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Dear ECLAS delegates, speakers and colleagues, it is a great honour for the University of Greenwich’s Department of Architecture & Landscape to be hosting the ECLAS 2017 conference. Since we formed the department five years ago we have developed our suite of professionally accredited architecture and landscape programmes with a focus on excellence in design. During this time we have established inventive synergies between the fields of architecture and landscape through teaching, research and practice. Many of these relations have been enhanced over the last three years through the facilities in our award winning building designed by Heneghan Peng Architects. What is abundantly clear is that the Department is home to a range of vibrant design led programmes with a broad range of intellectual and formal positions that have percolated through the national and international architecture and landscape scene. In addition to exploring new intersections of architecture and landscape in the Department, the establishment of the Advanced Landscape and Urbanism Research Group has been core to furthering world-leading landscape-focused research and enterprise. The group is pursuing research in: green-roofs, aquaponics and living walls; arboriculture and planting; critical theory on landscape, cities, democracy, food and everyday life; and design practice. Hosting the ECLAS 2017 conference is a hugely exciting prospect for us. We look forward to welcoming landscape architects, artists, planners, architects, geographers, ecologists and social scientists from across the world to discuss Creation/Reaction/. At a time when questions of landscape seem more relevant than ever, I look forward to the interesting discussions, presentations and ideas that we are sure to be hearing over the coming three days. Finally, I would like to extend my thanks for all the great effort that has been put into organising this event, as well as to thank all of the outstanding contributors and speakers who have joined us here at Greenwich.
Each social formation, through each of its material activities, exerts its influence upon the civic whole; and each of its ideas and ideals wins also its place and power.

- Patrick Geddes

The theme of the ECLAS 2017 Conference at the University of Greenwich is Creation/Reaction/. We are delighted to welcome delegates and speakers from across Europe and from around the world to explore issues of creativity, design, technological invention, political and social challenges, and ecological relations. Landscapes are in every way embedded in creative processes, from design to their making, from planning to their management, engaging different and often disparate community expectations. Of course the endlessly creative natural processes, from geology, to plants, to ecology and so on provide the prime matter with which the landscape professions are concerned. Creation almost always provokes a responsive reaction, sometimes as an opposing natural force or process, and often a human response ranging from approval and celebration to extremes of disgust and opposition. Creation can result in transformation as well as revolution – for better or for worse. The processes of transformation and revolution in design are an inherent part of the creative process, and it is often the moments of conflict or tension that can be the most creative. These catalysts may be found in creation and reactions across all practices in landscape, and thus we encourage participants to explore these active and often difficult situations they find in the course of their work.
Conjectural ‘Landscape Cities’

Landscape Architecture has a speculative role in imagining diverse, innovative, and environmentally responsive futures [1] [2]. As a research discipline, landscape architecture is prone to critique by a scientific community that either disqualifies speculations or does not know how to assess associative imaginations that guide many a design process. Such a critique is constructive because it urges to clarify what is both unique and systematic about designerly speculations and imaginative associations. In this article we will discuss the results and layout of a design studio with explicit speculative and imaginary methods. The outcomes are discussed and these reveal that creative discoveries are not bound by elaborative final design results. Some of the intermediate results, particularly those with an explicit habit-breaking effect on the imagination of the designers involved, have proven to be at least equally valuable. This discussion calls for a reconsideration of the presentation and sharing of the results of research through designing; moving from the familiar focus on high-end (i.e. ‘glossy’) finalizations, toward perhaps abstract but revealing intermediate products of enquiry.

Speculative Design Challenge (SDC)

Similar to a stimulating and provocative challenge as formulated in many a design competition, the whole team of supervisors has first invested in the proposition of a strong imaginative question. The formulation of this question involved a first imaginative speculation: a ‘what-if’ scenario. Or as Dunne and Raby formulated: ‘to open up spaces of debate and discussion; thereby they are by necessity provocative, intentionally simplified, and fictional. Their fictional nature requires viewers to suspend their disbelief and allow their imaginations to wander, to momentarily forget how things are now, and wonder how things could be’ (Dunne and Raby, 2001, Dunne and Raby, 2013).

How could Canterbury, New Zealand – with its current population of 600,000 people and area equal to that of the Netherlands

Conjectural Landscape Cities

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Keywords:
Landscape futures, Design-directed research, Scenario development
The parallels drawn between Canterbury and the Netherlands presented a number of possibilities for the research studio. First, the two countries have a similar total area size. Likewise, there are similarities in that both countries rely on agriculture driven economies, particularly dairy, which is vulnerable to rapidly changing requirements to mitigate environmental impacts [3]. However, unlike Canterbury, the Netherlands has an explicit urban focus and a much larger population, that in turn is connected to the infrastructure networks and dense populations of neighbouring countries. These twinned possibilities of similarity and difference drove the development of the research question: what forms of dwelling and landscapes might develop if the Canterbury region was inhabited by sixteen million people.

Responding to this question required challenging the prevailing, yet often limiting paradigm of New World landscapes: that intensively farmed landscapes and landscapes of outstanding natural significance cannot be located at the same site; that places of beauty cannot be places of industry and economic success; and that places of high production cannot be ecologically rich. Using design we sought to identify landscape forms in which ecological integrity and prosperity could be mutually achieved.

Provisional findings focus on two aspects of the research: landscape typologies that might afford potential for urban form; and an expanding typology along with assessment of design-directed research methods that provide value in the research studio setting.

**Design-directed research methods in the research studio**

This research was developed within a five week immersive design research studio. The studio involved twelve senior landscape architecture students and four mentors. Processes of designing provided the core tools and focus for the studio with strategies and methods tuned to ensure prolific outputs that were rich in form,
content, and variance.
Both through the studio, and following its completion, a reflective practitioner approach was employed to: review findings; examine the role and respective value of specific design methods in generating such findings; and the conscious selection and manipulation of design methods. A rotating structuring of design teams and their respective tasks was used to drive this, developing innovative and unpredicted outcomes. The following design processes were observed to generate valuable outcomes in the scenario development process.
Iterative cycles of Design and Critique allowed the rapid and prolific generation of a spread of core concepts (figure 2). The approach involved providing teams of 3-4 designers’ different design challenges that had to be rapidly designed into the same setting. After a period of 60-90 minutes these findings were then critiqued by other groups. From this gaps in the outcomes were identified and a different mix of designers teaming up for further periods of design generation.
Scenario Generation was used to generate further themes throughout the studio. This process worked to resist a sense of closure and completeness to the research studio such that landscape city concepts could maintain their generativity and sense of possibility. Such scenarios could be expressed graphically, schematically, and in text based form.
Within design disciplines there is a tendency to make declarative statements concerning the products and processes of design [7] [8]. A process of Manifesto Making was used to frame desirable, positivist outcomes that each scenario might achieve, even if no mechanism for delivering this attribute had yet been identified. This purpose was twofold: first to reflect, having declared an outcome, if it was indeed preferred; and second to prompt the designing of multiple ways such outcomes could be generated, particularly through the design of landscapes, interactions, behaviours, and changed understandings.
While landscape analysis is perhaps the most
familiar type of design research available since Ian McHarg's ‘Design with Nature’ [9], there are by now several and more elaborative guides for the creation of an inventory of the qualities of the existing landscape. Since our aim is to merge ecological, agrarian, recreational and urban developments, we have been keen on a *Thick Inventory Method* to include a variety of cultural aspects [10]. A ‘thin’ description would only include a refined selection of the most crucial aspects of, say, visual elements in the landscape. The ‘thick’ description we have used is described in ‘Landscape Machines: Designerly Concept and Framework for an Evolving Discourse on Living System Design’ [11]. It includes four categories that synthesize into a thick inventory: to examine what it is that *confines* different landscape types; to examine what external influences cause these landscape types to be *open* at the same time (i.e. by economy or migration); to examine what previous characteristics of human behaviour have effected the landscape (the current and previous *ontic* state of the landscape); and to examine what *systemic* interactions determine the current ‘steady state’ of the included ecological systems. A process of designing *Projective Densities* prompted the development of diverse landscape forms that might afford productive landscape values within a range of population densities. Here, a typology of built forms was extended in terms of the productivity that each form might afford, through planting, shelter, processing, and connectivity. In this process landscape was examined as the outcome of a changing population density meeting landscape city type, rather than being located within yet separate from the landscape. For instance, in this process a matrix of low, medium and high habitat densities were examined for the ways it might intensify the attributes in turn of aquifers, forests, braided rivers, drylands, and so on. These forms were then experimentally mapped onto prospective sites, at those sections of the Canterbury landscape that supported the different landscape city types (figure 3). *Game Board* processes allowed this exploration of habitat forms to be extended into the generation
of ‘conglomerate’ cities [12]. Here four cities were introduced into a landscape through a process of using dice to randomly generate the city density level (and accompanying form), and the number of hectares of this form to be located contiguously. This went in turn with each city champion locating their diced city mix on sites that might best support the desired functions of their specific city mix. Through this process it quickly became apparent which landscape city forms and respective densities worked synergistically with other landscape city forms and densities, and also those that were kept distant (figure 4). Through this process distinctive landscape patterns emerged that are the subject of further current study.

Eleven provisional Canterbury ‘Landscape Cities’
The form of Italo Calvino’s presentation of his Invisible Cities prompted the forced association of urban density requirements with dominant landscape forms and uses in the Canterbury Region [4]. In the following eleven ‘landscape cities’, landscape is interrogated to be the generator of the cities’ forms, activities, economies, food productions, ecosystem services, connectivities and scales (figure 1).

The Coastal City imagines a beach-dweller people whose lives are shaped by the sand, the wind, and the water. This inherent unpredictability provides residents with the daily, seasonal routine of perpetual adaption and readaptation in this constantly changing landscape.

The Tree City lives within a vertical natural world in which cycles of planting and harvesting materials match people and resources in a virtuous system that generates a deep awareness of the forest.

The Drylands City exists in a resource sensitive environment in which water is made precious by its scarcity.

The Lively Harbour City is more pleasant than pressured. Its inhabitants draw and express their identity from the birds and wildlife.

The Braided River City draws its life from the river’s changing banks and seasonal changes in
water levels.
A highly developed permaculture system underpins *Aquifer City* with a keen focus on innovative food production.
The brackish water margin provides the opportunity for *River Mouth City*’s tidal aquaculture.
The *Wetland City* is rich in food and other resources with water providing the city’s foundations.
*Alpine City* seeks its locations in remote valleys, and on steps above the more productive valley floor.
Gondola rather than roads provide connectivity with some core services moved from place to place through the course of the day.
In the Alpine City people work with the environment by sealing the two off from one another. Domes provide the futuristic dwelling structure of this city, and transport between these vertically stacked units is ensured by a Gondola.
*Irrigation City* is not just about living with water, but also about using innovative technologies and growing structures including hydroponic food webs that are suspended between buildings with harvesting undertaken by drones.
*National Park City* is a place made by volunteers for volunteers. It is a landscape that enables human survival and nature conservation such that the more people that inhabit it, the better the environmental outcomes that are produced.
These ‘landscape cities’ seek to imagine ways landscape can move beyond being a cultural palimpsest to that of a direct generator of habitat, urban form, and both fecund productivity and biodiversity. Such forms are currently provisional and are undergoing further levels of design iteration and critique as their potential and limits are considered.

**The Research Studio**
The role of the design studio has thus been the subject of examination in terms of its suitable scope and the manner of findings that result [13] [14]. This article reports on a current study into the ways a research studio may be structured, and distinctive design methods that have supported the process of inquiry. It also introduces the landscape city forms that were generated through this investigation.
From this three findings can be observed. Landscape can be an overt driver of urban structure and density including the suggesting diverse typologies of built form. Second, innovative and complex outcomes can be reached when design is positioned as a form of speculative questioning. Third, design-directed research in a studio setting enables the dynamic building of design methods, process, and scenarios which can be hybridised across scales, settings, programmes, and design teams.

This article presents a provisional outcome with current investigations underway to interrogate the detailed material developed within the research studio including close examination of the landscape cities to better consider their form, function, and capacity to work alongside other landscapes. The aim is to tease out the function of specific design methods in the research process, while finding purchase in real world settings for the eleven proposed landscape cities.

Notes


[13] See the `Refereed Studio` themed issues of Landscape Review: Vol 5(2) and Vol 8(1)


**References**


Figure 1: Selected Cities. Work by: Christine Skipworth, Ellie Helliwell, Jorden Derecourt, Ryan Satria, Tom Steck, Fraser Graham, Mees Van Wagendonk, Mingrong Zhang, Heath Melville

Figure 2 Laying out work according to the Quattro Stagioni design tool [6]
Figure 3: A map of Canterbury with a variety of 10 x 10 km areas isolated. At these points, a number of different landscapes and environments overlap.

Figure 4: An example of a conglomerate city developed through the use of a game board approach. While the image doesn’t show the map that helped generate its layout, a sense of the landscapes on which the cities are sited is readily apparent.
Abstract
Elizabeth Meyer influentially argues that aesthetic dimensions, in particular beauty, are a vital component of landscape architecture's capacity to create sustainable environments. This article identifies four positions in her presentation of prominent North American landscape architect Thomas Woltz's Orongo Station as an exemplar of ‘Sustaining Beauty’ that constrain landscape architecture's relevance in terms of sustainable design. It then presents, as an alternative manifesto, a generative programme for both Orongo Station and the discipline of landscape architecture that incorporates challenges of provenance, identity, experimentation and farm-to-plate-to-farm logistics; suggesting opportunities not only for sustaining landscape in this century, but landscape - in its connective, instrumental, practised and scalable sense - better sustaining us.

Introduction
In Sustaining Beauty: the Performance of Appearance – a Manifesto in Three Parts, Elizabeth Meyer (2008) seeks an alternative to what she considers is landscape architecture's ambivalent and mechanistic approaches to sustainable design, and asks if the discipline's former focus on aesthetics and beauty should have renewed validity today. Beauty, she argues, has the potential to influence, even 'persuade', our ideas and values, such that an ‘immersive, aesthetic experience can lead to recognition, empathy, love, respect and care for the environment’ (Meyer 2008: 7).

While Meyer’s goals are clear, her manifesto is less certain on what forms a landscape architecture focused on sustaining beauty might take, as she herself acknowledges. In her subsequent Slow Landscapes: a new Erotics of Sustainability she writes how Sustaining Beauty remains theoretically focused without a strong body of work to indicate specific approaches and outcomes (2010). In Slow Landscapes Meyer states both articles have been driven by a common set of questions: ‘are new forms of
beauty and the sensuous effects of being in a landscape relevant to a sustainability agenda? Can the pleasure and desire evoked through the experience of a designed landscape increase one’s concern for the environment? Can augmented awareness of the interdependence of human life across a site alter one’s aesthetic preferences? Are there motivations for enacting sustainable practices besides the ethical or the regulatory, such as the promise of an abundance of alternative practices and forms of pleasure?’ (Meyer 2010: 23). She then immediately responds by stating: ‘Before visiting Nick’s Head [Orongo Station], I answered yes, provisionally. Since visiting the station in May 2009, that tentativeness has receded. Let me explain why’ (Meyer 2010: 23).

Meyer evocatively describes the project’s genesis and new configurations of wetland, native plant reserves, horticulture, pasture layout, farm facilities, and farmhouse restoration. Her praise is fulsome: ‘the regular experience of the stunning but slow transformation of the [Orongo Station] landscape transforms aesthetic preconceptions. The unhurried, sensuous experience of everyday working and living allow new conceptions of strangely familiar beauty’ (Meyer 2010: 30).

There is a sense Orongo Station is her landscopic muse: ‘As I moved from one pasture to another, from narrow, exposed ridge to hidden coves, I experienced a sensuous pleasure. These varied spaces motivated by a land conservation ethic afforded a rich feast for the soul’.

I too, during my visit to Orongo Station, was taken by the scope of the project, and the scale of investment made to realise goals of repurposed production, ecological restoration, and the fostering of long-standing cultural connections with the land. The place is beautiful, heightened by the careful and gentle design details that incorporate road, bridge, path, and garden design, as well as the strongly gestural, and mesmerising remaking of the wetland. Yet despite this I found my reading of the farm increasingly at odds to that put forward in Slow
Landscapes. Meyer’s singular focus on aesthetics and its ‘beautiful’, ‘sensuous’, and ‘pleasurable’ dimensions worked to deaden what I read as a landscape very much animated and conflicted by the challenges, contradictions, and complexities that sustainability presents in this century. Consequently, I found myself asking, is this the manner of farm required for a sustainable relationship with the planet, or is more demanded of the owners, designers, critic, and the discipline of landscape architecture to take on this challenge? For unlike Meyer, I could not yet see a ‘new aesthetic landscape that express[es] a community’s health and function’ (Byrd 2013: 173). Rather, I discerned a landscape and a landscape architect putting forward questions concerning productive landscapes that had yet to be resolved, let alone answered.

Productive landscapes are vital to our life on this planet. Globally, agriculture must feed over seven billion people, as well as provide fibre, chemicals, and other resources for fundamental needs of clothing, shelter, energy, and health. Like many countries, Aotearoa New Zealand is driven by what its land produces rather than the wealth generated from its modest industrial centres. Sheep outnumber people by 7:1, cattle by almost 3:1. Estimates indicate its exports feed ten times its own population of just over 4.5 million people.

If Orongo Station is to be at the forefront of landscape architecture’s contribution to the design of sustainable productive landscapes, then the question this design asks the discipline is straightforward: is Orongo Station a relevant and potent strategy for farming at the regional, national, and even global scale? Specifically, does it secure greater ecological biodiversity and resilience, while at the same time increasing the productivity of the land, international demand for what this land produces, and greater returns for that produce? Or is it the reformulation of a farm into the form of a garden that, though based on an aesthetics of productivity, is merely a larger-than-normal hobby farm – in which the capital and operating costs of production are always
more than the value of that which is sold?

**A Diminished Sense of Landscape**
The implicit frame given Orongo Station in *Slow Landscapes* is landscape as sanctuary and retreat. With plantings and construction of built elements now complete – such as bridges, entrances, gardens, wetlands, and seabird enclaves – the task is to sit back and wait while nature takes its course. In terms of agricultural production, maintaining a status quo of optimal cattle numbers and prudent management of the lemons’ and nuts’ fruiting cycles are the operation’s steady focus. A sense of closure and contentment pervades: ‘this new aesthetic will take them a long time to achieve and will delay some of the pleasures of experiencing it for decades. They believe it is worth the wait, even for their children and grandchildren’ (Meyer, 2010: 26).

This quality of boundedness is also expressed in the 2002-2012 project date stamp stated on Nelson Byrd Woltz’s website marks, as if this decade covers the singular span of design’s impact on this landscape. It is also expressed in the clear property boundaries within which photos and visits are closely controlled. But other, following, factors arguably also reinforce this quality of separateness and disciplinary impotence.

1. **Landscape Architecture’s Function is the Production of Exemplars**

In *Sustaining Beauty* Meyer (2008: 7) writes of landscape architecture’s scope: ‘so while I do not believe that design can change society, I do believe it can alter an individual’s consciousness and perhaps assist in restructuring her priorities and values’. In this, design’s instrumentality – its capacity to materially change landscape – is oblique, working to generate cultural productions that ‘evoke attitudes and feelings through space, sequence and form. Like literature and art, images and narratives, landscape architecture can play a role in building sustained public support for the environment’ (Meyer 2008:
7). Here, the landscape architect’s role is to design beacons of practice that are ‘visions’ of how things could be. Their role is to produce exemplars – such as the ‘model farm’ (Meyer 2010) – rather than develop a thing that is itself an active, deliberate and virus-like catalyst, that expands to produce systemic change.

Such passivity limits Orongo Station. In Slow Landscapes it is a bounded jewel: a place for its owners to ‘experience the wetland and forest restorations during their daily three-mile runs’ that follow the ‘new pleasure road’, in ‘a sequence designed to increase their environmental literacy while affording sensuous pleasures’ (Meyer 2010: 26). In a resource-stretched planet such land-shaping seems excessive if its primary purpose is a gentle shift in one family’s understanding of environmental challenges. Surely these should be but fortunate by-products of the deeper possibilities and benefits this particular landscape could be structured to afford? To challenge Meyer’s position that design cannot change society – why shouldn’t an explicit design goal for Orongo Station be that it materially and substantively change the world? And if so, what would a practice of landscape-focused innovation direct both on the farm, and those sites in the wider world it is connected to, for this to be possible?

2. Sustainable Landscapes don’t have to be Profitable
Partnering this positioning of Orongo Station as a ‘model farm’ is an acceptance that exemplary landscapes don’t have to produce positive economic returns, provided social and environmental value is increased. As models their role is to inspire and represent, rather than outperform conventional approaches. Yet might this locate Orongo Station as a redundant appendix, and potentially indulgent impediment, to the twin challenges of effectively feeding the world at scale whilst ensuring environmental and cultural benefits positively accrue?

Meyer, incorporating Kate Soper’s ecologically
and socially aware ‘alternative hedonism’, states that Orongo Station ‘marks the emergence of a new type of landscape ‘anti-consumer’” (Meyer 2010: 30). Meyer comments ‘some needs are spiritual, symbolic and psychological and that they can be satisfied with activities that maybe perceived as sacrifices of time or profit’ (Meyer 2010: 30). Yet if such sacrifices of profit are permanent then the resources to sustain the farm must come from profits achieved elsewhere, potentially such as the owners’ trading of commodities and stocks. Given that almost all investments have associated landscape impacts – for instance, in the use of drowned valleys or coal to produce electricity to power the mega-scale data networks associated with IT investments– then, such impacts, as part of a portfolio of investments, are inevitably also part of the ‘ecological rucksack’ of Orongo Station (Wackernagel & Rees 1998). Must, as Meyer argues, requirements for ‘profit’ be tempered by requirements ‘to increase biodiversity, reduce soil erosion, improve water quality, and create wildlife habitat?’ (Meyer 2010: 26). While the overt tone is of virtuous sacrifice and abstinence, it also removes landscape architecture from a challenge that should be central to the discipline: how do we design productive landscapes in which increased and enduring profits are realised because of, and not despite of, a partnered and substantive increase in ecological value and biodiversity.

3. Aesthetics over Provenance

A quality of unhurried sensuousness pervades Meyer’s experience of Orongo Station. She writes ‘the unhurried, sensuous experience of everyday working and living allow new conceptions of strangely familiar beauty’ (2010: 30). The aesthetic qualities Thomas Woltz’s design affords are emphasized. Visual, tactile and sensual: there is the ‘sculpted ground plane’, ‘fragrant’ citrus groves and ‘gentle’ ocean waves, while ‘grassy tufts and shrub mounds of all shades of green, from bright chartreuse to dark olive, mixed with bands of mustard, ocher, and maroon, create a dense and rough surface that
both frames the shimmering fresh water channels and is framed by it’ (2010: 27). This ‘land is being revisioned as a more sustainable, more biologically and culturally diverse landscape and also as a 3,000-acre productive pleasure garden, over three times the size of New York’s Central Park’ (2010: 29).

Interventions that shift ecological functions in the landscape of Orongo Station are technically considered: the types of predator-proof fencing; the method of localised water storage; the re-establishment of two distinct types of wetland; the strategic use of planting to divert colder winds away from horticultural plantings; and the extensive reforestation of marginal pasture with native trees. In support of this strengthening of ecological performance it can be argued Woltz’s design affords many ‘cues to care’ so appropriate behaviours encouraged that might activate the ecological mechanisms at play. However these cues are not themselves the direct lever by which biodiversity is increased, or agricultural production is shifted from industrial mono-cultural food production (Nassauer 1995).

Orongo Station’s ecological rehabilitation demands a more active, functional analysis. For instance, can the increase of seabird nesting also improve regional soil fertility, and with it productivity, through greater concentrations of ocean-sourced guano? Have native plantings on marginal pasture halted water-borne soil loss? Can farmland that is configured to increase biodiversity directly increase the productivity of the land, as well as increase the value people give such produce? It is the improvement of the provenance of the farm’s produce that Woltz’s design establishes. This initial 2002-12 project sets up a subsequent (say 2018-28) opportunity for investigations that need to be at the core of sustainable landscape architecture. For instance can productive landscapes increase biodiversity and ecological value? How can the integrity carried in the heritage and taste of a land’s produce be made desirable such that it commands greater value? And given this what potentials are created that might resist the
commodification and assimilation into global supply chains that normally occurs at a farm’s gate?

4. Strange Beauties: a Voyeuristic Landscape

Throughout her article Meyer (2010) talks of the ‘strange beauty’ and the ‘strangely familiar’. As someone from Aotearoa New Zealand, the beauty in Woltz’s design I found most strange-making was his ‘Cook’s Garden’. Not so much in the underlying insight to plant clusters of native plants that matched the specimens identified by Joseph Banks, the first European naturalist to travel here; nor in the unknowing and slightly voyeuristic way Woltz mimicked Banks’ method of selection (Carter, 1987). Rather, it was how he surprisingly abstracts the normalised palette of native plants out of the de facto faux naturelle arrangements commonly adopted by landscape architects in Aotearoa New Zealand. His garden exposes to those of us living in this land our routine blindness to other ways native plants can be reintegrated into productive landscapes, and in such ways that contrast the country’s old-growth forests that have remained essentially unmodified since before settlement.

Meyer’s (2010) ‘strange beauty’, and the heightened awareness it reflects, is similarly the voice of the newcomer: a manifesto finding expression not in her homeland, but in the exotic location of another place. In English Reaction to the New Zealand Landscape before 1850, Paul Shepard (1969) wrote of the first impressions settlers had of the country’s landscapes and forests. Their writings also convey a sense of the ‘strangely familiar’, where a weave of introduced plants mingled with the remnants of Gondwanaland – a lush, untouched, different ecology that had never known mammals until one thousand years ago. A quality of voyeurism and the exotic is suggested in Meyer’s (2010) writing: here in a remote corner of the South Pacific is a North American academic critiquing the work of a North American landscape architect, for North American clients who live in North America much of the year. Such strangeness
can be considered through a lens of xenophobia, as certainly occurred in the national media of Aotearoa New Zealand when Nick’s Head Station was purchased in 2002 (Cullen 2002). Yet once the farm’s redevelopment commenced, local fears arguably subsided. At one level this might be due to locals seeing the scale of restoration work being undertaken. But could the aura of strangeness that envelops Meyer (2010) have dissipated for the owners through the activities of such work – not only through their transformation of the landscape, but also through this landscape changing them? In this sense a landscape operates as an open-ended conversation: you know the land, and the land comes to know you, and qualities of belonging are formed and shared. Attraction makes way for intimacy, and the possibility that this strangeness, which comes from not yet knowing your place, evaporates.

A further Reimagining of Orongo Station
For Meyer (2010), aesthetics provides the conceptual framework for her examination of the repurposing and rehabilitation of Orongo Station. Implicit in her study is landscape’s positioning as something physically encountered. Her essay senses a landscape whose trajectory is fully set. Also inferred is an acceptance that aesthetics, biodiversity and social well-being come at the deferral and reduction of economic prosperity. Yet it is the removal of this presumed polar positioning which is the most exciting potential of Woltz’s design. Can Orongo Station’s weave of ecological, cultural, and agricultural production values create economic, environmental and social returns that would be the envy of those whose sole focus is simply agricultural production? In a subsequent article seven linked strategies are developed that could release the potential of this project and expand the reach of landscape architecture practice. These strategies, which underpin the approach of Lincoln University’s DesignLab (www.designlab.ac.nz), are summarised here:

1. Landscape Architecture is Experimental
The tendency in design fields is to seek exemplars – solutions that act as inspiration for
projects elsewhere. For landscape architecture this brings a positivist disposition, prone to a sentiment of *if only the world would listen*. Yet near universal evidence of species extinction, biodiversity loss, population growth, demand for food, and growth of urban areas suggest immense complexities far greater than is being addressed by the discipline. What is the scope of a farm like Orongo in the face of such issues? Can it be explicitly designed to be the very catalyst which gathers together neighbouring farms and processors to build biodiversity, social well-being, and prosperity for the region? In this Orongo Station must not be an exhibition piece. Instead it needs to be an open virus-like experiment, tuned to examine such questions, where interventions and effects are measurably assessed and reported, rather than rhetorically asserted - a living lab no less.

2. Landscape as a Distributed System

Woltz recognises the potential for distributing Orongo Station’s restored biodiversity values beyond its perimeter for instance through establishing breeding sites for protected native seabirds. There is similar potential for the social and productive dimensions of this landscape to also be distributed in ways that is scaled beyond property boundaries, individual owners and regions: where ecological restoration brings direct value to neighbours and is bundled with the presentation of the region’s produce and tourism opportunities. Here landscape value and benefits can be distributed, layered and designed such that a region’s sum is greater than any specific part.

3. Make Provenance Matter

Our lives are lived through landscape, and Orongo Station is no exception. In our homes, gathered into the artefacts, food, clothes, furniture, technology and utilities, are the landscapes of the world, and with it their complex social, environmental, and ecological dimensions. Each part comes from a particular place. The lemons from Orongo Station provide a distinctive provenance. To eat this produce is to taste
food grown well, through being irrigated with unpolluted waters and grown on land that adopts practices of free-range and organic management. It also contains the taste of a farm’s deep integrity that is re-seeding native forests, wetlands and enabling the return of valued and rare native birds. Yet while the landscape architect is highly skilled in establishing the conditions for such provenance, absents themselves in creating the products, services and systems needed (including communication, packaging and distribution logistics) to make tangible and valuable that provenance which comes from landscape?

4. Farming what deeply belongs to the land
Orongo Station and its surrounds do not naturally tend towards being pasture. If left alone it would seek out the endemic species of plants, birds, and insects that dominated this place 200 years ago. Aotearoa New Zealand has a strong preservation ethic associated with its endemic species. Almost all are preserved for their intrinsic value, with fully one third of the country – primarily old growth forest – set aside as public conservation lands. Yet the remaining land has become intensively farmed, creating stark contrasts between the country’s two distinct landscapes. While Orongo Station brings these two landscapes into one site its design creates a miniature version of this distinction between productive exotic farmland (pasture, lemons, cattle), and those lands retired and returned to native forest (native plants and birds). What if the indigenous was also considered as productive? Could native totara be grown as plantation species to be subsequently harvested as timber or bio-fuels, and manuka and kawakawa for their therapeutic benefit they have always been known. Can a twenty-first century economy based on the productive use of native species be imagined such that Orongo Station’s current ratio of pasture to native planting be considered transitional?

5. From Plate to Farm
Orongo Farm exemplifies how landscape architects can create meaningful attachments to place. This includes Woltz’s homestead
garden design, the graceful curves of the road, and arrangements of forbs. Significant further potential for place attachment at Orongo Station exists. People passionate about wine and cheese can discern the land from which they are grown. While such qualities of provenance connect the land to one’s palate, it is a return journey from plate to place that Orongo Station also offers. Eating its food is invitational: to one day visit this farm to be part of improving its ecological values through tending its restored native forests. While such a process can generate revenues, its purpose is more than touristic. It can also help navigate the path from Soper’s ecologically and socially aware ‘alternative hedonism’ to one participating in the sustainable functioning of this landscape, such that consumers are active agents in the liveliness and values of Orongo Station, while also pursuing and extending opportunities for ethical consumption that generate lifelong connections and qualities of belonging.

6. Return the Gaze
A defensive position might disguise the dissonance produced by a farm owned, designed, and lauded by people living 10,000 miles away. But colonialism, like voyeurism, operates because the looking is strongly weighted in one direction (Clayton 2000). This sense of being outsiders also provides possibility – for Meyer, Woltz and the owners are insiders elsewhere living in a place that, complementing Meyer’s experience, is strangely beautiful to me, while not being strange to her. What is the honest exchange of the landscapes of Aotearoa New Zealand into that world? Meyer might foster collaborative critiques of North American landscape architecture from the strong cohort of university-based landscape academics researching in Aotearoa New Zealand (Stephenson, Abbott & Ruru 2010; Selby 2010). Exchanges and opportunities for design in North America could develop through university programmes and Nelson Byrd Woltz’s professional networks. The owner’s extended networks could actively develop markets for Orongo Station and the wider country’s produce, so revenues from these high value exports
accrued back to the people and environment of Aotearoa New Zealand. Intellectual inquiry could also travel in both directions. What is the manner of a North American ‘Cook’s Garden’? In terms of critique, how might North American industrialisation and infrastructure be interrogated through the lens of New Zealand’s conservation values? Orongo Station need not be only a physical meeting place, but also the meeting of diverse cultural understandings that could enable the people and cultures of Aotearoa New Zealand to intervene in the ‘strange beauty’ of Meyer’s, Woltz’s and the owners’ homeland.

The emphasis of native plantings and wetland restoration at Orongo Station comes from repurposing lands that are marginal in terms of agricultural productivity. Target 11 of the United Nations Convention on Biodiversity commits 17% of the planet’s lands to be set aside for biodiversity (https://www.cbd.int/sp/targets/). Proposals by landscape architect Richard Weller’s for pan-continental parks considers this at a macro scale (Weller 2014). Could a localised version be more effective? Could farms like Orongo meet this target, and be a catalyst for a network of farms to achieve this at a regional scale? Could endemic biodiversity and wild nature, rather than just being located as large tracts separate to production, intermingle with both farming and our daily living?

Conclusion: The sites of landscape architecture
The richness of experience that Orongo Station can generate must be vigorously expanded beyond those living and working there. While both the world and Orongo Station offer moments of great pleasure neither are a ‘pleasure garden’. How can we ensure that produce grown out of nurturing biodiversity, and cultural depth, gives us the greatest pleasure, and in so doing become the most valued?

The landscape-centric qualities that need to be designed and realised lie beyond the terra
firma of both the boundaries of the physical site and landscape architecture's de facto realm of influence. Woltz's design, while not addressing this opportunity, does establish the conditions for its investigation: the possibility of an experimental landscape-centric project that is systems-based, distributed and connective; a landscape that is designed as a transformative, open-source catalyst that distributes its values from farm to region, from farm to plate and back again, and from the exotic to the endemic. Landscape architecture has the capacity to do more. It is strongly situated to realise an expanded site of operation in which a landscape's character is carried all the way from place to person and back again; in all the ways and moments that landscapes make our lives, regardless of the many places they may be located. In this, might landscape – and with it provenance, and nature, and ecology, and embodiment – embrace our all?

References
Wratten,
Abstract
The role of public participation and engagement is a very important step before introducing a new public landscape project to any community regardless of the scale and location of the project. Encouraging open participation during the design process of public projects is shown to be important in different examples around the world. It provides understanding to the decision makers about the needs, behaviours, and culture of the community. The involvement of public in making decisions for their environment provides and enhances its value and civic pride. In Saudi Arabia, the involvement of public participation is represented by the municipal councils. The study has examined processes of the municipal council of Jeddah city, and investigated whether the council can represent the engagement of the public in making decisions about their environment. Moreover, the study has overviewed the work processes of the council to gain greater understanding of its involvement. Analytical framework has been established to examine the extent to which the council represents the needs and behaviours of the public. The study has represented a critique of the current limited engagement of the public regarding planning decisions for space creation and impact of outdoor space using patterns in Jeddah.

Introduction
The city residents are provided with a wide range of benefits through the outdoor public open spaces in Jeddah. The people mostly use outdoor public open spaces for different purposes and to gain various personal benefits, such as physical wellbeing, mental wellbeing, social wellbeing, reviving memories, and place attachment [1]. According to Addas [1], both Saudi and migrant residents of the city gain these benefits, when they use and visit these spaces. This is not only applicable in Jeddah, but majority of the studies investigated the benefits of outdoor open spaces and its impact on physical, mental, and social health of the people [2-6].

The creation of outdoor public space is often intended to respond the needs of its users
and the community. However, this perception depends on the scale of the proposed projects. The public involvement during decision-making processes, which is known as public participation or public engagement, helps in achieving the desired target. In recent years, European and Western countries have regularly enabled public opinion to contribute to local decision making in urban management and planning. However in Islam, the principle of consultation was founded 14 centuries ago and stated in the Holy Quran [7]. The Municipal Council was formed in Saudi Arabia during 2004. The formation of this council was intended to give the public the right to be part of local decision making processes regarding their urban environment. The study has investigated the level of public engagement achieved within the planning agenda of Jeddah Municipal Council.

Public participation
Public participation is intended to involve the community in making decisions regarding their urban environment [7]. The approach and level of engagement varies between different countries, but it intends to translate the need of users and give people the right to shape their urban context. The level and need for public engagement have been determined through scale of the project [8]. The public participation has proven the success of giving public opportunities to understand the processes of projects and give decision makers an understanding of their needs [9]. According to Creighton [9], public participation is useful and helps in shaping the urban context by responding to users’ needs, expectations, and values. Money and time are needed, while conducting a well-designed public participation because design and construction is based on the needs of users and not on the expectations of planners and designers [9]. The performance of local authority is affected by the involvement of public in planning processes and changing perceptions regarding the importance of public participation [10].

Saudi Arabia Municipal Council
The municipal council is a legal entity that
possesses financial and administrative independence, and is organisationally linked to the Ministry of Municipal and Rural Affairs. The council directs the authority to report and monitor according to the rules of municipal councils and its regulations within the jurisdiction of the local municipality. Municipal councils were established in 2004 by the request of Saudi Council of Ministry. At first, the election to the municipal council was only permitted for men over 21 years with no background in the military sector. However, in 2015, women gained the right to vote for municipal elections for the first time [11].

The terms of reference for municipal councils and systems for basic operations have been issued by Royal Decree on 31\textsuperscript{st} July 2014. Within the limited powers of council members, the plans and programmes of municipal implementation, maintenance, and development have been approved. The Council approves the budget of municipality, prepares its final accounts, and give opinions on building regulations and expropriation of property, fees, and fines in the municipality. The council monitors and evaluates municipal services and examines the complaints, needs, and suggestions given by the citizen. Moreover, the council needs to organise periodic meetings with citizens to increase communication between them [13].

Proposed framework
The analysis of the responses by participants revealed the work flow of municipal council in Jeddah, and the difficulties faced by the local authority. Councillors have limited rights to engage the public, because the councillors are not engaged with the planning processes at different scales. This may be due to many reasons, like the systems of Municipal Councils are still new within the country. The public participation has evolved from previous systems in many countries as a result of democratic processes, but difference in political viewpoints in Saudi Arabia has made it more complex.
Majority of the councils appear to believe that it is difficult to gather public opinion, regardless of political issues that could face local councils. The gathering of public opinion could remain an issue, even if the political issues, work structures, and municipality were better organised. There are good practices of how to meet and engage with local communities in many countries. It is important to note that Jeddah Municipal Council conducts several meetings and gathering with the public. However, empirical evidence based on councillors’ opinions suggested that they are more ceremonial and most of the people attending this meeting are businessmen. Therefore, they failed to adequately reflect the public opinion.

Planners, decision makers, and councillors need to understand the importance of engaging the public when planning changes to their environment, because the public represents users of these places and their needs. The needs of public should be a priority, when planning the open spaces of the city. The city development structure is explained in figure 1, and shows that the municipal council belongs within the state framework. It suggests that the Council has little close contact with decision makers and has difficulty communicating the public needs.

The issues of power and rights of councils are beyond the scope of this study, which attempts to discover public engagement; while planning stages, and how this engagement could involve most of the community. The proposed framework is to focus on a range of social places that could represent most of the demographics of the community. It would help the Council to gather more information and have greater contact with the public, if they conduct regular visits to the proposed urban public spaces. These social places have wide range of city residents and they are reflecting different demographics of the city residents especially in mosques. This information about the public needs can result in strong evidence that could change the political views and the work structure of the country. This
interaction helps councillors, officers, decision makers, and the government to understand the needs of the public (Figure 2).

Methodology
The study has identified the extent of citizen engagement in creating outdoor public spaces in Jeddah city, and presented a framework to ensure the needs of the public represented in the planning and development of open spaces in Jeddah. This study has included a review of the literature to identify the importance of public participation, and relied on qualitative analysis to investigate the operation of Municipal Council. According to Gorman and Clayton [13], qualitative research enables data to be collected from the context of occurrence, so that occurrences can be described. The qualitative survey was based on various interviews with members of Jeddah municipal council, Jeddah Municipality, and Ministry of Municipal and Rural Affairs.

The interviews included closed and open-ended questions, which helped in obtaining personal input from a variety of individuals [14]. The researcher interviewed many members of the Jeddah Council, Jeddah Municipality, and Ministry of Municipal and Rural Affairs to reflect different points of view for understanding the operating structure of the Municipal Council. It has helped in the identification of the difficulties faced while considering the opinions of citizens. The selection of the interviewees was according to researcher’s choice, availability, and cooperation of the members. These interviews recognised ethical boundaries and required approval by the interviewees. The researcher assured them confidentiality and anonymity, because of the sensitivity of the subject and their positions. The data collected from the interviews has been recorded in Arabic, which was transcribed and translated by the researcher. All transcripts for each interview were read before, which helped to gain a clear understanding of the common issues and themes raised by the interviewees.
Results and Discussion
The study has highlighted the extent to which community needs and concerns are communicated to the Ministry by the Municipal Council. Three themes have been evolved after analysis of the interview transcripts by the researcher (Figure 3).

Lack of understanding
Community
The interviews with various participants revealed that there is a lack of understanding regarding the creation of outdoor spaces among people working at Jeddah Municipal Council, Jeddah Municipality, and Ministry of Municipal and Rural Affairs. An interviewer stated that the local community is clueless about the true meaning of public participation. However, it clearly describes the role of the Municipal Council, which is to clarify public participation. The role of the public is to communicate the needs of the community to the Council and government. The lack of understanding regarding role of public participation is due to involvement of the public in the Saudi Arabian community. The councillors need to educate public about engagement with decision making process to improve their environment.

Municipal councillors and officers
The interviews with Municipal councillors and officers revealed the lack of knowledge and understanding regarding their role as a councillor or officer. One interviewee stated that ‘some members of the Council consider this position just to show off and they are clueless about their actual duties’. Other participants indicated that some members believe that the government appointed them to make the decision on behalf of the community. According to the 2014 Royal Decree that stated the duties of the Municipal Council, the Council shall examine the complaints, needs, and suggestions of the citizen. Moreover, the Council shall organise periodic meetings with the citizens to increase communication between them. Some responses to the interviews with Municipality officers and
Councillors stated that ‘engaging the public in planning decisions is a waste of time and resources’. This has been supported in previous studies that report some undesirable designs and spaces introduced in the city without considering the actual needs of the public [1]. According to Mandeli [11], the involvement of the public in the planning urban context still lags behind expectations.

Rights
The interviews with a number of officers, councillors, and members of the Ministry of Municipal and Rural Affairs indicated that municipal councils have been subjected to insufficient authority. Moreover, the counsellors have limited power to take action to get involved in the community planning decisions. One participant stated that a councillor always wonders about engagement of residents in planning processes, while we as a councillor in the city Municipal Council are not engaged. This statement has revealed a misunderstanding of the role of the Municipal Council and its relationship to the Municipality and to the Minister. The council is involved in the planning processes of the projects that facilitates direct interaction with the public. Other interview responses from previous and current members of Jeddah Council indicated that majority of the people tried to communicate with the Jeddah Municipality on sensitive issues that affect residents and the public realm. However, there was no response from the Municipality.

Resources
Financial
The rights and the power of the Municipal Council are limited and cannot take a direct action. However, lack of adequate funding makes its role more challenging. This was the most sensitive issue raised in interview responses, because all participants believed that if they had funds to practice their duties, it would simplify many issues regarding public engagement. One participant said public need funds to conduct meetings.
Database
According to several participants, Municipal Council lacks access to a database for the Municipality and Ministry database regarding new planning projects at a city scale or neighbourhood scale. One Ministry participant stated that the Council has no right to know the new projects, because they are not involved in the process. A participant believed that if they get involved in the process it would be a waste of time because of the current situation of the country and limited rights provided to them.

Conclusion
This study has focused on the current engagement and participation of the public in Jeddah, Saudi Arabia, when the Municipality is involved in decision making regarding creation and change in outdoor open spaces within the city. This critique of public engagement in decision-making processes in Jeddah has presented an overview of the work processes of the Council. This has exposed the weakness highlighted in the interview responses, indicating design and planning decisions related to the creation and change in the urban open spaces. Moreover, it has also considered the needs and cultural behaviour of the citizens.

The study has highlighted the benefits of urban open spaces when they meet the needs of users in Saudi Arabia and other countries across the world. Users are reported to get benefits from public open spaces in cities in various ways (reviving memories and place attachment, social wellbeing, mental wellbeing, and physical wellbeing), when these spaces take account of users’ needs. The literature supports public participation in decision making for creating or changing the urban spaces. In contrast to many western countries, municipal councils in Saudi Arabia have only been established for around ten years, and still appears to lack clarity in terms of their resources, rights, and understanding of the relationship with the local citizens. Three themes have been revealed from responses to the interviews, which are lack of understanding,
The study has proposed an analytical framework to overcome the perceived difficulties of gathering public opinion in decision-making processes. These findings have indicated that the Jeddah Council has little contact with decision makers for developing urban spaces, and has difficulty communicating the needs of the public. The study has aimed to improve the engagement and participation of the public to inform decision makers about need of users for open spaces in the city; although, the issues of power and rights of councils fall outside the scope of this study. This analytical framework will identify various open spaces that represented the demographics of the city. It would also enable the public to talk with representatives of the Council at regular times regarding proposed changes to urban spaces or creating new urban spaces. Improved communication between users of open spaces and council officials would ensure that the new projects are well used and meet users’ needs. This analytical framework might also contribute in addressing the issues, faced by Jeddah Council in terms of rights and power with the new data collected through public participation.

Acknowledgement
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Conflict of Interest
This research holds no conflict of interest and is not funded through any source.

Notes
References
Gillham, B. 2000. Case Study Research Meth

Figure 1: City Development Structure

Figure 2: Proposed framework to involve the public in decision making in Jeddah (Source: Author)

Figure 3: The themes
Abstract
The aim of the study is to develop an effective remote sensing-based framework in order to support long-term urban and ecological areas mapping, monitoring and assessment in terms of sustainable urbanization in Bursa, Turkey. A critical component of sustainable urbanization is to understand the environmental elements and processes that constitute landscape system. Landscape analysis is a fundamental part of any monitoring system providing the mechanism for determining whether policies and actions are having the desired effect. The study is mostly focused on the urbanization and ecological process interaction in the fourth biggest city of Turkey. Firstly, the quantity and quality of urban change between the period of 1979 and 2015 were determined. Than the ecological structure of the city such as national parks, urban forestry’s, urban green networks, hydrological networks, agricultural areas were analysed. Current urbanization structure was evaluated by considering the ecological processes. Organic growth is highly characteristic for Bursa City. The most considerable change was observed on the agricultural areas. Approximately 124 km$^2$ of new urban area was gained mainly from the different conversion of various land use classes around the city center during the 1979-2015 time period. By itself, 113 km$^2$ of agriculture areas were converted primarily to urban in the defined time period. The inappropriate land use policies of the time were unable to cope with the rapid development which resulted to urban sprawl. The degradation of land use and natural resources were also increased including Nilüfer Stream, which is one of the main hydrological sources of Bursa. This study has highlighted the importance of urbanization and ecological processes' relationship and we hope the results can be used of in sustainable environmental planning studies.

Introduction
Conserving landscape connectivity has received increasing recognition as a key strategy to protect biodiversity, maintain viable ecosystems and wildlife populations and to facilitate sustainable...
urbanization. Ecological corridors are the primary tool used to achieve landscape connectivity. In the absence of connections, loss of wild life populations are observed and the landscapes move toward to isolation which ends up with the annihilation.

Corridor solutions based on the ecological core of the city stabilize urban structure, promote the co-functioning of the built environment and green zones and also can enhance the relationships between the natural landscape and urbanization. (Kowalewska, 2011). In this frame, the study aims to analyse the ecological process in terms of ecological networks and the urbanization relationship in the fourth biggest city of Turkey, Bursa. Bursa city has very rich underground/surface water resources and important industrial market share with the bottled water in the Turkey. Also, city is famous with the Uludağ Mountain (also National Park) which is one of most popular winter sport centre with the endemic vegetation and other flora/fauna populations. The city has an important potential for the ecological networks with the water sources and green structure. One of the widely accepted concepts today is that of ecological corridors including linear landscape elements that connect the habitat patches (Viles, Rosier 2001). Green infrastructure, rivers and transportation are the linear landscape elements and considered for the study. The advanced technology such as remote sensing and Geographic Information Systems integration was also used for the related analysis. The current status of the ecological corridors was determined and relationship with the urban development was argued. Also, the potential corridors for the study area were presented.

**Study Area**
The city of Bursa is the fourth most populated city in Turkey with a population of 2.8 million, of which 1.7 live in the metropolitan municipality. The city plays an important role in the national economy ever since the first industrialization movement began in the 19th century. Bursa is one of the most point shooting centres with the truism activities, agriculture, trading and
industrial opportunities and facing with the rapid urbanization problem. The location of the study area is given in the Figure 1.

**Method**

The methodology of the study consist of five general steps including: (i) determination of green structure (forests and urban greens) and urban with the classification of 1979 and 2015 remotely sensed data; (ii) digitizing of the river networks and transportation in the GIS environment, (iii) relationship with the urban growth and ecological processes with the change analysis and (iv) potential ecological network with the overlay analysis.

1. **Determination of the Green Structure**

Green structure is the network of natural, semi-natural and man-made green spaces, such as parks, gardens, allotments, river banks, cycle paths, woodlands, tree belts, green roofs, green walls, green bridges and urban street trees, that support natural and ecological processes as well as providing benefits for human health and wellbeing (Landscape Institute, 2013). For the study, urban greens and forestry was considered as the green structure. Determination of the green structure was performed with the object based classification. 1979 Corona ait photo with the 4 m spatial resolution and 2015 RapidEye satellite data with the 5 m spatial resolution were used for the object based classification. Object-based classification generates objects with different shape and scale by considering reflecting characteristics, geometry and texture properties. This process is called as multi-resolution segmentation. The size of segments can be generated by the user. It uses traditional classification approaches such as Nearest Neighbour classification. The manual correction of the classification mistakes can be easily performed with the ground truth data. For the study, extensive manual editing was performed for the black-white Corona air photo by considering literature, available city maps and expert knowledge. Six general class including Urban, Agriculture, Forest, Green, Open Space,
Water were determined. Urban and green structure was masked out from the two dated classification maps.

2. River and Transportation Network Analysis
Network analysis includes digitizing of linear landscape features such as river and transportation in the GIS environment. The urban river landscape is an important physical element and a kind of ecological corridor in urban landscapes. River corridors play important ecological roles such as providing habitats, acting as filters and barriers, and being water sources and water sink (Forman and Godron, 1986). They also supply water resources and transportation ways, increase urban landscape diversity, enrich the life of urban and contribute to stability, comfort, and sustainability in urban development (Cook, 1991; Baschak and Brown, 1995; Yue 2012). Transportation supports the network with the tree belts, refuge plantation, edge species and etc. So, it is considered another supportive element of the network for the study. Google Earth, remotely sensed data and available city maps were used for digitizing the subjected networks. Distance analysis for the river network was performed for the different dated images and comparative analysis were made for the urban and the ecological corridors elements. Figure 2 shows the green structure and network for the year 2015.

3. Change Analysis
Change detection is the process of identifying differences in the state of an object or phenomenon by observing it at different times (Singh, 1989). The objective of the change analysis for the study was to compare urban growth change and made an evaluation among the urban and other corridor features especially by considering the river distance. Because urban rivers are widely influenced by human activities and distance between the cultural use and ecological corridors are come into question. The traditional change matrix was used for the comparative analysis. Firstly Euclidean distance was calculated for
the river network for different time periods. Than the distance image was reclassified and 14 categorical classes were generated with the maximum of 20954 m. Finally urban extent image was overlaid with the river distance map. Urban growth was calculated for each of the categorical distance class (approximately 450 m) and the quality of change was identified. Same steps were followed for the forest, green and transportation classes. As seen in the Fig. 3, the river penetrates into the urban in many points. This growth affects the quality of river and also destroys the land cover and the river landscape.

3. Potential Ecological Corridor
Potential ecological corridor was also identified for the study area by considering urban distance, river distance, road distance, distance from forest and greens with the overlay analysis. The Fuzzy membership function was used for standardization of the different variables (Figure 4). The Fuzzy Membership reclassifies or transforms the input data to common scale of 0 to 1 or 0-255 based on the possibility of being a member of a specified set. 0 is assigned to those locations that are definitely not a member of the specified set, 1/255 is assigned to those values that are definitely a member of the specified set, and the entire range of possibilities between 0 and 1/255 are assigned to some level of possible membership (ArcGIS Tutorial 2016).

The distance maps of urban and river, forest and greens were standardized with the Guassian function, however linear function was used for the road distance. The scale of 0-255 range was used. The larger number of 255 presents the greater possibility for the ecological network. The results of overlay analysis were given with the Hillshade image in order to clarify the visual analysis (Figure 5). Hillshade image was generated from the 10 m Digital Elavation Map. 2015 urban extent was compared with the potential corridor map and the intersection of two was presented. Potential map was calculated without considering existing urban structure. The dark green presents the intersection (Potential
Results
The holistic evaluation among the ecological corridor features with the urban growth was carried out. Different time periods including 1979 Corona air photo and 2015 RapidEye satellite images was used for change detection. Urban growth, forest and green classes change was calculated by considering categorical river distance map (Figure 6). After analysing the land use/land cover, a potential map for ecological corridors for the study area was generated. Maximum distance of 20954 m river distance was divided into 14 equal classes to evaluate the relationship between urban and the other corridor features. Category 1 indicates the distance values approximately between the 0-450 m, category 2 indicates 451-900 m and so on. After digitizing, the total length of the river and road networks was calculated as 110.081 m and 5335 m respectively. Congruently, total area of forest and green classes were calculated as 23931 ha and 1823 ha respectively.
Between the years of 1979-2015, 11734 ha new urban area was gained. 3404 ha of this area is within the 450 m of the river distance. As seen as the Fig. 6 most condensed urban is just near the river networks especially in the category 1 (C1) and 2 (C2) level. Than the considerable decrease is observed. For the C1 and C2, 3404 ha and 2904 ha new urban area is gained for the year 2015. There are very small changes in the forest class. The Uludağ Regional Park contains the very large part of the forest class and due to special protection status, the changes in forest class is mostly due to seasonal effects such as leaf cast. However, due to river reclamation studies, an 350 ha area of increase was observed in the green class within the C1. For the 1979-2015 time period, total of 1064 ha green area was gained. The increase in road network is 430 ha between
the same date ranges. The reclamation studies were mostly carried out in the intersection of river network and transportation changing to 80 to 160 m. Planting with the natural vegetation cover was carried out in the reclamation areas. In this frame, transportation supports the river network in several places. Most considerable change in the study area is the degradation of agricultural areas. In the last 35 years, 113 km² of agricultural areas were converted primarily to urban. Besides, forests and river near environment was depredated with the agricultural uses.

Conclusions
Ecological corridors have a prime role in urban ecological construction and sustainable development. Coordination between the urban development and corridor features ensures the liveable cities both for human and wildlife.

The city of Bursa represents a case of dense population and rapid changes were observed in the last 25 years which resulted in land degradation especially on the agricultural areas and green infrastructure. The city has an important ecological potential which is not efficiently being used. Besides, conversion of agriculture or green structure to urban is a common environmental problem especially in rapidly grown cities. Therefore, this study aims to analyse the effects of long-term urban development in terms of ecological aspect by using remotely sensed data, GIS and AHP integration. Five spatial variables including distance maps of urban, river, transportation, forest and greens with the Fuzzy approach was used for corridor mapping. 8615 ha area was calculated as the potential network without considering existing urban structure. River network was determined as the most deterministic variable. Interactions of the urban greens, forest and transportation with the river networks were also analysed. Distance analysis showed that, most populated urban areas were observed near the river networks. Besides, 4299 ha land cover is still available for the actual potential network. However,
drainage applications were carried out for the potential urban development and the rivers were covered with the concrete and placed under the infrastructure. The rivers and the near environment is not actually suitable for condensed urbanization due to functional, aesthetic, recreational and etc. reasons. Lack of law about the waterfront rehabilitation, the regeneration of riversides, restoration and (re) naturalization of rivers and streams enables the degradation of natural landscapes (Coteli, 2015). The river distance analysis with the historic urban change demonstrates this deficiency. Similar studies about evaluation of the green networks, ecological corridors or green infrastructure were carried out in several cities of Turkey (Görmüş 2016; Manavoğlu and Ortaçışe 2015; Yaman and Doygun 2014; Salıcı 2009; Ozhancı et al, 2011). The urban green systems, landscape character analysis by considering ecological networks, identification of possible green ways are the subject of these studies. Degradation of agricultural areas and green structure due to urban sprawl identified as the common threats.

We hope this research supports the management and sustainable development for ecologically sensitive urban rivers.

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Figure 1. Location of the Study Area

Figure 2. Urban and ecological corridors features

Figure 3. Categorical distance image and urban growth for the years 1979 and 2015.
Figure 4. Gaussian and Linear Fuzzy Functions

Figure 5. Potential ecological corridor map and the 2015 urban growth

Figure 6. Relationship among the corridor features and urban change
Abstract
The concept of sustainable development has reached a transdisciplinary state to bring solutions for multidimensional problems at an international level. Therefore, ranging from local to international, sustainability has become one of the fundamental considerations of landscape planning discipline at every level. Regarding to the concept of sustainability, in this study, natural and cultural factors affecting the landscape are considered.

This study, aims to share outputs of several analyses related to the historical environment and natural resources of Osmaneli which is an Anatolian settlement located in the city Bilecik. The analyses focus on the natural and cultural potentials of the settlement. Promoting the settlement’s cultural and natural values to public were the other goals. To achieve the aim of the project, Osmaneli’s cultural and natural potentials are considered through a holistic and transdisciplinary approach.

Within the research, Osmaneli’s natural and cultural values and potentials are determined through a detailed analysis phase, while strategies for sustainable and holistic local development are questioned through public participation and focus group meetings as well. Design studies that were carried out, ensured the reflection of general planning approaches into design decisions.

It is expected that this transdisciplinary holistic approach will provide a base for future detailed research. Thus, the project outcomes will contribute in economic and social development of the settlement with an increase in life standards meanwhile reinforcing Osmaneli’s unique identity.

Introduction
Forman and Godron (1986) describes the ‘Landscape’ as a heterogeneous piece of land composed of a group of interacting and similarly repeating ecosystems. This living system exhibits
three common characteristics: Structure, Function, and Change. Each characteristic can provide important clues about a landscape. It is not possible to strictly separate these components which are in close relation with each other [1].

Holistic Approach
The landscape as a whole looks more stable and much minor changes do not necessarily alter its holistic appearance, type or identity. Landscape holism is closely related to structural aspects, and it reflects order and chaos. The main force behind change is the reorganization of existing structures to optimize their functioning. The existing landscape structures form the framework and constraint of all processes and activities in this geographical space. New needs for functioning will demand new adapted structures and will induce change [2].

The pioneering landscape architect Ian L. McHarg (1992) states the importance of landscape components and holism as follows: ‘If there is a creative - feasible - healthy environment in a place, then it is necessary to know what its components are and to utilize it to design cities for Human’ [3].

Individual consideration of the change in landscape components can rarely give adequate idea about the overall landscape change [4]. Holistic approaches emphasize that systems are equal to more than the sum of their components. It is not applicable to put forward an idea about a landscape by evaluating a single component of that landscape. A landscape is a whole composed of interacting systems therefore a landscape to be studied must be evaluated along with surrounding areas and systems [5].

A landscape is influenced by many natural and cultural factors and is shaped by such factors. There is a need for holistic methods and tools that can present the spatial, ecological, and sociological structure and evaluate the relationships between these structures so that
landscape planning decisions can become applicable from the regional scale to minor detail. It is essential to be able to present the whole which the building blocks of the landscape constitute effectively, instead of getting lost into the details of each building block which constitutes the landscape.

According to Miller et al. (1998), the most complex challenge is to make arrangements within social and cultural frameworks allowing people to meet their needs at an optimum level without introducing social and environmental problems for the future [6]. According to Eetvelde and Antrop (2009), landscape inventory is required to be monitored and evaluated especially in development, management, and conservation plans, and when new concepts are emerged in this subject [7].

It appears that the evaluation of the landscape components as a whole has a common consideration to make decisions based on the conservation-utilization balance in other words the sustainability [8].

1. **Sustainability**

The concept of ‘Sustainable Development’, defined as ‘to meet the needs of the present without compromising the ability of future generations to meet their own needs’ in Brundtland Report [9] was handled in an international platform with Agenda 21 which was from the outputs of the United Nations Environment and Development Conference held in Rio de Janeiro in 1992 [10]. Agenda 21 has the characteristics of an action plan for actualizing the concept of ‘sustainable development’ and integrating the environment with social and economic development. Local Agenda 21, which is a sub-expansion of Agenda 21 and is based on public participation, constitutes an important framework for degrading the concept of sustainable development to a local scale.

Sustainability in landscape planning can be interpreted in two ways. The first perception
is concerned with the preservation of certain landscape type or values and the continuity of practices indirectly maintaining and organizing these landscapes. Accordingly, the sustainability may relate to either natural or cultural, either conventional or contemporary, either ostentatious or ordinary landscapes. This concept can be applied in studies to sustain conventional techniques in rural landscapes, as well as related to in the landscape quality of natural landscape remains or new contemporary landscapes. The second perception is to consider the sustainability as an essential principle for future landscape arrangements. In this case, the concept is concerned that the potential landscapes have sustainability at high amount in special rural regional planning and management [11]. This approach also matches up with the Local Agenda 21 characteristics.

To be able to make sustainable planning decisions about an area, the area must first be analyzed very well along with its components. Carrying out these decisions taken in a healthy manner is directly proportional to which extent and level they meet the needs of the area in question. The most convenient way to determine the usage requirements of an area is to take the opinions of those living people in that area and to incorporate these opinions into planning. This situation, which can be summarized as ‘Public Participation’, is an important step in the development of sustainable planning strategies. If it is desired to be successful and decisive in sustainability researches, the methods and procedures that will promote public participation must be included in the research [4, 12].

The public participation provides a link between the individual and the structure, and thus it ensures that both theoretical and liberal components are involved in planning and management. The public participation should be considered not only as helping to shape the decisions adhering to ordinary landscape, but also as making a conscious contribution to the decisions [13]. Likewise, the landscape ecology
can only gain a holistic character when public awareness and participation plays a role equally with the opinions of natural scientists and planners [14].

2. Transdisciplinary Approach
As Naveh (2001) points out, ‘Multifunctional Landscapes’ should be considered as systems interacting in a concrete, complex, natural, and cultural sense. They are the concrete, self-transcendent and self-organizing ‘Gestalt Systems’ of our total human ecosystem. They need to be studied, upscaled, managed and evaluated with the biperspectivable systems view, from the smallest mappable ecotope to the global ecosphere landscape. For this purpose, Multifunctional Landscapes should also be considered as products of material, natural, biogeophysical systems and as mental, cognitive noospheric systems. To achieve this, the aid of innovative, transdisciplinary approaches and research methods, as well as cooperation between landscape researchers from natural, social, and human sciences, the humanities, and the arts as well as the professionals involved in all phases of land use decision is required [15].

The functioning of natural laws is always in a network of interactions complicated by economic processes and social phenomena. If it is desired to be successful to create ideas and significant approaches to sustainability and actualize them, this network of interactions should be handled. It is necessary to draw attention to the common points of natural, psychology and social sciences. The complexity of their interactions can only be understood by this means. For this reason, the essential component in landscape perception is a transdisciplinary initiative and originality in terms and the cooperation of the respective fields of expertise in thought strategies [16]. According to the perception of contemporary landscape ecology, there is a need for conceptual models and tools to assist in analyzing and presenting the interactions between nature and society that are at the center of the sustainability argument [17].
To form applicable strategies for landscapes within the scope of sustainability, it is necessary that the spatial, ecological, and sociological landscape components should be considered and evaluated together from a holistic perspective. Decision-makers are recommended and advised to approach to the matters of management and planning the landscape discussed from this perspective [8].

Landscapes, of course, have characteristics that are very different from each other and need to be evaluate with an ‘area-specific’ approach. However, the common denominator here is that landscapes are multi-componental ‘Gestalt Systems’ which need to be addressed in the context of sustainability [15]. The purpose of this research is to capture harmony and hierarchy between methods which can reflect the components of sustainability (society, ecology, and economy).

Revealed strategies for assessing natural-cultural potentials of a selected landscape are important especially for the decision makers and administrator to serve as a guide. But even more important than that is to know how to handle with a multi-componental landscape.

32.49% of the total population of Turkey is in the Marmara Region and 97.08% of this population lives in urban areas [18]. This concentration makes settlements close to the Marmara Region such as Osmaneli for daily escape routes, which are easily accessible and attractive for touristic and recreational activities in terms of natural-cultural potentials. However, to prevent the tendency of development forced by request needs to be handled versatile, considering the holistic landscape character, without harming the identity values and without leading to overcapacity uses. At this point, to ensure the sustainable development of the region and to protect its identity values, it is very important to carry out a qualified landscape analysis dealt with holistic and transdisciplinary approaches.
The aim of this research is to propose the planning process of Osmaneli District, which has high potential for daily use tourism and recreational activities, by considering holistic and interdisciplinary approaches with a sustainable development focus. How can we analyze quickly and efficiently a landscape which has high tourism and recreation potentials and is under intense pressure of development, considering all its components that generate its identity values? The way we look for answer this question is an example for short-term comprehensive holistic and transdisciplinary landscape research.

**Material and methods**

The Anatolian settlement Osmaneli is located in northwest of the city Bilecik in the Marmara Region of Turkey (Figure 1).

This location is in a one-day access distance for settlements in the marmara region. For instance, Osmaneli is accessible from Istanbul at two hours by car. Which is a privilege to be able to meet an environment rich in natural cultural potentials in such a short period of time. For this reason Osmaneli was chosen as a research area.

Osmaneli, which dates back to 3000-4000 BC [19], has a total population of 21,071 as of 2016 [18]. While the urban population ratio is 68.3%, the rural population ratio is 31.7%. There are 27 villages belonging to Osmaneli.

The Osmaneli town center was founded on the south bank of a major stream, the Sakarya River (Figure 2). The lands on the north coast of the river are used for agriculture. The Marmara Region climate is dominant throughout the district, and micro-climate zones are located especially along the Sakarya River. Fertile agricultural lands extend along the Sakarya River. When we look at the climatic characteristics of the region, it can be said that it is hot in summers and almost warm in winters as well as precipitation is rain and during spring, autumn and winter, and snowfall can be rarely seen. Snowfall can only be seen on the surrounding
hills. The district center has an altitude of 150 meters, and it is surrounded by hills and mountain ranges with altitudes ranging from 500 to 900 meters (Figure 3). The villages are scattered and located at different altitudes among these hills.

The research area is located at the intersection of four geographical regions (Middle Anatolia, Marmara, Aegean, and Mediterranean regions). This geographic location, as well as the rugged topography and the Sakarya river, provides biological and cultural diversity (Figure 4).

Its unique biogeographic structure allows the research area to be used for various tourism and recreational activities.

A number of long and short term methods have been used to reveal landscape planning and management strategies related to the research area.

At the beginning of the creation phase of the research project, meetings were organized with the municipal authorities, ideas were exchange and opinions were taken on various topics. This approach ensures to focus on the real problems of the region, to determine obstacles and opportunities and to identify the region by opinions of the public authorities. This close contact has lasted throughout the whole project process, has been put into effect as an important solution partner for replicating and sharing the project outputs with the public. This contact helped assigning space for accommodation, exhibition, meeting-like activities and accompanying the excursions. In addition, this partnership with the municipality has made it easier to reach the representatives of other divisions such as the district governorate, ministry, directorate, university and NGO etc. which have authority or influence on the research area. With the support of the municipality, expenses such as transportation and subsistence were reduced and this facilitated the establishment of productive studies. This
support also provided a more realistic dimension to social structure analysis by serving as a bridge with local people. Issues, requests and needs of the regions were reached easier, and solutions were developed.

A detailed inventory, analysis and synthesis study was carried out by bringing together experts from various disciplines in order to capture a transdisciplinary holistic perspective within the framework of sustainability. The disciplines involved in this study include landscape planning, architecture, interior architecture, forestry engineering, geomatic engineering, urban planning, geology, geography, history and archeology, meteorology and climatology, botanic and wildlife.

A landscape planning perspective that sets conservation priorities however does not ignore the need to use it can only be reflected by a versatile and effective landscape analysis. For this reason, many analytical methods have been systematized with the ‘Multi-Criteria’ perception in order to be able to evaluate the research area covered by a comprehensive and broad perspective as a holistic view.

In order to identify the user profile, first of all it is necessary to investigate the effects of historical development, cultural and natural structure. To do this, the user profile, socio-cultural and socio-economic structure was introduced taking into consideration the natural-cultural factors that are effective over time. Moreover, the relationships between the natural and cultural structure were determined based on the principle of public participation by identifying the people’s awareness level and needs about natural and cultural potentials.

Sustainability has a meaning only given the fact that the needs are actualized by considering the conservation criteria. First of all, it is necessary to present the conservation criteria in a practical and effective way considering the natural structure regarding the area in question and to
compare them with the cultural structure and user needs. The availability of public participation is particularly effective in the decision-making process of the planning, which increases the applicability of the strategies developed.

**Statistical data** about the socio-economic and socio-cultural structure were evaluated in a way to present the user profile.

A **semi-standardized interview technique** was used to create qualitative data about user needs. With the help of mostly open ended questions, the user’s opinions about the respective matter were taken. [20,21,22].

‘**Rapid Rural Evaluation**’ interviews were carried out to reflect the public opinions of those living in Osmaneli to the planning process and to reach information about the area which has not been registered yet however has importance in terms of planning decisions in a detailed, economic and quick way. Thus, public trends were identified to shed light on planning.

A **face-to-face interview survey** technique was used to derive quantitative data on user needs. For this study focusing primarily on quality of life, urban and rural life, a total of 384 surveys were conducted that 118 of them were in rural area and 266 of them were in district center. This survey study is an important component incorporating public participation in the project.

‘**Public Participation**’ is one of the most effective ways of presenting nature - society relations. For this reason, it is appropriate to obtain information directly from the user in order to determine cultural, historical processes and needs. Management of ecological conditions and processes in multiownership landscapes requires cooperation by diverse stakeholder groups [23]. Meetings were held with the groups representing the user to provide public participation, and opinions were taken from them. Through these meetings, the level of natural-cultural consciousness and awareness about the
environment in which the people live was able to be measured and discussed.

To present the landscape potential of the research area, the natural and cultural structure patterns, characteristics and the interactions between these structures were presented with a series of methods.

Osmaneli District is divided into ‘Landscape Character Zones’ (Figure 5.) described by Makzoumi and Pungetti (1999), taking into consideration the land cover / land use classes, their natural-cultural characteristics and their distribution [24, 25].

An ecological risk analysis based on analytic hierarchy process is used for evaluating risky areas with high ecological potentials [26]. However regions with ecological importance and sensitivity, such as habitats for birds and butterflies, important vegetation areas, areas with endemic or endangered plant species and aquatic areas etc., have been identified by Rapid Ecological Assessment technique.

Rapid Ecological Assessment parameters are as follows:
- Topographic features,
- Structure and distribution characteristics of vegetation,
- Quality of habitats,
- Effect potential of the predicted recreational use patterns on target species

A SWOT analysis was carried out to determine the strengths, weaknesses, opportunities and threats of Osmaneli’s indigenous values and relations with its immediate surroundings.

Results
Thanks to this multi-componental research technique, the research area with its specific natural and cultural characteristics could be considered in a versatile manner, and the components constituting the ‘Identity Values’ of the settlement were able to be described
in detail. Landscape character zones play an important role by determining identity values (Figure 5.)

Research outputs are shared with three sources. First is the Research Project titled ‘Establishment of Strategies for Assessing Cultural and Natural Structure Potentials in Osmaneli District of Bilecik City’. This report determines sustainable development strategies for Osmaneli.

The second output study titled ‘Osmaneli in Development Process’ was prepared in line with the expertise and approaches of different disciplines regarding the matter [27]. This study covering Osmaneli’s history, natural cultural values and local characteristics has a content that examines the tourism and recreation potentials and cultural heritage based upon the existing values of Osmaneli. The aim of the book is to ensure that the natural and cultural values of Osmaneli are shared with the public and interested parties and experts.

Another output of the project is the book titled ‘OSMANELİ: Urban Spatial Readings on Design Workshops’ [28] which was created by discussing Osmaneli as a research area in many undergraduate level courses. This study is a holistic work which allows to include undergraduate students in the research project and focus on the design processes with different perspectives.

To reflect the planning approach to the design dimension, design studies were integrated in the research. Osmaneli Workshop Studies aimed to develop a holistic educational approach for undergraduate students in the Department of Interior Architecture and Environmental Design, with a transdisciplinary approach, to obtain different conclusions on the same test area and to evaluate these conclusions with their positive and negative aspects. For this purpose, Osmaneli was considered as a study area in many courses (Diploma Project, Interior Architecture Studio 5,

Considering the same area within the scope of the various courses ensured that more qualified and detailed data was attained, a healthy data source was established and so the analyses and evaluations became more realistic and applicable.

The students could examine the test area in different ways and assess the whole. They became familiar with the holistic approach by this means.

Also national interuniversity design workshops were organized to highlight the identity values of Osmaneli. Lecturers and student groups from design departments of five universities were invited for the ‘Steps to Promote the City’ workshop aiming to design alternative urban furniture for Osmaneli. Within the frame of the workshop, which was held with the participation of nearly 60 students and lecturers, fixed elements such as benches, lighting elements, loophole covers, semi-fixed elements such as electric poles and direction signs and mobile elements such as garbage cans, containers and recycle bins were designed for Osmaneli. Prior to the design phase, conferences were organized to provide the students with information on the subject.

In the second workshop on ‘First Step to the City Identity’, the work groups established with the participation of the students and execution of faculty members from the design departments of 7 universities focused on designing a ‘Gate Arch’ for Osmaneli. The conferences related to the topic were also included in the organization and so the students and participants were informed. The outputs of the three-day activities were publicized and shared with an exhibition organized by the Osmaneli Municipality in Osmaneli.

These national student workshops actualized provided an opportunity for the students and
experts from different institutions and disciplines to discuss the relationship between conventional texture and daily needs of today’s life within the context of design.

Events were organized to ensure that the strategies generated in the end result of the research are transferred in a versatile way.

A nature education project titled ‘osmanelidae: Environmental Education in Osmaneli’ was carried out in the research area in summer 2015. Participants of the project were natural sciences teachers who will share acquired information with their students. This project is also an important work in order to draw attention to the beauties of Osmaneli especially in its rural areas. The project was repeated in summer 2017.

Several private and public agency representatives, NGO members and public representatives were invited to participate in a stakeholder group meeting on “How to Benefit from Osmaneli Natural Resources and Values’ held in the Research Area, and topics such as education, industry, agriculture, livestock-breeding, tourism and revetment of river banks were opened to discussion. Thanks to this meeting it was possible to determine the real and actual problems of the research area and evaluate the usefulness of the proposed strategies.

**Conclusion**

The research area is located on the main transportation route opened from Marmara Region to Anatolia, and has transportation links with major cities like Istanbul, Bursa and Eskisehir. On the other hand, provided richness and diversity in terms of natural and cultural resources are also important. With these characteristics, Osmaneli has an important potential in terms of tourism.

In addition, the settlement has a wide range of agricultural production. The public and local government are willing to deliver outstanding
products to consumers through featured presentations. The presentation of boutique products such as quince delight can be shown as an example in this context. Besides, it can be said that the agricultural production in the settlement is also a source from the point of eco-tourism, which has gained importance recently.

The Ministry of Culture and Tourism has been involved Osmaneli in different tourism routes for the purpose of evaluation and development of local features for tourism purpose.

The main development trend of the settlement is agricultural production. In this sense, it is important to develop fresh vegetable and fruit production and floriculture activities, and to establish infrastructure that will enable to evaluate and transforme these products into economic benefits. In this context, small-scale production areas can be created in which the products can be cold storaged, packaged and processed.

The most important feature of this research is that it can be a model in the process of researching similar areas in terms of Landscape Planning Potential. The resulting strategies aim a sustainable development process. The resulting outputs also support these strategies.

The extensive impact and outputs of the Project, which is dealt with in a transdisciplinary and holistic approach at different scales spread in a wide range and provided significant added value.

*In this framework, it can be said that the research is based on the condition that ‘landscape planning and management can only be realized if sustainability in social, cultural and environmental dimensions can be achieved using transdisciplinary, holistic methods’.*

**Notes**


Nachhaltige Landschaftsentwicklung durch Bedürfniserfüllung, Partizipation und Identifikation. (The landscape as a habitat for the inhabitants - Sustainable landscape development through need filling, participation and identification). Inauguraldissertation der Philosophisch naturwissenschaftlichen Fakultät der Universität Bern. (In German)


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Figure 1. Osmaneli, an Anatolian settlement. (Foto by Ersin Alok)

Figure 2. Sakarya river flowing through the district center. (Foto by Ersin Alok)

Figure 3. The district centre Osmaneli is surrounded by hills. (Foto by Süleyman Uysal)
Its unique biogeographic structure allows the research area to be used for various tourism and recreational activities.
Abstract
The 2014 International Highrise Award jury unanimously resolved that Italian ‘Bosco Verticale’ was to win the prize for the world’s most innovative high-rise building. The motivation behind the award was that the project, “blazes the trail for greened high-rises and can be considered a prototype for the cities of tomorrow”. This project - set by the architects to create a new standard for sustainable housing, but, according to many, having worth based on expensive, manicured aesthetics alone - lever on almost 900 trees, along with thousands of shrubs and floral species, planted on the balconies up to the 27th floor of two residential towers. In February 2017 a sponsored planting of 42 palm trees (Trachycarpus fortunei) and 50 banana plants (Musa ensete) has been installed opposite the city’s 14th century Duomo cathedral, while existing 24 Carpinus betulus trees have been removed. Also this initiative has divided the city, with supporters saying they add a touch of fin-de-siècle sophistication to the iconic square, but critics deriding them as “kitsch”. Both projects testify current interest in innovative forms of design and governance in relation to the urban forest in Milan, also reflecting planners and policy-makers’ desire to lighten the burden of building and maintenance of green spaces, directly involving private capitals in such activities. The contribution aims at exploring benefits and trade-offs of emerging processes of transformation/revolution in green infrastructure planning and nature-based design within the built environment, as fulcrum of the creative process currently effecting the urban landscape worldwide.

A Vertical Forest for the Isola neighbourhood in Milan
Vertical Forest, according to the designers, a «house for trees and birds, also inhabited by humans, under the sky of Milan», is a project by Boeri Studio (architects Stefano Boeri, Gianandrea Barraca and Giovanni La Varra). The residential complex consists of two towers, which are respectively 110m and 78m high (27 and 19
floors) with a profile strongly characterised by vegetation on the façade.
Hundreds of pre-cultivated young trees (3-6 m high) and thousands of shrubs and herbaceous plants were placed on the four façades of each tower, in planters on the side of projecting balconies containing a 1 m deep cultivation substrate. Evergreen tree species have been planted facing southwest and deciduous plants fronting northeast, aiming at seasonal colourful effects. Among the tree species planted, over a hundred of trees with natural height-potential of up to 30-40 m, such as Quercus ilex and Fagus silvatica. Those trees, which have been planted in order to adorn the balconies of all 113 apartments, and that contribute to the definition of an Urban Forest, would be subjected to periodic ‘acrobatic’ pruning. For security reasons, tree fall-restrain devices (elastic temporary bands that connect the root bulb to a steel mesh embedded in the soil; aerial cables and steel cages that restrain the root-bulb) have also been installed.

The real estate project was completed in 2014, in an area on the edge of the ‘Isola’ neighbourhood, traditionally a working class settlement whose name is evocative of its long segregation from the rest of the city of Milan. Following World War II, and mostly during 1980s, Isola has experienced several transformations, still remaining popular and artisanal in its characters, hosting numerous cultural associations and offering several opportunities for recreation and spontaneous social gathering. Today, the social and economic structure is undergoing dramatic changes, with emerging components being represented by business and mixed used developments, progressively replacing original nuclei of low rise residences. The neighbourhood currently hosts around 21,000 inhabitants in its wider configuration and presents one of the highest population density in Milan. From the urban and architectural design point of view, Isola is also characterised by some of the outstanding examples of the Milanese rationalism – ‘casa Ghiringhelli’, 1933; ‘casa Comolli Rustici’, 1935; and ‘casa in via Perasto’, 1934 – designed by
prominent Italian architects, Giuseppe Terragni (1904 - 1943) and Pietro Lingeri (1894 – 1968). Bosco Verticale is part of the wider project Porta Nuova (29 ha) being developed by Hines Italy since 2000, with the intent of requalifying the neighbouring areas between Garibaldi, Varesine and Isola quarters.

**Illustrious forefathers**

Many and well known are the ancestors of the Vertical Forest. Among those, the utopian houses of Friedensreich Hundertwasser, with the façades entirely covered with the fronds of the «trees tenants»; the hanging gardens of Emilio Ambasz, conceptualised according to a «green

we now need a university concerned not only with measuring nature as found, but dealing with the fact that in the process of mastering nature, we are creating a new manmade nature... Design is an act of the lonely jump. It is not something that you can do deductively. It is an inductive production, and you need different systems of thought ».

In the early eighties, James Wines (1932) suggested a ‘green therapy’, first in his Forest Building (1978) for the BEST supermarket chain, and later in his dreamlike watercolours, in synch with land art and contemporary artistic research. «The [20th] century began with architects being inspired by an emerging age of industry and technology. Everybody wanted to believe a building could somehow function like a combustion engine. As an inspirational force in 1910, one can understand it. But as a continuing inspiration in our post-industrial world, or our new world of information and ecology, it doesn’t make any sense»[1]. His interpretation focuses on integrative ideas in architecture and public space that sow the seeds for social interaction[2]. Wines claims that environmentally responsive solutions for contemporary urban centers can grow out of information that already exists within a cityscape – including social, psychological, aesthetic, topographical and ecological elements. His works demonstrate this absorption of context into contemporary design by clarifying the ways it can accommodate the future and celebrate a city’s unique identity. His green therapy was
meant to invade the city, spread everywhere and create the impression of a new porosity that would let the urban structure breathe (Portoghesi, 2017).

**Biophilia and non-human agency**

Since the origin of mankind, cultures around the world have used the natural elements for the construction of their living spaces. In the field of applied sciences, this phenomenon of codification of the historical use of natural elements in anthropic environments is known as *Biophilia*, meaning “love of life or living systems” (Fromm, 1964; Wilson, 1984), and refers to the psychological tendency in humans to be attracted to all that is alive and vital. In the subsequent *The Biophilia Hypothesis* (Kellert & Wilson 1993), the authors proposed that biophilia evolved by natural selection in a cultural context, a process to which they refer as gene-culture coevolution [3] (Gullone, 2000).

The various case studies – which developed first in the field of biology and psychology, and then advanced in neurosciences, endocrinology and architecture – are all related to the human desire to (re)connect with nature and with the natural systems.

Another interesting and more recent school of thought refers to “bio-cultural diversity» (Vierikko et al., 2015) as a consequence of a process in which values and cultural practices are formed through interaction with biodiversity.

With the expansion of uncontrolled urbanization – sprawling – from any part of the world’s population, the peculiar qualities provided by biophilic design – such as stress reduction, reduced healing time, increasing creativity and the general improvement of human comfort and wellbeing – have assumed primary importance. Paradigmatic in this respect is the importance attached to the dimension of “agency” of natural elements, and trees in particular (Cloke and Jones, 2001), i.e. their transformative abilities, considered essential in determining the quality of life of individuals and communities. Through the functions of growth, reproduction, dissemination, and association, trees play an important role
in characterizing both urban and rural places, as well as in the stimulation of sensory and emotional responses from people interacting with them.

Marketing and Natural Capital
The first decade of the XXI century was characterized at an international level by an impressive growth in natural capital and architecture contamination, with original outcomes in building and construction research and practice, marked by the intersection between neuroscience and bio-architecture. More and more relevant is the spread of new standards and approaches to sustainable and bio-eco-oriented design, mainly thanks to the contribution made by the natural capital in terms of quality of living and connection with urban places; the latter, increasingly negatively characterized by soil sealing, diffused pollution, economic crisis, and social conflict. The concept of Urban Forest has rapidly been progressing thanks to the spread of international scientific research findings and studies[4] that have highlighted the important contribution made by Urban Green Blue Infrastructure (to which the Urban Forest belong), in terms of Ecosystem Services. Among them – essential to make the urban ecosystem vibrant, resilient and attractive – are: the provision (water, food, raw materials, etc.), the regulating services (climate change, air quality, water cycle, etc.), the cultural services (recreation, spiritual, aesthetic, etc.) and the support services (creation of habitat, conservation of genetic biodiversity, nutrient cycling, etc.). Traditionally, the management of those important local natural resources has been almost exclusively preserved by the public sector, but lately we are experiencing a progressive involvement of other stakeholders, such as private business operators, non-profit associations, as well as citizens. This phenomenon, often communicated as a virtuous public-private-partnership, has found fertile ground in the municipal administrations, which have seen in such precious occasions of activism the
opportunity to lighten their responsibilities in terms of construction and operating costs and other commitments. Like with other consumer goods, but relying on scientific results that demonstrate the many benefits provided by the natural capital to the urban ecosystem – research findings and studies that investigate specific phenomena and resources, well-defined and never generic – designers, developers and public administrators have put the Urban Forest at the heart of their marketing strategies, sometimes with real operations of luxury branding, as in the case of the Vertical Forest in Milan.

**Inclusive and resilient cities**

Biophilic cities and architectures, levering on nature-based solutions and appropriate technology (Schumacher, 1973), are able to offer, thanks to the capabilities of active involvement of large sections of the population, resilient urban environments and housing conditions compatible with articulated and conflicting needs, like those characterizing the transition period of post-Fordist economies. These are real disruptive projects, inspired and inspiring, because emblematic of the human values of respect and inclusion. They’re not just living devices for a small elite who, to get a little more than a virtual contact with an alleged urban biodiversity, ends up recognizing, more or less consciously, a significant premium to domesticated replicas of the Urban Forest. They are very different housing solutions, both in terms of aesthetic qualities and performance, compared to the ones levering on responsible use and virtuous implementation of multifunctional Urban Green Infrastructure, not surprisingly characterizing significant architectural heritage requalification and urban regeneration processes at an international level (Andreucci, 2017).

Interesting, on the other hand, the media hype and the debate among experts and citizenship regarding such operations in Milan - not only the Vertical Forest, or the project CityLife in the Fiera di Milano district, but also the recent
tree planting of *Trachycarpus fortunei* (palm trees) and *Musa ensete* (banana trees) in piazza del Duomo - controversial exotic installation, sponsored by a multinational company, that will adorn the iconic square for the next three years. Three main interpretations and narratives of the Urban Forest, with an anthropocentric character in common, are characterizing the heated discussions of the moment, with multidisciplinary supporters for the one or the other, depending on the context and the different experiences in research, profession, teaching, and social life. The first reading focuses on the importance of ecosystem services provided by trees in the city, highlighting how the fragmentation of natural systems, due to urbanization, is resulting in habitat destruction and resilience impoverishment. The second comes from the fascination exerted by city beautification processes, in the belief that new imaginative and visionary architectures represent virtuous models, regardless of socio-economic and environmental challenges to address. The third questions the relationships and exchanges – both emotional and affective – between elements and natural systems and humankind and the role exercised by them in decision-making and governance. Regardless of the prevalence of one tendency over the other regarding sustainable urbanization, the contemporary urban discourse seems to have awakened. After a long period of collective amnesia and substantial inability to learn lessons on resilient growth that replicate these methods and tools – implementing adaptive transformations, inspired by evidence and results achieved in other fields like urban ecology. This renewed interest in evolutionary and synergistic relationships and challenges involved in the dispute between nature, architecture and “making the city” stimulates the search for an urban design concept of ‘organized complexity’ (Jacobs, 1961) – not a mere aggregation of parts individually functional and tested one by one, but an articulated association, mutually adaptive and multi system in its structure, which is able to interact in a complex series of models. An urban design efficiently and effectively
responsive to the multiple challenges posed by the Anthropocene, which is able to implement not only ecological and environmental design principles tout-court, but also evolutionary and integrated socio-economic perspectives, for the benefit of inclusive and resilient urban ecosystems, the natural capital, and the men and women who animate them.

Notes
[3] Gene-culture coevolution, during which hereditary learning principles have elaborated upon culture while the genes which prescribed the biophilic propensities spread by natural selection in a cultural context (Wilson, 1993, cited by Gullone, 2000).
[4] Such as Cost Action FP1204 “GreenInUrbs” and “FAO Silva Mediterranea WG7”.

References
Abstract
In 1950, ‘atomic garden’ was registered as a new term in the English language, referencing the radio-isotopic experiments at Argonne National Laboratories in Chicago. Nine years later, the Atomic Gardening Society (AGS) was set up by Muriel Howorth in the UK. In these kinds of gardens, plants respire in an atmosphere of radioactive carbon dioxide, which was popularized as a form of breeding through exposure to radioactivity in order to generate useful mutations. Muriel Howorth had identified a social benefit in atomic science: it could provide a clear solution to world hunger.

Around the same year that the AGS was founded, experiments in agriculture carried on by the Spanish government resulted in a particular atomic garden located in ‘El Encín’, a rural property dedicated to agricultural research near Madrid. This garden is a unique space arranged in a circular pattern composed by twenty concentric circumferences. The measurements of its design where based in the necessary range of a radiation dosage.

Although it hasn’t been used since the last two decades, it is a rare element of landscape architecture that needs to be brought to light as an important part of our built heritage. To that end, this paper introduces its historical context, analyses its formal, perceptive and ecological characteristics and discusses its inclusion in new programs for environmental education.

Introduction

On 23 September 1953, the Madrid Agreement was signed, where the governments of the United States of America and Spain renewed their diplomatic and commercial ties. This proved a turning point for the Spanish autarchy (1939-59), a period of the Franco Regime characterized by a politicized economy based on an internal market, self-sufficiency, and nationalism. The agreements made it possible for foreign capital to enter the country (Spain had been excluded from the Marshall plan) and for technological advances to arrive, which were needed for the modernization of the country.
One of the areas that benefited from this agreement was that of technical and economic cooperation for the development of agriculture. In April 1955, the Minister of Agriculture, Rafael Cavestany, was invited to tour the facilities for the Cooperative Extension Service of the United States Department of Agriculture[1]. In September of that same year, and with an experimental remit, the Spanish government created the Agricultural Extension Service, and selected two technicians from the Ministry of Agriculture for training in the United States. Part of the facilities of the Agricultural Extension Service was placed in the El Encín estate, located about 40km east of Madrid. At this estate, practical training for agricultural technicians as well as experimental programs were carried out under American guidance.[2] Among them there was a field set aside for gamma radiation known as the “Atomic Garden”, the aim of which was to carry out experimental trials involving the irradiation of plants. This paper studies this facility in the historical context of atomic gardens, describes the originality of its design, and, finally, presents the peculiarities found in the current ecosystem after half a century of inactivity.

**From Atoms for Peace to the Atomic Gardens**

President Eisenhower made his speech on “Atoms for Peace” before the United Nations General Assembly in New York on December 1953. More than 8 years had passed since the dropping of the first atomic bomb on Hiroshima. Eisenhower combined the alert regarding the risks of using atomic energy as a weapon with a defense of the beneficial applications of this technology in the development of agriculture, medicine and electricity. The speech was a turning point in the Cold War and a clear effort to boost the peaceful uses of atomic energy. A controversial program soon followed, in which the United States gave nuclear reactors to more than 15 countries under the pledge that they would use them for peaceful purposes. Moreover, the International Atomic Energy Agency (IAEA) was created in 1957, with its headquarters located in Vienna, an organization that sought to increase
the amount of research being done involving atomic energy in the fields of healthcare and electricity generation.

One of the most singular applications of atomic energy within agricultural research was radiation fields. Their origin can be traced back to the American laboratories of Argonne, Brookhaven and Oak Ridge[4]. The goal was to subject plants to gamma radiation in order to bring about genetic mutations that would be beneficial. The search was for varieties within species with a greater resistance to plagues, larger or better-quality fruit, or with accelerated growth cycles among other characteristics. From the beginning, these gamma radiation fields with agricultural applications were known as “atomic gardens.” As part of the Atoms for Peace program, examples of these laboratories were built in the United States, Europe, Russia, India or Japan.

A decade after the first experiments, in 1959, writer Muriel Howorth founded the Atomic Gardening Society. This scientific society promoted the use of atomic technology within homes, under the belief that it could contribute to solve the problem of world hunger. It encouraged its members to plant irradiated seeds in their private gardens. Howorth compiled her experiences in the 1960’s book, Atomic Gardening [5]. She benefitted from the collaboration of C. J. Speas, a dentist from Tennessee, who, through the society, sold seeds irradiated with cobalt-60 inside a bunker located in his back yard. In 1960, Speas had sent Howorth around three and a half million seeds, which were later distributed to almost a thousand individual members of the society [6].

In 1959, the construction of the atomic garden at the El Encín estate began. The work finished in 1961. This garden was unique in Spain and was the 16th to be built in the world. It was designed by professor César Gómez Campo[7], an agricultural engineer and with a Ph.D. in biological science. The technology, the radioactive material, and the technical recommendations for its construction were provided by the United States, under the framework of the
bilateral agreements. For 12 years, starting in 1962, Gómez Campo directed a Section for Applications of Nuclear Energy in Agriculture within the National Institute of Agricultural Research, obtaining noteworthy results.

The life of the atomic garden at El Encín coincides with the time of the international expansion of this technology for agricultural experimentation. In the same manner, its closure in 1971 can be framed within the international social rejection to these types of facilities. On one hand, the use of irradiated seeds was prohibited for health and safety reasons; on the other hand, gamma radiation fields progressively disappeared from agricultural research laboratories all over the world during the 1970s. All in all, at least two active atomic gardens still exist at the present time: The Gamma Radiation Field at the Radiation Breeding Institute in Hitachiōmiya, Japan, and the Malaysian Nuclear Agency Gamma Greenhouse at the MINT Tech-Park in Malaysia.

**The Design of the Spanish Atomic Garden**

Atomic gardens require a single radiation source. In these gardens radiation is applied from a central point and planting is designed in concentric circles from the centre. In atomic gardens, the distance to the source determines a space usable for daily experimentation, surrounded by a mass of vegetation that acts as a protective barrier. This tree mass inevitably acts as a second space for experimentation, where the effects of radiation are only identified in the long run. With regards to this functional constraint, there are two types of atomic gardens. The first and most frequent type are gardens designed in spaces without any preexisting elements. As a result, they are organized following a strictly circular layout. The second, very scarce type, are those built between preexisting tree masses that are used as envelopes.

The amount of radiation received by the plants varies depending on its proximity to the center. For this reason, a concentric space around the radiation source is needed, where the plants that will be irradiated can be placed at variable
distances. During experimentation, a single variety is usually placed along a circular sector so that the effects of the radiation can be evaluated based on its distance to the cent. The majority of the plants close to the source die; the more distant ones suffer genetic alterations and anomalies in their growth and morphology; and the plants situated in the intermediate zone suffer genetic changes without showing signs of abnormal alterations.[9]

The garden designed by Gómez Campo follows the first type; in other words, it does not make use of a preexisting tree mass. Its space is organized around a strict circle, with several concentric zones. First, around the radiation source and 50 meters in diameter, we find the circle used for experimentation with radiation. This area is surrounded by a separation ring made up of an earth embankment with a 10m-wide triangular cross-section 4m high. Its goal is to prevent more than 95% of the radiation from escaping to the outside. The second area is a mass of trees in the form of a ring, with an inner diameter of 80m and an outer diameter of 450m.

The atomic garden has a single access point in the northeast part of the complex where a 3m-wide path opens up through the tree mass and ends in the central experimentation zone. The path is straight and corresponds to one of the radii of the garden. It is only interrupted by a security zigzag that makes it possible to go through the separation ring between the central zone and the tree mass. Next to the garden entrance, there is a small building with an office and a laboratory.

The central area is divided into six sectors, where the plants irradiated with capsule of the highly radioactive isotope Cesium-137 were located. [10] Under normal circumstances, the cultivation and experimentation operation was carried out between March and November. From a distance, using a cable, the operator could raise the mount containing the isotope in order to irradiate the plants growing around it. The Cesium was kept elevated up to 20 hours per day. When it was housed inside its lead enclosure, it was safe to access the field in order to tend to the plants and
gather data from them. The 50m diameter of this space allowed for plenty of margin to choose the intensity of the desired radiation dose. The tree zone was created through tree alignments arranged in 24 concentric rings. Each alignment is made up totally or partially by trees of the same species. Among the species selected, there were *Populus x canadensis*, *Gleditsia triacanthos*, *Cupressus*, *Acer*, *Populus nigra*, *Abies*, *Cedrus libani*, *Elaeagnus angustifolia*, *Catalpa* and *Ligustrum japonicum*. As a whole, a tree mass was created that served as a second protection barrier against the radiation. Nevertheless, this area was also used to observe undirected alterations and mutations in the trees in the long run that had resulted from the residual radiation leaving the separation ring. With this purpose in mind, very specific plantings were made, such as an alignment of pine trees grafted to achieve pine nuts with a soft shell. In general, the trees resisted the radiation, and, in some cases, the seeds germinated and yielded larger fruit. However, the radiation also produced sexually sterile trees, while other hybridized and were eliminated.

Between 1961 and 1971, the experiments in the atomic garden at El Encín, under the direction of Gómez Campo, produced vegetables with a variety of structural changes as well as producing varieties that were resistant to a number of diseases and plagues. The experiments also resulted in changing the color of flower petals, and a deceleration in the growth process of tubers such as potatoes, as well as in onions or carrots was also achieved. Aside from experimenting with vegetables, starting in 1966, a broad program for the improvement of grape varieties through hybridization and irradiation with gamma rays was carried out, yielding 523 new varieties.

**Conclusions**

The atomic garden at El Encín has currently been inactive for 50 years. It was the object of a radiation cleaning process, and the access of people has been largely restricted over the past decades. This has made it possible for it to
consolidate into a unique reserve in the area of the Henares River, an environmental corridor that has been subjected to an aggressive process of urbanization.

The trees that did not hybridize and were not removed have given way to a circular garden with unique characteristics. Figure 4 shows the different species that currently make up the tree alignments in the form of concentric rings. One of the environmental characteristics of the garden has been its unforeseen transformation into a habitat for a great number of birds. Birds of prey such as the *Falco tinnunculus* or woodpeckers such as the *Picus viridis* are among the species that nest in its trees.

After an initial phase documenting the atomic garden, the goal now is to establish the design criteria that will guarantee its conservation and inclusion in the program for education and the enjoyment of nature that has developed at El Encín. The original design, developed under strictly functional criteria, has created a site with great spatial and environmental complexity that we must take advantage of.

References

Notes
agraria y desarrollo rural (Madrid: MAPA, 1996), 393.


[10] César Gómez Campo, Manuel Casas-Builla, “El campo de radiación gamma en El Encín”, Iberica II (1965): 50-52. The radiation field was equipped with a Cesium-137 radioactive source located at its center, designed as a hollow lead cylinder with 25cm-thick walls, where the emitting material was housed. Inside the lead-protected chamber a radiation measurement of 100,000 rads/hour was obtained in internal irradiation mode. When the source was put into field irradiation mode, a reading of 600 rads/hour was obtained at a distance of 1m and 60 rads/hours at 3m. The intensity of the dose of radiation at 25m from the source, at the edge of the central field, was about 0.5 rads/hour, an adequate dose for the continuous irradiation of plants that spend several weeks or months in the ground.


Figure 1: Atomic Gardens. Frank Scherschel.
Figure 2. Aerial View of the gamma radiation field at El Encín, Spain (1961)

Figure 3. Aerial View of the gamma radiation field at El Encín, Spain (2010)

Figure 4. Species position within the tree zone. Species are rendered in rows, from right to left, top to bottom. First row: Sensu lato, Cupressus, Celatonia silique, Periploca angustifolia, Robinia pseudacacia. Second row: Pinus pinea, Juglans regia, Ulmus, Populus, Fraxinus. Third row: Ligustrum vulgare, Crataegus Monogyna, Betula, Fagus Sylvatica, Quercus. Fourth row: Ailanthus altissima, Pinus silvestris, Pinus nigra, Abies alba, Melia azedarach. Source: Prepared by the authors. Contributor: David Pardo.
Abstract
Historical city centers have been important places to sustain and showcase the social life and vitality of urban communities from past to present. However with the effects of rapid urbanization and globalization, many physical, social, environmental, and economic problems that range from urban regeneration pressures to abandonment of urban spaces have began to be observed in many of them around the world within the recent decades.

Understanding the socio-spatial dynamics of urban environments by studying their social performance and value has been emerging as a critical topic among landscape architects and urban designers alike within the recent years. In particular, such research is believed to help understand the use and the sustainability of heritage sites that are sensitive to significant changes and challenges related to urbanization with the context of globalization.

The purpose of the research is to review and study social performance field parameters to assess pedestrian scale urban form and functions of the historic districts and city centers. Specifically a case study was conducted in the historical city center (Hans District) of Bursa, Turkey, which was inducted as an UNESCO world heritage site in 2014. Research particularly concentrated on the visitors’ perceptions of social performance factors derived from the design literature. An online survey conducted and field observations carried out through convenient sampling to measure various parameters regarding Bursa Hans District’s performance in urban design scale.

The results are that visitors prefer the aesthetics of historic buildings and improved open spaces in comparison with some other designed elements of the district.

Research illustrates that measuring social performance of historic districts can not only help understand and improve their uses but
also promote sustainability of such historic city centers which are struggling with the changes and challenges of urbanization in the 21st century.

**Introduction**

The needs and expectations of the society is the motivating power of design interventions. For this reason, the success of design is a concept closely related to the satisfaction of the users and the extent to which they meet their needs.

Urban design as a process of shaping the urban space is the action of designing the city’s built environment, groups of buildings with different uses and the pedestrian movements, services, spaces and objects between them [1]. Sustainable urban design is an important issue for today’s cities and aims to create ecological, economic and social benefits for those inhabitants of the city [2].

Historical city centers such as the Hans District in Bursa, have witnessed urban development and growth from the era of establishment to the day. Understanding the socio-spatial dynamics in such urban environments and measuring the visitor satisfaction of urban design as a process of creating a space in today’s cities where a large part of the world’s population lives is of importance for the sustainability of urban landscape.

Hans District, one of the UNESCO Heritage Sites in the city of Bursa in Turkey, illustrates the creation of urban systems of the Ottoman cities in the early 14. Century. The district is an important example of human-scale urban form with its commercial buildings as hans (caravanserai) and kulliyes (integrating mosques, religious schools, public baths and a kitchen for the poor). However today, the city of Bursa is growing rapidly and numerous urban design projects are being undertaken by the local and central governments. So understanding, sustaining, and improving its core functions for the community and/or the visitors is one of the
key issues to flourish the social life and the vitality of the district.

The review of the broader design and planning literature suggests that such concerns are not limited to the city center of Bursa alone but the number of studies on UNESCO heritage sites or historic centers is not large. While there are studies on the sustainability of urban design in the design literature [2, 3, 4], the study of socio-spatial aspects measuring the social performance and/or value of urban districts seems to be a relatively new concept.

In order to respond to this gap this research focuses on the concept of sustainability of urban design. The paper is primarily set to review and study social performance field parameters to assess pedestrian scale urban form and functions of the historic districts in city centers. Specifically, a case study was conducted in the historical city center (Hans District) of Bursa, Turkey which was inducted as an UNESCO world heritage site in 2014. Research particularly concentrated on the visitors’ perceptions of social performance factors derived from the design literature.

Engaging with community for sustainability

In 2015, the international community agreed on a new global framework for sustainable development. The UN 2030 Agenda for Sustainable Development called “...for making cities and human settlements inclusive, safe, resilient and sustainable by strengthening efforts to protect and safeguard the world’s cultural and natural heritage” [5]. The New Urban Agenda in 2016 also explained transformative commitments and effective implementation ways for the sustainability of cultural heritage sites. It was emphasized that culture should be an important component of urban plans and strategies to safeguard cultural heritage and landscapes from potential disruptive impacts of urban development. In this sense, it is suggested that the leveraging of cultural heritage for sustainable urban development should be supported by
innovative use of heritage sites through community engagement [6].

Creating successful places also depends on understanding the dynamics of the local community as well as the physical context of a place. Appreciating local attitudes, initiatives, history and customs by involving the people who live and work there and who share a common concern for the area is an effective way to overcome potential conflicts. If the process of community engagement process carried out successfully, it can improve design proposals, speed the planning process by creating a consensus, help to integrate new and existing communities and engender a feeling of ownership among the local community [7].

Engaging community is a dynamic process far beyond the matter of consulting people. Thus the success of community engagement depends on some guiding principles such as involving the right people, creating partnerships and identifying boundaries at an early stage, being clear about the objectives of the engagement process, ensuring that appropriate facilitation skills and resources are in place, recognizing that different methods and techniques will be appropriate for different types of project [7].

**Bursa Hans district and management plan**

Located on the south of the Marmara Region in Turkey, Bursa has been the focus of interest of many civilizations throughout history. However, it gained importance after the foundation of the Ottoman Empire as the first Ottoman capital, and became an important political-social-economic-cultural center after the 14th century.

The characteristic settlement plan for Ottoman cities, starting with Bursa, consisted of a little square placed in the marketplace; a central mosque; bazaar, covered bazaar and hans which have manufacturing, commercial, social and cultural functions; Sultan Complexes which consist of a group of integrated structures...
intended for religious and social use, including a mosque, a madrasah, a hospital, a public kitchen, a tomb, or a library and neighborhoods around the complexes with irregular and dead-end streets.

The commercial center of Bursa, also known as Hans District, shaped by the caravan route of the Ottoman era and developed around the first Sultan Complex called as Orhan Ghazi Complex which was built outside the city walls by the command of Sultan Orhan Ghazi who conquered Bursa. Today Hans District still comprises 21 registered monumental buildings including 7 hans (inns which have two stories, rectangular plan properties), and numerous markets, bazaars, public buildings and also new adjustments to meet the new demands of society. However, the Ottoman trading culture and traditional daily rituals still continues in the district[8].

With all these universal values the Hans District was inscribed as an UNESCO world heritage site in 2014. During the UNESCO nomination process, Bursa and Cumalikizik Management Plan was prepared. It contains different objectives and action plans focused on seven themes which is mentioned below:

1. Management, Authority, Legislation, Organization, Coordination, Participation
2. Cultural Values - Conservation and Planning
3. Social - Economic - Environmental Life Quality
4. Training and Awareness
5. Accessibility - Transportation
6. Tourism - Promotion - Visitor Management
7. Emergency and Disaster Management [8].

The plan report emphasized that the most important problems about the Hans Area was the decrease of the number of users and homogenization of users as a result of increasing number of shopping centers due to urban sprawl. This problem is getting bigger by ineffective utilization of public open spaces and historical buildings which do not seem to meet today’s needs. In this respect three objectives were determined under the topic of Social - Economic
- Environmental Life Quality in the Management Plan.

Objective B3.1- Developing the cultural use of areas to enable the maintenance of the traditional culture and character by hosting social and cultural events
Objective B3.2- Creation of a sustainable financial model with the participation and cooperation of relevant institutions and organizations.
Objective B3.3- Increasing quality of life and public services considering urban environmental quality with the establishment of a balance between conservation and utilization [8].

In summary, the plan underlines greater understanding and implementation strategies for the socio-spatial, in addition to economic, environmental and life quality aspects for the heritage district. Although, various steps seem to be undertaken by various stakeholders to implement some of these objectives (some project are still ongoing) there seem to be little done to understand and evaluate user satisfaction. This situation certainly seem to call for evaluation and assessment of the district in order to achieve these objectives, and sustain and showcase the social life and vitality of Bursa Hans District.

**Methodology**
This research follows quantitative methods to document and assess the social performance of Bursa Hans District by specifically studying visitors perception and satisfaction. The performance of projects is often studied and discussed in the design literature as evaluative approaches to learn from the past lessons in order to improve and guide future projects [9,10]. The importance and the value of urban landscapes have also been covered by many scholars in design and planning literature [11,12,13,14,15,16]. The literature highlights the importance of social factors and provides some insights on how design stimulates factors such as culture, safety, health and well-being, and quality
of life and provides early guides and precedents for social performance/value studies within the past couple decades [17]. However, the focus on social performance in urban design/district scale, is a relatively new research area to be explored.

The study primarily utilizes visitor questionnaire, in addition to field observations and key stakeholder interviews, to measure and assess the social performance of the district in question. The questionnaire consists of four parts: Demographic questions constitute the content of the first part of the survey. In the second part, multiple-choice social performance questions developed by one of the author(s) as well as in Landscape Architecture Foundation (LAF) studies are adapted to the study [11, 18]. According to LAF, seven basic conditions are required for improving sustainability [11]. These conditions are social sustainability, quality of life, physical and mental health, socialization, education, safety and aesthetic satisfaction. For this reason, in the second part, the visitors were asked whether the Han’s area fulfilled the expectations gathered in these seven basic conditions. The third part of the questionnaire utilized Likert Scale questions to study various socio-spatial performance variables distilled from the relevant literature [11, 18, 19]. According to CABE, the urban design contributes to urban identity, the availability of different types of use, and the frequency of use at different times of the day. These factors improve the socio-economic well-being of the people living and working in the region, enabling people from different segments to use the area and strengthening the relationship between people and the region [19]. All these factors form the social value created. In the final part of the questionnaire, open comment field is provided for visitors to share ideas to shed light on what should be done in the region for the future.

Following the completion of the preliminary draft of the survey questions, meetings were held with the stakeholders such as Bursa area Management Unit, Bursa Metropolitan Municipality Urban Design Office and Bursa Historical Bazaar Union.
The experts in these units shared their ideas on the survey questions with the project team. After the last revisions, trial surveys were done and unidentified questions were removed from the questionnaire. The questionnaire was published on the websites of these institutions as well as other social media platforms throughout the city for about four months. Findings at the end are analyzed using descriptive statistics and frequencies to summarize visitor’s perception of the social performance factors reviewed in this research.

Results

107 Hans District visitors completed the online survey conducted between late January and May, 2017. Visitor profile questions illustrated that 52% of survey respondents male and 48% of female indicating a gender balance in responses. These questions also revealed that over 65% of the survey respondents were between 25 to 45 years old whereas only 28% was over 45 years old. The site is mostly visited once a month by 56% of the survey participants and 82% of the respondents mainly come to the district from three main sub-province of the city of Bursa. Profile questions also illustrated that 45% of the respondents traveled 30-44 minutes to reach the area. The most common transportation vehicles used by the respondents were public bus services, metro and car respectively.

1. Social Performance Field Parameters: Multiple Choice Questions

Once the visitor’s demographic profile and their access behavior to the district is understood visitors’ perceptions of various social performance variables are reviewed. The responses the multiple-choice questions illustrate that Hans District:

- Contributes to the physical health for 68% of the respondents mostly via resting and walking.
- Improves to the quality of life for 77% of the respondents. This quality of life gain by the feeling tranquility (73%).
- Promotes activities for 62% of the respondents in the area. They join planned activity such as
theatre (24%), conversation (16%), exhibitions (13%) mostly. Eating is most preferable unplanned activity (56%) by participants. Provides opportunities for educational activities for the 14% of the respondents in the district. The most prefferable educational activity is art related activities. Promotes sustainability for 95% of the survey respondent primarily through walkability and culture transmitted from generation to generation. Provides safe and secure environments for 74% of the respondents. Visibility (48%) and lighting (36%) are listed as the main reason of this feelings. Affects people in artistic context(63%). Promotes architectural heritage is the most declared concept by the respondents(87%). The most visited place is Kozahan for 91% of the respondents. This is followed by Ulu Mosque and Cumhuriyet Street.

2. Social Performance Field Parameters: Likert Scale Questions
After the multiple choice questions respondents were also introduced with various statements in Likert Scale to document their perception of the Hans district. The summary results on these questions as follows. Hans district is found beautiful and/or impressive by only 63% for the participants. Same number of participants agree that the open spaces in the area is qualified as beatiful whereas respondents seem to have mixed feelings about the quality of streetscapes in the district (53%) While 93% of the respondent agree with the statement that historical buildings are impressive. The ratio of participants who agree with a similar statement regarding new buildings by only 23% of the visitors. Participants strongly supported the statement that Hans District promotes the urban identity of the city of Bursa (96%). The work carried out in the district seems to influence of the visitors decision to visit the area (59%) and the district can also be actively used at different times of the day for that reason (43%).
According to the findings the district improves the social wellbeing of the living and working people in the site (42%), and enables the number of people from different segments of the site to access to the site (51%). Respondents also stated that Hans District promotes participation in outdoor events (56%) as well as walkability (44%).

Conclusion

Historical city centers are of value to sustain and showcase the social life and vitality of urban communities. Therefore understanding socio-spatial dynamics of urban environments is necessary to ensure their longevity and sustainability. Historical urban environments, such as the Hans district studied here, have a unique role in this context. UNESCO’s “historical urban landscape approach” points out these roles and necessities in a holistic way. Preserving the quality of the human environment, enhancing the productive and the sustainable use of urban spaces, recognizing their dynamic character, and promoting social and functional diversity are some of the main components of UNESCO’s approach [20].

As it is highlighted above, Hans District is visited by people from various age groups and genders from different parts of the city. There seem to be a consensus with limited variations about its contribution to sustainability, artistic context and urban identity of the city. Results also reveals that the district in its current state improve their quality of life, contributes to their health and well-being, and assures their safety needs in its urban context. However, the level of recognition and/or participation in educational activities in the district was very limited among respondents. Although majority of the work carried out in the district have important social implications the results illustrate that some of these improvements and changes may not be as visable to participants.

When it comes to the physical character and attributes of the built environment in Hans
District the respondents were overwhelmingly supportive of the aesthetics of historic buildings, and most found parks and open spaces aesthetically appealing. However the respondents were not as supportive for the aesthetics of the streets/streetscapes but most importantly the aesthetics of various new buildings. Perhaps part of the criticism here, based on the field observations, may be about the piecemeal improvements and development strategies rather than district level thinking.

The results also reveals that the work carried out in Bursa Hans District have somewhat followed the seven priority areas of the management plan without illustrating a clear roadmap (a detailed district level master plan and/or an urban design guideline) in between the two. Although the district in its conception seem to be identified as a cohesive whole as an urban design intervention a majority, if not all, of the improvements seem to be done in a piecemeal fashion. Perhaps adding this layer to district level thinking may increase the visibility of the district and increase the satisfaction of the community while assuring its longevity and sustainability in the long run. Once such road map(s) (i.e. urban design guideline) are created a determination of a more comprehensive set of performance variables for social, economic and environmental factors can be the subject for the future research.

The results of the study of social performance parameters in the case of Bursa’s Hans District illustrates that the changes in the spatial function and character of such historic sites at urban design scale do influence visitors perception, satisfaction as well as their socio-spatial responses to built environment. Those changes that are made to physical environment influences social behavior thus engaging community in the evaluation process, and documenting and measuring their perceptions with empirical methods after the changes are being made is a critical step to assure sustainability, longevity and vitality of such environments.
In conclusion, creating cities and communities that work socially, economically and environmentally in order to promote sustainability in the long term will be one of the main challenges of this century. For that reason, it is necessary to conduct performance research similar sites and districts in order to improve future urban landscapes.

Notes
Abstract
Teaching geology is inevitable for landscape architect students to understand how geological processes form and contribute to the landscape.

Core of the paper is to distinguish between universal/generic principles of geology and the application and working out of these principles on a given site at a given time in a landscape architectural project (the typical design situation). Given the fact that international students come from very different countries, schools and geological settings, the level of principles should be sufficient to understand the geology in their own country and to apply these knowledge in their design approach.
Principles include the distinction between the different cycles; the rock cycle, the hydrological cycle and the carbon cycle; the distinction between geology, geomorphology and soil science; aspects of material, process, form, the different types of rock, the distinction between (endogenic) internal and exogenic (external) geological processes. Tectonics, geological processes, materials and structures should be made recognizable both in the field and on the map. A core issue in teaching geology, to make landscape architect students be able to read geological maps and interpret the legend.

The application of these generic principles on a given site and at a given time is a necessary component of learning how these principles work out in landscape architectural projects. Some projects in Budapest are very useful to illustrate how landscape architects make use of and implement geological principles in design.

It is not only necessary that students learn to distinguish the principles both in abstract and in the field, but also that they learn how to deal with them in design. It means that geological knowledge should be referred to later in different design projects and should be part of teaching in studios, seminars, workshops and fieldtrips.
Introduction

The Landscape Architecture and Urbanism department at Szent István University in Budapest has been running an international design-oriented Master of Landscape Architecture program since September 2014. Almost 100% of the students in MLA program come from outside Europe. Most of them have bachelor's degrees in architecture or other design-oriented fields, while only a few have landscape architectural backgrounds. Furthermore, almost none of them, first of all the ones with architectural training, have studied geology during their undergraduate programs. In the Hungarian educational system, landscape-architecture students are required to take one semester of geology/earth science in their Bachelor level program. While compiling the curriculum of the MLA program the question was if earth sciences should be part of it at all. Examining eleven randomly selected European and non European landscape architecture programs, I came to the surprising conclusion that geology and soil science as independent subjects are typically part of the undergraduate curricula in the landscape architectural programs of Agrarian or Life Science universities. In case of Technical Universities, where landscape architectural program is usually run by the architectural faculties, only one school out of three among the researched schools had geology or soil science in their program, while in case, when landscape architecture education is run by a design school, there is no geology/soils science in the program at all, according to the curricula of the researched schools. (Fig. 1)

The question is: how important is geological knowledge for landscape architects, and what areas of earth science are essential for a well-trained landscape architect.

Each landscape we see, no matter if it is natural or human landscape, represents an equilibrium of different forces. Even if those forces are invisible, the visible forms of landscape refer to forces which shaped them. [1]

Natural landscapes are formed by long-term geological processes, by climate, as well as by
flora and fauna. As human landscapes are more complex than natural ones, the forces behind the visible landscape are more multi-faceted. In addition to natural forces, human landscapes are also formed by socio-cultural and technological forces.

In both cases, however, geology is one of the main forces responsible first of all for the visible topography and soil quality of a given site and partially for the hydrological and ground water conditions. Thus, teaching geology is essential for landscape architect students to understand how natural processes form and contribute to the landscape. [1]

Materials and methods
Geology is a broad subject that cannot be taught comprehensively to landscape architecture students. Therefore, it is necessary to choose those areas to teach, which give students general conceptual basis and can be utilized well during their future professional work.

The Master of Landscape Architecture program in English is a four semester long international course, composed of students from different parts of the world with very different academic backgrounds and attitudes. It is important to give knowledge during the MLA training that can be utilized by the students in their own country and region once they return home to start working as landscape architects. As the training takes place in Hungary, most of the design sites are in this area. Therefore, the knowledge of Hungary, especially the region of Budapest, including its geological features, is also very important.

Teaching geological basics is part of a one-week long introductory workshop at the beginning of the four semester long program. The curriculum is based on the above mentioned principles. The tight time-frame requires a very compact and intensive program focusing on the most important features of earth science. Instead of a geologist, the curriculum is compiled and taught by an instructor with landscape architectural background, so that the education is considerably landscape oriented as well as based on practical considerations. The geology / soil science
education consists of 4 thematic blocks, each of them consisting of theory based lectures and related student projects, designed to help deepen the theoretical knowledge.

In the first thematic block the lecture comprises basics of geology, geomorphology and hydrogeology. When introducing the general concept of earth science, the main emphasis is put on the cyclical character of the processes (Fig.2) and on the principle of layered structure; the so-called law of superposition. (A law of geochronology stating that in a sequence of deposited rocks, the younger layer is always on the top.)

Learning about the rock cycle (geological cycle) helps to understand the process of rock formation and to clarify the difference between igneous, metamorphic and sedimentary rocks. Knowledge of the geological cycle helps to understand the formation and natural occurrences of most commonly used rocks. Their characteristics, like sturdiness and machinability determines their usability in the building industry and landscape construction.

Among the main branches of earth science, geomorphology is extremely important for landscape architects. It is a study of the earth-forms and the forces (processes), that are behind those forms. Those geomorphological processes include volcanic activity, earthquakes, weathering, solar radiation, erosion, deflation, etc. Some photos of famous geomorphological formations are presented, which show clearly how the geological forces fault or bend the rock strata. One of the most common forces that form the earth’s surface is water. The lecture highlights the main principles of hydrogeology with a special focus on how water bodies (oceans, seas and rivers) form the earth’s surface. Students learn about how to define watersheds, and their importance in any projects concerning natural waterflow. Along the course of a waterflow, different sections are defined according to erosion/deposition processes.

The second block is about soil science. Since it handles the upper layer of the earth (±1.5 m)
that determines its suitability for different types of land-use, this study is another key issue for landscape architects. The process of soil and humus formation is also part of the curriculum, and the students learn about important elements such as the soil horizon as well as the basic soil types (sand, clay and loam) and their differences. There are different kinds of subsurface waters, some of which have a strong effect on the land-use as well. The students learn about hydrological features like the water table, ground water level as well as confined and unconfined aquifers.

The first student task’s aim is to help understanding how those geological and soil science principles form the earth surface and determine the landuse in some particular cases. Each student presents the geological character and soil characteristics of his / her country / region in a 5-7 minutes long Powerpoint presentation. By doing so, students are encouraged to reflect on the theoretical lecture and to examine the geological processes of their familiar landscape, the types of rocks that can be found there, the kind of soil typical for the region, and the way it was formed. During these presentations fellow students will also learn about geological characteristics of faraway countries and see how geologic processes and geomorphologic forms appear in different parts of the Earth.

The workshop classroom contains a collection of local rock samples from Hungary mentioned during the lecture both in natural and polished form. During the workshop, students can inspect and touch these samples anytime which helps to make the information transmitted in the first lecture more palpable.

The next block deals with the specific geological and hydrogeological features of the Budapest area. [2] During the lecture we focus on typical geological processes and the morphology of this region. This way the students will be acquainted with the geological aspect of the landscape where they will work on different projects over the next 4 semesters. Since the area of Budapest is particularly exciting from the hydrogeological point of view (e.g. the Budapest’s thermal water
Budapest is located along an ancient geological split, where the River Danube was formed relatively recently. Due to this split, the same dolomite rock that is exposed on some hillsides of Buda can be found on the plains of Pest—more than 100 m deep. Budapest is famous for its hot water springs, most of which are located along the River Danube, along the ancient geological split. In addition to the thermal baths, the extensive cave system under Budapest is also a result of hot water activity formed by the dissolution of the limestone base of this region. The River Danube is a relative recent feature in the landscape, just some 10,000 years old. The river used to have many branches on the Pester plain before it was regulated in the 19th century. Even today many of these ancient river branches can be discovered in the Pest side by the gravel remains of former riverbeds. The tributaries on both sides of the Danube in the Budapest region are also mentioned in the lecture. The valleys formed by those creeks at the Buda side also serve as main ventilation channels for the city today.

One of the site visits following the lecture leads to a dolomite clog next to the Danube (Gellért Hill). Its trail on the steep east side offers fantastic views to the city, especially the Danube and the Pest plain, and during the walk you can see the exposed dolomite rock surfaces of the hillside as if we were walking in a picture book about its geological past.

Our second urban walk focuses on exploring stone materials used on buildings as cladding or footing and in different landscape projects. Here, students can see what kind of stone material can be used for different landscaping tasks, and learn about the ways surfaces can be machined.

The fourth lecture is about mapping geological data in general and how to collect data on geological conditions in a given area. Fortunately, in Hungary there is a free web site where you can query the soil type, base rock and groundwater depth at any point of the country. Using the map,
students are able to gather accurate information on geological, soil and hydrological conditions for any real-time design assignment. Although we know that there are few countries in which such a usable and free geological database is available, we encourage students to find similar online databases for their home country. After the presentation, the use of web interface is practiced by the students. [4]

Discussion

After studying the general geological principles and the specific geological and hydrogeological characteristics of Budapest, we focus on how those geological principles might appear in specific landscape design projects, and how landscape architectural tools can emphasize geological features of a site. There are two site visits to highlight these issues; both of them are parks in Budapest. Before the site visits, students get detailed information about geological, hydrogeological and soil conditions of those parks. The first site is a 4 hectare size district park, the so-called Bottomless Lake located very close to the campus. The main attraction is the 1 hectare size pond at the deepest part of the park, which is – contrary to its common name - only 4-5 m deep. (Fig. 3) It is interesting to note that there was a clay mine at the site till the beginning of the 20th century, which had to be abandoned due to an unexpected groundwater burst. The rough shoreline of the newly created water surface has not been settled for decades until the end of the 1950s, when the area around it was landscaped. Due to the growing intensity of building development in the broader environment, the groundwater level - and thus the level of the lake - is declining. Eutrophication has also started as a result of decreasing water supply and the overpopulation of fish. Approximately 10 years ago an aerator pump was placed here to mitigate the eutrophication process by bringing oxygen into the water. This site represents how a hydrogeological condition, such as high groundwater level, becomes a major attraction of a park. [5]

The other suitable site to represent how
landscape architecture can benefit from the unique geological features of a site is Jubilee Park, which was set up in 1965. The park is located in Budapest near the top of Gellért Hill on a rocky plateau on the southwestern slopes which used to be a windy, exposed site. Due to the difficult soil conditions, the site grading prior park construction started by exploding the exposed bedrock formations. Due to its position, the park offers superb views to the Danube and southern bridges, and to the Buda and the Pest riverbank. The landscape development plan reflects on this specific exposure by applying suitable pavements and vegetation. There are some natural rock formations on the site, which were integrated into the composition. [6]

Conclusion
The geological and soil knowledge gained in the Introductory Workshop will be referred to later in connection with different subjects during the course of the MLA program. During the first semester, when teaching about different analysis methods, geological and soil conditions are mentioned as an important aspects of analysis. In the Urban Ecology class/subject, geology is referred to as one of the bases of ecology. During the subsequent semesters, students in different openspace and landscape design projects are always asked to refer to the geological characteristics of the design site. Thus, by the end of the four semester long training, in the course of the diploma thesis design project, students deal in a self-evident way with the geological and morphological characteristics of their design site.

Notes
[4] https://map.mfgi.hu

Abstract

“The urban is, therefore, pure form: a place of encounter, assembly, stimulation. This form has no specific content, but is a center of attraction and life. It is an abstraction, but unlike a metaphysical entity, the urban is a concrete abstraction, associated with practice.” (Henry Lefebvre, The Urban Revolution)

The port city of Haifa, Israel, has an image of a peaceful city, in which different national, ethnic and religious groups live together in relative harmony. As a major city in a country known for its tension and violence, this normality is a rare quality.

However, a closer look at the city’s social geography will show us that the image of Haifa as a city of coexistence is, in many senses, a myth. In fact, the different groups in the city do not live together, but rather one above the other, in the most literal sense. The socio-economic topography is reflected in the physical one.

The downtown suffered for decades from neglect, as the authorities treated it as an economic resource and were blind to its inhabitants. Over the years, physical barriers have divided Haifa’s downtown into fragments and worsened the social separation. From the building of the British colonial port in the 1930s, to the Israeli-Palestinian conflict and the 1948 war, followed by erasing parts of the urban fabric, up to the chapter that we are witnessing today: the attempt to brand the downtown as a “hip” urban area by top-down municipal acts that are mimicking grassroots processes. The political and economic paradigms have shifted through the years, but the exploitation of this area, at the expense of the people living in it, remains to this day.

After examining the urban processes that led to the current situation, we suggest an alternative approach. One that sees the downtown as a shared space breaking the physical barriers caused by infrastructure and zoning, and the disciplinary boundaries between landscape,
transportation engineering and urban design.

If the city is a concrete abstraction associated with practice, as Lefebvre claimed, the practice of walking, can teach us a lot about the values that are reflected through a city’s physical form. We have chosen, in this work to look at downtown Haifa through the eyes of the pedestrians. Mapping the current obstacles and suggesting a design option that breaks down barriers that block the natural flow of pedestrian movement.

The design is based on relating to open spaces as a shared platform for different means of transport, eliminating the priority that vehicular moment has today and removing visual and physical fences. This will allow linking the city to the sea. We also propose changing the coastline and creating a longer and more varied coastline.

The design proposes a physical act. At the same time, it is a social declaration, which points out that urban rehabilitation is about eliminating fences. Reviving a decayed city cannot be achieved by branding, but rather by fighting segregation and separation.

**The Creation of the Downtown - an Introduction to Haifa’s Social Geography**

The port city of Haifa, Israel, has an image of a peaceful city, in which different national, ethnic and religious groups live together in relative harmony. As a major city in a country known for its tension and violence, this normality is a rare quality.

However, a closer look at the city’s social geography will show us that the image of Haifa as a city of coexistence is, in many senses, a myth. In fact, the different groups in the city do not live together, but rather one above the other, in the literal sense and as a metaphor to the social power relations.

The socio-economic topography is reflected in the physical one. The population with the highest income lives in the higher parts of the
city, while the Downtown municipal quarter is ranked amongst the lowest in the city\(^1\) in socio-
economical terms.

Downtown Haifa’s historical core is the Old City that dates back to the mid 18\(^{th}\) century. In the late
nineteenth century, Haifa became the commercial export center of northern Palestine and southern
Syria due to its active port. Its status became stronger following the 1905 expansion of the
Hejaz Railway that connected the city’s port to the railway that ran from Damascus to Medina.
As a result, Haifa grew from a small town with 4,000 inhabitants in 1868, to a city of 24,600
people by the beginning of first world war. The religiously diverse population consisted at that
time of 40% Muslims, 40% Christians, 15% Jews, and the rest of other religions\(^2\).

As Haifa started to grow beyond the walls of the Old City, it started taking on new form that was
directly influenced by international and political process. At the end of the 19\(^{th}\) century Haifa
experienced the first signs of colonial affects with the founding of The German Colony west
of the Old City. At the same time, the different religious and ethnic groups that lived side by
side in The Old City started building separate neighborhoods as the city sprawled. However,
the dramatic change came after 1917, when the British troops occupied Palestine. In the hundred
years following this event Haifa went through colonial and post-colonial processes, along
with traumatic events derived from the Israeli-
Palestinian conflict, that have turned it from a
compact mixed city, to a sprawling fragmented metropolis.

While the city was being built on the slopes of the Carmel Mountain, reaching as high as
470 meters, the Downtown area at the foot of the mountain has suffered from neglect and
decay. The following paragraph will review these

\(^{1}\) Socio-economic terms refer to the economic and social conditions of a region or community.
\(^{2}\) Religious diversity included Muslims, Christians, Jews, and other religions.
processes and their physical and social outcome.

The Creation of the Downtown’s Physical Barriers and Social Segregation

A. The British Mandate (1920-1948) – Colonial Motivation for the Development

1. The Port and the Petrochemical Industrial Area
At the time of the British Mandate, Haifa continued to grow rapidly. The population of the city during this period (1920-1948) grew by a factor of five and the built-up area grew from 0.8 to 6 square kilometers. The biggest source of the development was the modern port built by British Mandatory Government in 1933. The main motivation for building such a massive port was the discovery of oil in Kirkuk in northern Iraq. Haifa’s new port was the endpoint of the Iraq Petroleum Company (I.P.C) pipeline. Its construction necessitated the reclamation of about 340,000 square meters from the sea. Two breakwaters were also constructed – the main one 2210 meters long, and the second one 765 meters. In 1937 an oil jetty was constructed and Haifa became a main harbor for oil export. Next to the oil jetty, the British Mandatory government developed an industrial area that served European oil companies such as Shell and Anglo-Iranian Oil Company (AIOC, the source of today’s BP). This area, the size of approximately third of Haifa municipal boundary, is still active today, and serves Israel’s petrochemical industry. The port, which stretches to some 3 kilometers along the city’s central shore, is to this day the most significant barrier of the Downtown, with activities ranging from military, industrial and commercial next to a nowadays-smaller passenger cruising facility, that are inaccessible to the public.

2. The Railway
This section of the railway that runs through the downtown and is still active today, was built by Palestine Railways – a British government owned
railway company. The railway is still one of Haifa’s most important transportation infrastructures, connecting it to other cities such as Acre and Tel-Aviv. However, in terms of urban design, its effect on the city is devastating. The railway is a fenced space, which acts as a wall that hides the sea.

3. King’s way
The section of The Coastal Road that passes through the Downtown was built by the British Haifa Port Authority in 1933, on an area that was reclaimed from the sea, and was given the name King’s Way. After 1948 it was re-named Ha’atshmuat\textsuperscript{5} Road, and was re-constructed, separating motorized vehicles and pedestrians and making way for faster vehicular movement.

B. The National Conflict and the War of 1948 – The Demolition of the Old City

During the 1920 and 1930s Haifa knew mass immigration of Jews fleeing pre-World War 2 Europe. The tension between the Jewish and Arab population grew as the national conflict was building up. Violent incidents pushed these two groups apart and the Jewish residents built a separate urban center in a “Hadar Ha Carmel” – a neighborhood on the slope of the mountain, overlooking Haifa Downtown. Thus, a distinction was made between the new, upper, mostly Jewish neighborhoods and the lower, older, mostly Arab parts of the city.

The UN Partition Plan for Palestine, approved on the 29th of November 1947, designated Haifa as part of the proposed Jewish state, but gave it a status of a “mixed city” with both Arab and Jewish populations. By that time, the city’s population reached 140,000, of which 53% were Jews and 47% were Arab.\textsuperscript{6} In December 1947 a wave of violence between Jews and Arabs marked the beginning of the war. A seamline has evolved between the Downtown and Hadar Ha Carmel, separating the two national groups.
from one another. Tens of thousands of people living near the seamline left their homes in the following months. On 21 of April 1948, the British announced their forces are withdrawing from large parts of the city. The Jewish paramilitary organization – Ha-Hagana, attacked that same day the Arab neighborhoods in the Downtown and around it and took control over the city. Some 30,000 to 40,000 Arab residents fled the city as a result and Haifa’s Downtown was left deserted. A short time later, the authorities of the new Israeli State demolished most of the Old City, except for mosques and churches.

Israeli Historian, Yifaat Wiess, describes the fate of Arab Haifa in 1948:

“The rapid, fleeting nature of events may perhaps explain the disturbing disparity between Haifa as a Palestinian symbol of the Nakba (Disaster) on the one hand, and its conventional image among Jewish Israelis as a shining example of Jewish Arab coexistence, on the other”. [7]

C. The First Decades of Israel’s Statehood – When Modernism, Socialism and Zionism Clashed with the Reality of Haifa’s Downtown

In the early years of Israeli statehood, Jewish refugees coming from the Maghreb and from post-World War 2 Europe inhabited the empty houses of the displaced Arab population in the eastern part of the downtown - Wadi Salib. The Zionist and Socialist governmental and municipal bodies had plans to continue the destruction of the downtown to make way for a modernistic urban plan. However, since the Jewish refugees lived in the houses that were supposed to be demolished until the early 1970s, the plans were not fulfilled at that time.

D. Completing the Erascape

It was not until the late 1990s and early 2000s that the Israeli government’s modernistic plans were partly realized with the building of the Haifa’s new Governmental Quarter. The iconic skyscraper, which got the nickname “the Missile Building” for its missile like shape, is the most
notable building in this complex.

This process defined was by Israeli planners Ziva Kolodney and Rachel Kallush as Erascape [8] - the erased landscape of the downs old core made way for a new cityscape.

**The Municipal Reaction - Place Branding and Spectacle**

Haifa is characterized by post-industrial symptoms that are common in many port cities around the world. In “The Urban Revolution”, Lefebvre described the industrial city as an often “shapeless town, a barely urban agglomeration, a conglomerate or conurbation…”[9]. The Haifa metropolitan area fits this description, as the city lacks a distinct urban center. According to Lefebvre, the industrial city serves as a prelude to what he defines as a critical zone.

In the critical zone: “The increase in industrial production is superimposed on the growth of commercial exchange and multiplies the number of such exchanges. This growth extends from the simple barter to the global market...”[10].

Haifa is in a continuing process of entering the critical zone as its economy is shifting. The port and the industry adjacent to it are no longer the most dominant economic generators of the city. International and local companies linked to the global hi-tech economy have based their offices at the edges of the metropolis, in segregated compounds. The Tel Aviv metropolitan area offers more job opportunities suitable for the age of the global economy, than Haifa. As a result, there is a continuous flow of workers, which either migrate or commute from Haifa to the Tel Aviv metropolis.

These processes take their toll on Haifa’s urban environment, and most intensely on its Downtown. Every single block in the central Downtown contains apartments, offices or stores that are closed down. The presence of deserted businesses and apartments gives the passerby a feeling of walking in an urban Greyfield.
In recent years, the City of Haifa has been trying to brand its Downtown as “a lively student-centered compound, combining cultural life, entertainment and commerce” [11]. The Downtown Administration, which manages this place-branding campaign, belongs to the municipality but acts more like a management of a shopping mall. Its aim is to promote the economic potential of the Downtown area and to attract business people and entrepreneurs. The strategy the administration is that of place branding by tools of festivity and spectacles.

In the last few years, the Downtown Administration has tried to attract businesses in an attempt to revive the city, by giving owners of empty properties an exemption from municipal tax payment for one year should they rent their store to Haifa municipality. The municipality sub-rented these spaces under a project that it branded as ‘Compound no. 21’ to artists and designers. This “urban rehabilitation” project focused on attracting agents of “the creative class”. Financial benefits for ‘hip’ designer shops along with ‘festivals’ based on consumption were meant to initiate a gentrification process. Real-estate speculators started buying properties for rent in the Downtown. However, many of these properties stand un-rented and some of the designer shops and galleries have closed down once the financial benefits have expired. [12]

We claim that the failure to turn the Downtown from a Greyfield to a vibrant urban space is due to the fact the barriers that fragment the Downtown have not been lifted.

The Administration tries to attract students and designers by organizing festivals and fairs and encouraging entrepreneurs to convert deserted buildings to student dorms. As a result, there has been an increase in the number of people, which live in the central part of the downtown. Unfortunately, this effort focuses on short-term inhabitants. Thus, as a representative of the downtown administration told us, they have achieved in “increasing the number of beds
of beds in the central downtown from 2000 to 3000”. The local communities gain very little from the so-called urban revival, since the barriers described before, still limit the everyday urban environment of the downtown.

Several years ago, Ha’Atsmaut Road has been transformed to make way for a new public transportation system, built for a BRT [12] system branded as ‘The Metronit’, which has its own lane in the center of the street, bounded by fences and high vegetation. As if the barrier set by the vehicular transportation was not enough, The BRT fences made it virtually impossible for pedestrians to cross the street, except in the limited crossings.

An Alternative Reaction – A call to break down the barriers of Downtown Haifa

1. A Proposal for a Shared Space in Downtown Haifa

“Theyir story begins on ground level, with footsteps. They are myriad, but do not compose a series. They cannot be counted because each unit has a qualitative character (...). Their swarming mass is an innumerable collection of singularities. Their intertwined paths give their shape to space. They weave places together. In that respect, pedestrian movements form one of these ‘real systems whose existence make up the city’.” [13] (De Certeau)

As an alternative reaction, we have chosen, in this work to look at downtown Haifa through the eyes of the pedestrians, because the collective act of walking, as De Certeau identified is one of the practices that make up the city.

In order to break down the segregating barriers, we propose a design based on the following criteria:

- Relating to space as a shared platform.
- Removal of barriers (motor impairment, visual, and physical fences).
- Changing the transport system.
- Linking the city to the sea
Changing the coastline and creating a longer and more varied coastline.

Directing the movement towards the port by using existing and historical gates and openings.

Increasing the built mass and suggesting urban infills of mixed-use blocks.

Adopting the local urban typologies for the new proposed buildings.

The streets as a Share Space

The proposed section removes the presumed priority that vehicle users have over pedestrians. Ha'atsmaut Road, in its current state, is planned first and foremost for vehicles, with a wide carriageway and multiple lanes, large signs which can be seen from a distance and plenty of car parking for adjacent businesses. Pedestrians are less thought of – with very few places to cross the street and narrow sidewalks.

The shared space eliminates the limits for pedestrians, as the public space completely open and fenceless. Car-free areas are created by the use of trees and street furniture. Similar principles can be implemented on more narrow streets.

2. Renewing the Connection Between the City and the Sea

The proposed Shared Space reaches the coastline, giving the public access to the sea that was denied for generations. After over 80 years of reclamation projects, we propose “giving back” some of the reclaimed land to the sea by creating small artificial bays that can be used for marinas. Thus, the coastline where the city meets the sea, will be longer and more varied.

Conclusion

“The urban is, therefore, pure form: a place of encounter, assembly, stimulation. This form has no specific content, but is a center of attraction and life. It is an abstraction, but unlike a metaphysical entity, the urban is a concrete abstraction,
associated with practice. “7

This text has demonstrated through the example of downtown Haifa how physical separation caused by extreme zoning and by massive infrastructure is often reflected in social segregation.

Place branding is perceived as a “rehabilitation” tool for areas that suffer from urban decay. Haifa’s the Downtown Administration has been trying to re-brand the downtown through acts of festivity and consumption. By doing so, it is treating the downtown as an economic resource rather than a place to live in.

In contrast to this theme-park renewal approach, we propose change through one of the key factors of the practice of everyday life: movement.

If the city is a concrete abstraction associated with practice, as Lefebvre claimed, we would like to see Haifa reflecting social justice through its form. The design proposes a physical act. At the same time, it is a social declaration, which points out that urban rehabilitation is about eliminating fences. Reviving a decayed city cannot be achieved by branding, but rather by fighting segregation and separation.

Notes
[5] ‘Ha’atsmaut’ means ‘The Independence’ in
[6] There are various estimations as to the number of Jewish and Arab residents in the city. The estimation stated here is according to Yifat Wiess, *A Confiscated Memory: Wadi Salib and Haifa’s Lost Heritage*, (Colombia University Press, 2011).


[10] Ibid.


[13] BRT = Bus Rapid Transit


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Image 1: The location of Haifa’s Downtown (marked red).

Image 2: The commercial center and Al-Jarina Mosque during the Ottoman period.
Source: Mansour, Johnny, Haifa - a Word that has become a City, (Haifa, 2015)

Image 3: A Map of Haifa in 1918.
Source: Ottoman Haifa, Aspects of the City, 1516-1918, (Haifa City Museum, 2009)
Source: Israel State Archives (ISA)

Image 5: Downtown Haifa – 1933
Source: Israel State Archives (ISA)

Image 6: Displacement of Haifa’s Arab residents 22 April 1948.
Source: Mansour, Johnny, Haifa – a Word that has become a City, (Haifa, 2015)
Image 7: A Plan for The Development of Haifa’s Downtown, 1953 (unbuilt)

Image 8: Al Jarinah Mosque and Haifa’s new Governmental Quarter with “The Missile Building”, 2016. Photo by: Yael Bar-Maor & Laila Murad

Image 9: Greyfield Symptoms: shattered windows and closed-down shops at the Clifford Holliday block on Ha’atsmaut Road. Photo by: Yael Bar-Maor & Laila Murad
Image 10: Proposed design vs. existing situation
Abstract
The impact of the Modern Movement on rural landscapes in Europe and beyond is a widespread but little known, recognised or understood phenomenon which still exerts effects today. Within the HERA thematic programme “The uses of the past” this subject is now being studied within the MODSCAPES project. In the 1920s through to the 1980s there were a series of internal colonisations, large scale restructuring of rural landscapes, settlements and, through these and associated propaganda, a re-imagination of what rural areas should be like. Fascist Italy, Spain and Portugal, Zionist Palestine, Colonial French Morocco and Italian Libya, the resettlement of Greeks from Anatolia in Thrace, Communist Soviet Union and post-war communist states (eg. Ukraine, Estonia, Latvia or the DDR) are studied. In Estonia, after the WW2 and the Soviet occupation, all private land was expropriated by the state and the farmers became members of collective farms (kolkhoz) or state farms (sovkhoz). Land was reorganised, drained and made easier for machinery and, over time, new centres were constructed in Modernist styles and under Modernist conditions of thought and theory. One case study in Estonia is an outstation of the former Kirov collective farm at Omedu on Lake Peipsi (which focused on fishing and the production of fake caviar). Using several methods to examine the landscape: historical GIS, archival sources, drone imagery, architectural modelling and go-along interviews we have reconstructed the development of the landscape before, during and after the collective farm era. We found that the landscape was extensively remodelled into a fish farming centre which was never completed, a post- modern office and production facility which was built out of poor materials and fell into disrepair and a strange saga of how the production of the fake caviar contains all the elements which characterised the late Soviet system.
Introduction
The impact of the Modern Movement on rural landscapes in Europe and beyond is a widespread but little known, recognised or understood phenomenon which still exerts effects today. Within the HERA (Humanities in the European Research Area) thematic programme which started in 2016 “The uses of the past” this subject is now being studied through several lenses within the MODSCAPES project [1].
In recent decades, design-related disciplines have turned their attention towards the rural landscape as an emerging field of practice and conceptualization [2, 3, 4], making up with the so-called ‘divorce’ between design and agriculture after WWII [5].

The topic, however, has attracted considerable case-specific scholarship, dealing with experimentations such as the failed internal colonization and subsequent successful reforestation of Portugal under Salazar [6]; the resettlement of refugees after the Greco-Turkish War of 1919-1922 [7] and the modernization of rural landscapes in Kemalist Turkey [8]; the reclamation of the Pontine Marshes and of the Apulian tableland [9], as well as the establishment of rural colonies in Italian Libya during Fascism [10]; the Zionist colonization of Palestine [11]; the reorganization of the Gharb Valley in French Morocco [12]; the pueblos in Francoist Spain [13]; early independent Algeria’s rural development policy [14]; the forced collectivization of Ukrainian and Baltic countries’ rural landscapes during Soviet rule [15,16] and the German Nazi General plan “Ost” for the colonization of Central and Eastern Europe [17]. In the MODSCAPES project a sub-set of the above case studies is being examined by the Modscapes research partnership: Fascist Italy, Spain and Portugal, Zionist Palestine, Colonial French Morocco and Italian Libya, the resettlement of Greeks from Anatolia in Thrace and Soviet Ukraine, Estonia, Latvia and Communist DDR. In all these places the effects of Modernism are still present.
In Estonia, the focus of this paper, after the Second World War and the Soviet occupation all land which was under private ownership was expropriated by the state and the farmers had to hand in all tools, livestock, seed and any other assets. The farmers became members of collective farms (kollectivnoye khosyaistvo, kolkhoz) or state farms (sovietskoye khosyaistvo, sovkhoz). Land was reorganised, drained and made easier for machinery and, over time, new centres were constructed in Modernist styles and under Modernist conditions of thought and theory. This included standardised buildings – blocks of flats, animal houses, grain silos and production facilities. Some special buildings were also designed such as cultural centres, schools or kindergartens. After the collapse of Communism, the collective farm system disintegrated, land was given back the owners or their descendants and often the buildings fell into disrepair, were abandoned or found new uses, although the housing is usually still occupied.

Within the Estonian case study several sample areas have been selected for examination by the Estonian University of Life Sciences, and which will be looked at in different depths, as follows: for Estonia the former Kirov collective farm, now known as Viimsi, with an outstation at Omedu on Lake Peipsi (which focused on fishing and the production of fake caviar), “Avangard” at Äksi (which focused on egg and chicken production), “Lenin” in Läänemaa (focusing on cattle and pig production) and “Kingissepa” in Saaremaa (the 1st kolkhoz in Estonia). Figure 1 shows the locations of the study areas.

**Research objectives**

In this paper we present preliminary results from a plot case study at Omedu where we have applied the various methods described below. We aimed to find out how the landscape developed and what it is like now, 26 years after the Soviet Union collapsed; what is visible, what is its condition and what does this mean for the future in terms of what to preserve as representative of the collectivisation phenomenon.
**Method**

The research strategy involves:

- Understanding the changes that took place over time:
  - before the collectivisation process – what was the landscape like before?
  - During the collectivisation process – what was planned and what was implemented?
  - After the end of the collectivisation phase/collapse/abandonment/normalisation of the landscape – what is left and how does it appear today?

- Understanding the process at two spatial scales:
  - The landscape, that is the general territory belonging to the project, and
  - The settlement core, that is the village or other built ensemble

- Capturing the impact of the processes and people’s reaction and memories of the changing state over time.

We applied two complementary approaches to analysing the data about the landscape as comprising three aspects, each interacting with each other [18]:

- **Image** (the perception of the landscape and its sensory impact)
- **Structure** (the area and its layout patterns)
- **Action** (the processes which led to the landscape, especially the human actions which created it)

In addition, and as a means of understanding the way landscape is built up as a series of layers or deposits over time we apply the “sedimentation” model. This proceeds by local mapping and analysis of the historical formation of each case study area, where the assessment looks for a specific modernist identity of the sampled rural landscapes. The survey methods consist of:

- **Understanding** the spatial grammar of the case study area;
- **First-hand perception** of the case study area through use of different media;
- **Discovering** significant spots which form a representation of the landscape under investigation.
We prepared a series of map layers all at the same scale using QGIS using topographic maps from several different eras - pre-war, during Soviet times and now. These were digitised from raster images into vector files for comparison. We also examined the pattern and structure of the built elements – the individual buildings and the functional and representative layouts in more detail. For this we constructed a 3D model in ArchiCAD of all buildings and structures. We could then compare what was designed with what was built and what is there now.

In addition to the static data about the physical form we collected and interpreted moving images made by simple videos taken while driving/walking/flying (by drone) through or round the area (we call this “diving in”). These videos were accompanied by commentary and obtaining impressions from this.

The final aspect of data collection involved “go-along” interviews (walking around the site and talking about what is seen there or memories) with residents and former workers who revealed the way in which the site operated and what each area was for. It is important for understanding how the landscape impacted and continues to impact the experiences and perceptions or residents.

Results
Landscape scale
The evolution of the landscape, as Figure 2a-d shows, started with a natural, undeveloped area of wetland and forest, into which was gradually inserted a factory, dwellings and fish tanks. After the collapse of the kolkhoz the area quickly fell into ruin: the buildings were looted, the tanks emptied and forest started to grow back, yet some of the residents still live in the housing which remains (and who were interviewed in a go-along).

The mapped ayers show how a basically undeveloped area with poor accessibility, almost no settlement, very wet soil conditions and a large amount of forest – not exactly ideal circumstances for developing a fake caviar factory – was shaped by the application of
an ideology which would not “take no for an answer”. It raises the question – why on earth was the factory and fish tanks located there? It is the other side of Estonia from the main Kirov kolkhoz, makes no use of the nearby Lake Peipsi, has very poor transport connections and few people to provide labour? As time went on the place was gradually developed but the fish ponds were not finished, although the factory complex was. The landscape was considerably modified where the complex was created but abandoned to forest elsewhere, leading to a curious isolated element of “civilisation” in a remote place among the encroaching forest. In the years after it was abandoned the forest has come back even more, advancing to occupy the fish ponds (which have concrete linings but do not contain water).

Building ensemble scale
The factory building complex was designed by a well-known architect, Ado Eigi who ran a design bureau at the main kolkhoz centre in Viimsi and went on to have a career after the Soviet era, mainly designing private houses. The design, built in the 1980s, shows decidedly post-modern style. However, as a result of the economic problems besetting the Soviet Union in the 1980s the whole complex was built of shoddy materials and while large parts of the building structure remain, they are crumbling as the materials decay and are attacked by frost. Figure 3 shows the current state of the building complex from the air. As can be seen from the aerial perspective, the forest has taken over and advanced not only to the edges of the buildings but even onto its roofs. The canal which provided water to the fish ponds is still open but the fish tanks have also completely disappeared among the trees. A study of the designs of the building complex from the plans and drawings of the architect, the creation from these of a 3D model in ArchiCAD and on-site examination of the extant buildings revealed the extent to which the original design had been modified. The buildings have an interesting layout where the factory facilities, storerooms, quality control laboratories and offices are connected by a single axial walkway,
allowing access in all weathers. In addition to the main building, a number of housing units for favoured expert staff – like laboratory technicians – were provided and a pump house, water storage tank, electricity substation and culture house (unfinished at the time the kolkhoz ended) completed the ensemble. Figure 4 represents the structure as it is now and the original design as modelled in ArchiCAD. The parlous state of the building is clearly visible – its condition is past any repair in part due to the use of shoddy materials and as there are no plans to conserve the complex as part of the history of the Kirov kolkhoz and the work of Ado Eigi face serious challenges (see below).

Experiencing the landscape: diving in and go-along
The Dive-in, a method to record and map impressions while moving around a site, created a first encounter into Omedu, which builds the basis for all the following steps in the research narrative. The team commented continuously on all aspects of the appearance while moving and filming (Figure 5). Together with the maps the film material was used to assess types of distinctive places as well as elements which would become the focus of the Go-along interviews. The encroachment of the forest has altered the setting of the building complex so that the way it would originally have been seen by visitors is now hidden. The main axial passage way and the entrance do not (and did not) provide a clear orientation of the site and the main entrance and car park gives access to the factory sections and not the offices and director’s suite. Thus the site is difficult to read and makes poor sense from a landscape and architectural point of view.

Go-along interviews
We tried to understand the spatial character of Omedu being part of people’ lives and so we interviewed two local women (who still live there and who worked in the complex as quality control technician and office worker) while letting them walk us through different places which mattered
to them personally (Figure 6). As we went along with the interviewees in their familiar area we shared the place, the experience and some time together. The interviewees gave us a glimpse into their daily life and routines when being workers and settlers. After the interviews we mapped the interview route and places that were part of the story telling. Together with the maps, the film material was used for analysing the interviews and finding places which strongly represented the character of Omedu.

The narrative included curious detail about some of the aspects of how and why the place was developed and how the fake caviar was produced. The site was chosen by the powerful chairman of the Kirov kolkhoz at Viimsi (which is near Tallinn in the north of the country). The women told us how he pointed at a place near Lake Peipsi on the map and said “we will build it here” – without any detailed knowledge of the swampy nature of the site and no logical reason for its location in an unsuitable place. They described how, to make the fake caviar; gelatine was brought from a factory where bones from slaughtered pigs and cattle were rendered down. It was flavoured with extract of herrings – later the fish ponds were supposed to supply trout for this but it turned out that the water was too warm for them – which was brought all the way from Viimsi (Kirov) and it was coloured with tea (they were unsure as to where the tea came from but it could have been Georgia). There was a unique process for creating the small spheres which mimicked the fish eggs from which caviar is derived and the product was sold extensively in Ukraine and Belarus, earning a substantial income for the kolkhoz and enabling the wages to be rather high.

The women described how they had to check batches for quality and how good the place was to work in (being new and of a very interesting design) with good laboratories. They told how the place was looted and everything that could be taken away was stolen soon after the collapse – in the times of the “wild East”. An amusing feature of this was the fate of the huge tea store left behind – it was used as fuel for stoves!
Discussion and conclusion
The research revealed how the kolkhoz landscape and building complex came to be – as a result of the top-down decision making which took place far from the area and with no specific knowledge or logic involved. A relatively undeveloped landscape of wet forest and wetlands was transformed by drainage and other techniques and a unique architectural ensemble in post-modern style was constructed. The bizarre product – fake caviar – and the fate of the complex after the collapse of Communism mirror the surreal world of the Soviet Union in its last days. The visual exploration of the site, the reconstruction of the original designs when compared to the remains and the memories and stories of the interviewees all help to reveal the history of the landscape. As an exercise in modernism it reveals both an approach to modernisation – the introduction of advanced technology into a remote and unpromising location, drainage, creation of fishponds and the building complex and also Modernism expressed through the architecture. Perhaps it is ironic that this late flowering of Soviet architecture and expression of the hubris of the top-down central planning presaged the collapse of the entire system. What is left is a sad witness to a failed system expressed in the curious architecture, fish tanks full of trees and the crumbling brickwork of the buildings as they are gradually eaten away by frost, not to mention the way in which the place was ransacked as soon as the whole edifice came crashing down.

Notes
[1] https://www.modscapes.eu/about/
the commons and state formation in Portugal, University of Wageningen


[10] Capresi, V. (2009), The Italian rural centres built in colonial Libya (1934-1940), Bonomia University Press


[16] Bell, S. et al. (2009), Management of cultural landscapes: what does this mean in the Former Soviet Union, Landscape Research, v.34, n. 4: 425-455


Figure 1: Location of Estonian study examples

Figure 2a: The landscape in 1935, before the Soviet occupation and collectivisation (source: Estonian University of Life Sciences based on Maa-amet maps)

Figure 2b: The landscape in 1969, during collectivisation but before the factory was built (source: Estonian University of Life Sciences based on Maa-amet maps)
Figure 2c: The landscape in 2017 showing the physical remains (source: Estonian University of Life Sciences based on Maa-amet maps)

Figure 3: The Omedu complex from the air showing its current state (2014) (source: Kaiti Lillipuu, Creative Commons)

Figure 4: A collage of images of the building complex at Omedu; the current state and the model constructed from the plans to show how it was supposed to be when newly completed (source: Estonian University of Life Sciences)
Figure 5: a collage of images taken from the dive-in video of the unfinished culture house (source: Estonian University of Life Sciences).

Figure 6: a collage of frames from one of the videoed go along interviews (source: Estonian University of Life Sciences).
Abstract
Decades of growth and expansive construction of cities and towns left a public space often degraded and of poor quality. The architecture has a duty to recover the relationship between pedestrians and their surrounding space, both in terms of projects and territorial planning. The usual methods for cartographic and planimetric representation that are usually employed, though useful, have certain limitations to collect some types of information about perceptions and time. They create a hierarchy that brings constructed or physical elements into a main position, as they are easier to represent graphically. The importance of a large number of variables that affect the territory, such as sensations, environments, memory, perceptions, sounds, temporal relationships... are relegated to the mind of the designer, hardly finding place in the working documents usually handled.

The research project aims to develop a new methodology for representation and landscape project, focused on pedestrians and the timing of their walks, in which both physical and immaterial elements such as the memory of the place are equally important. It would also allow relating all the sensory experiences that now rest in separated fields of study such as townscapes, soundscapes, smellscapes, memoryscapes... achieving, in short, a public space focused on the needs and experiences of pedestrians, one of the challenges for the architecture and urbanism of the 21st century. The methodology we want to define -the Sound Diagram- aims to be both a tool for analysis and design of public space for professionals in architecture, urbanism and landscape, and an element of collective interest to help communicate different qualities and stories of public space to its own users, taking advantage of the ICT (Information and communication technologies).

Introduction
Public space is the element that organizes and characterizes each city or town. It is the space where all social strata come together, equalizing
possibilities and experiences. Its construction depends on the collective commitment, being a reflection of the society that formed it. It is both the support of memory and intangible qualities of the place, helping to define the concept of self-identity of each site.

Decades of growth and expansive construction of cities and towns left a public space often degraded and of poor quality. The architecture has a duty to recover the relationship between pedestrians and their surrounding space, both in terms of projects and territorial planning.

The usual methods for cartographic and planimetric representation that are usually employed, though useful, have certain limitations to collect some types of information about perceptions and time. They create a hierarchy that brings constructed or physical elements into a main position, as they are easier to represent graphically. The importance of a large number of variables that affect the landscape, such as sensations, environments, memory, perceptions, sounds, temporal relationships... are relegated to the mind of the designer, hardly finding place in the working documents usually handled.

Objectives
The research project aims to develop a new methodology for the study, analysis and intervention in public space and landscape that reflects both its tangible and sensory qualities, focusing on the pedestrian scale through their times and routes. It will be essential the use of new technologies as a means of processing and spreading the information. The aim of the investigation is to look for a way to analyze the territory that includes elements of sensory reality perceived by pedestrians (views, sounds, smells, materials, feelings...) in addition to aspects of the intangible culture such as the memory of the place. The parameter “time” is the axis around which the representation of space is built. Due to the different properties of the information collected (both tangible and intangible) and the interest to link them through the time parameter, we want to investigate a new expression tool through sound that enables the study and
manipulation of the information.
The methodology we want to define –the Sound Diagram– aims to be both a tool for analysis and design of public space for professionals in architecture, urbanism and landscape, and an element of collective interest to help communicate different qualities and stories of public space to its own users, taking advantage of the ICT (Information and communication technologies).

**Related work**
The study of public space from the point of view of the pedestrian, added to its relationship with the environment and its interactions, was the object of concern and investigation throughout the twentieth century. Below we review several disciplines that we consider very important to take into account when analysing public space or landscape, and therefore they are to be considered in the process of achieving the Sound Diagram:

- **Walkscapes.** F. Careri in his book ‘Walkscapes: walking as an aesthetic practice’ approach the connections between the walker and his environment. Dada’s ‘visit-excursions’ through the streets of Paris in 1921 was a milestone of great interest (Careri 2002) [1]. In that action they enhance the value of walking through several spaces of the city, other than those of historical or monumental relevance. The representative photograph of the action is taken in a ‘terrain vague’ (Solà-Morales 1996) [2], one of the semi-abandoned terrains in the city, which the landscape designer Gilles Clement might have in mind when he speaks of ‘neglected land’ (Clément 2012) [3], as those vacant or forgotten lands often left in the process of expansion of the cities, and that, according to his ‘Manifeste du Tiers-Paysage’ (Manifest of the Third Landscape) are a great source of opportunities. Figure 1

Later, the Situationist International continued Dadaist concerns, although more oriented to urban analysis, especially through Guy Debord. Unlike Dada, Situationists have the need to draw the paths, the ‘dérive’ (drifting) (Debord 1956) [5], eliminating in a certain way
the fact of spontaneous action. In the ‘Guide Psychogéographique de Paris’ (1957) Debord presents a city divided in islands that are ‘homogenous environmental units’ (Careri 2002) [6], which the tourists have to link by walking routes through voids in the map. (Figure 2)

- **Townscapes.** Within this name, taken from the work of Gordon Cullen *Townscapes* [8], we can include the different studies made in the second half of the 20th century, which analyze the city in a visual way based on its elements, being the work of Kevin Lynch *The image of the city* one of the greatest referents in the field. Also in the 1960s, Alison and Peter Smithson advocated the importance of including other disciplines such as the social sciences in the urban planning debate. Thus, the concepts of ‘Patterns of Association, Patterns of Growth, Cluster, Mobility’ [9] appear in their *Urban Structuring* (1967) as a response to dominant rationalist urbanism after World War II. The phenomenological approach, booming in the 70s and the 80s, implies the objective study of subjective phenomena. Norberg-Schulz exposes in *Genius Loci: Towards a Phenomenology of Architecture* (1980) the importance of the ‘place’ [10] (the spirit or characteristic ambience of the place) in the projects of architecture and public spaces.

A more recent theory of urban analysis, the space syntax leaded by Bill Hillier, is well known by its capacity to describe and categorize streets in terms of connectivity and perception. A previous study of the movements through the urban environment using the space syntax method and depthmapX tool (Hillier 2014) [11] can suggest the more interesting paths to develop the sound diagram. In fact, complementing widely recognised space analysis methods is one of the aims of the present investigation.

- **Soundscapes.** We find it very interesting to introduce, within the architectural and urban discourse, characteristics of the field known as ‘Soundscapes’, a term popularized by Murray Schafer in the 60s. This branch, that studies the relationship between people and the sounds that surround us as an acoustic ecosystem, became especially important with the possibility to record
and manipulate sound files. This discipline focuses on spatial, urban, ecological, and landscape features, which tell us about the relationship between pedestrians and their surroundings, and the ability of the sounds to define or characterize spaces, as well as being carriers of the collective memory of those spaces. The successive evolution of technology and the interest in the field currently made ‘Soundscape’ the central topic of many researches. The London Sound Survey initiative stands out with thousands of recordings of the city [12].

A soundscape consists of events heard not objects seen. (...) To give a totally convincing image of a soundscape would involve extraordinary skill and patience: thousands of recordings would have to be made; tens of thousands of measurements would have been taken; and a new means of description would have to be devised. Murray Schafer, The Soundscape: Our Sonic Environment and the Tuning of the World [13] (Figure 3)

- Smellscapes. Until very recently, this field of work have been overlooked or poorly taken into account by urban planners, usually considering smell only as a negative element, as Quercia, D, Schifanella, R, Aiello, L. and McLean, K report in ‘Smelly Maps: The Digital Lives of Urban Smellscapes’ [15]. Their contributions on smell classifications and the importance they have in the reading of urban spaces are revealing and therefore, it becomes very interesting to incorporate olfactory perception into the Sound Diagram. (Figure 4)

- Memoryscapes. There are initiatives to make maps of the memory of the place [17], a quality of the public space very important in Europe and that often is forgotten in the traditional cartography. Stories and legends are key elements to take into account when analyzing a landscape, so the Sound Diagram should incorporate these layers of information as well.

- Songlines. Without going deeper into an already well-studied subject, it is worth highlighting the parallelism of the Sound Diagram with the
Australian Aboriginal songlines, which functioned as a kind of sound map loaded with information and meanings.

To find their way, Aboriginal Australian people have long used environmental clues that are nearly imperceptible to others [...] When they describe a place, they evoke both its mythical and physical attributes. Karen O’Rourke, *Walking and Mapping. Artists as Cartographers* [18]

**Methodology**

The following scheme is an overview of the creation process or methodology of a Sound Diagram:

1. Delimitation of the spaces or routes to be represented. It can be an urban or landscape environment.

2. Selection of the elements to include in the diagram. Although some of them can be discovered during the walk, it is convenient to start with a basic list of elements that interest us depending on the type of place and project in question.

3. Field work. Making of the mapping gathering the data and associated times.

4. Cleaning and ordering of the information in a time-plane, which will be the “music sheet” of the Sound Diagram. (Section 4.1)

5. Assignment of one sound to each mapped element. (Section 4.2)

6. Building of the Sound Diagram, according to the “music sheet” and the sounds.

7. Manipulation of the Diagram freely to project changes in the sequences, so it could improve the pedestrian experience. (Section 4.3)

**1. The time-map or “music sheet” of the Diagram**

In order to create the Sound Diagram, a preliminary field work is necessary, making the **time-map** which will be the “music sheet” of the diagram. It is obtained by walking the desired area. Once the route is started, the rhythm is marked in the map (every minute, every 3 minutes or in the desired interval), as a metronome. The resulting intervals are all the same length, not in meters, but in duration.
On this map, already with a rhythmic grid, the elements we want to map are added at the moment they appear or disappear. Views, sounds, spaces, smells, sensations... The aim of the diagram is to reflect every item a pedestrian can perceive, either tangible or intangible. This way both items can coexist in the same document and help the designer to take decisions based not only in the highly precise measured elements (constructed element, environmental values...) but also in some aspects more difficult to include in the usual cartography, such as sensations. Once the tour comes to an end, with all the data collected, the time map is finished. This map is important because it allows us to reference any sound that appears in the diagram with its spatial location. In the same way, it allows us to go the opposite direction if we want to intervene in the landscape: by manipulating the sounds (erasing, displacing or adding) we can obtain a projected scene, from which those changes can be translated to the time-map and later to the original cartography.

2. The sonority of the diagram: organizing sounds
The Sound Diagram is not a Sound Map of a city, understood as a recording of the streets. Instead it represents constructed elements, sensations, urban events... through an acoustic codification. One of the necessary tasks we have to make before obtaining the first Sound Diagram is the realization of a “sound library” - as a database - to associate the perceived realities with sounds, so that once established that database, all the diagrams can be constructed according to it. This allows the comparison between diagrams of different cities or routes, establishing common points and differences. In order to associate sounds with urban realities, we are beginning the study of neurophysiology research on “synesthesia”, to achieve the best possible association of sounds with colours, smells, sensations... so the resulting diagram can be as recognizable as possible by a pedestrian, although it also has an associated sound legend. To help this purpose, production effects can also be introduced, such as left-right balance.
(depending on where the item is located), high-low volume of each track according to the intensity we want to represent, reverberation or sound textures to resemble different materials... Throughout the history of architecture the relationship between music and our discipline has been well studied -with common elements such as rhythm, harmony, scale, intensity, sequence... - but always treated from the compositive-geometrical point of view referred to edification. The theoretical contribution of two of the most recognized authors like Cage and Xenakis is of great interest from the point of view of the relationship between music and architecture, and therefore an interesting basis to apply in public space and landscape. However, in order to avoid confusion between our work in making a Sound Diagram and the work of musicians, let us consider the expression of John Cage:

> If this word, music, is sacred and reserved for eighteenth- and nineteenth-century instruments, we can substitute a more meaningful term: organization of sound.

John Cage, Silence [19]

3. Manipulation of the Sound Diagram
Each element to be represented constitutes a ‘layer’, in this case an audio track, which only contains the information of that element. The number of tracks in a Sound Diagram is completely variable depending on the information to be mapped. New layers can be added at any time, gradually making the diagram more complex.

The structure of the Sound Diagram allows the user to decide which layers they want to hear, muting others in order to obtain a customized diagram adjusted to different projects or purposes. People can listen to the Diagram on their device while being in the field or in the office as many times as wanted, and activate or deactivate layers, focusing on specific features.

4. Applications of the Sound Diagram
As mentioned above, the Sound Diagram can be treated as both an analysis and project tool, and
a collaborative work of interest to citizens.

- Analysis and project tool. The diagram is constructed according to some guidelines and analytical data, therefore its content is adjusted to the reality of the “mapped” path, constituting a reliable source of information about the place that can be useful for projects in public space and landscape. The diagram is not only a reflection of the current state, but allows its manipulation to incorporate or modify elements.

- Artistic Approach. The Sound Diagram consists of analyzing or “mapping” a territory through some routes, and above all in trying to transmit that information to the citizens in a different way from the traditional one. The approach from perception and senses can facilitate that it reaches the average listener. It has potential to be used in fields such as tourism, the collective of blind people, or any inhabitant wanting to discover different features of their environment that may have been overlooked. Transmitting the diagram through the ICT helps to reach a wide range of people.

**Case study**

In 2011 the author of this paper participated in a team within the conference *Intuited City: Compostela 2021* [21]. The objective was to improve the pedestrian movements from the centre of the city (cathedral) to the periphery, through the Route of Santiago de Compostela. From the beginning, we believed in the need to look for a graphic way of representing time, so as to be able to use it in urban planning. (Figure 6) The first schemes sought to move from a regular cartography to a time diagram, but we still had elements lacking strength in the drawings: the view of the towers of the cathedral, the murmur of a nearby river, the atmosphere of the entrance to the Obradoiro’s square, the magic of an oak forest in the path. Thus, we thought it possible to translate these graphic schemes to a sound code, so that the route was a kind of ‘song’ in which all the desired elements appeared and disappeared, with more or less intensity, being able to perceive them in the same sequence in which a pedestrian would. (Figures 7, 8)
Due to lack of time and the difficulty of the execution, the sound research remained as an incomplete experiment, but it opened up a path that was resumed shortly afterwards, reaching the definition of the methodology here presented. (Figure 9)

We will soon be able to test the tool in the study of a green infrastructure for the metropolitan area of A Coruña. This way, we can put together in the same diagram different elements found in a path along the coastal zone, so as to relate them through time and the sequence in which they appear: moments in which the sea can be seen, heard or smelled, in those that we cross areas of special botanical interest, spots known by their legends or traditions, areas where we hear or see traffic, where we perceive pure air, find different pavements or architectural barriers... Once we have that representation of the pedestrian route, we will use it to detect deficiencies, possible improvements, and opportunities that the territory offers us, being another tool of the project, as well as GIS or CAD maps, Excel bases, etc.

Discussion
This work intends to reach academics and planning professionals by opening a discussion on the role of pedestrians in the usual cartography, and find a useful tool that allows us to reflect the complexity of the landscape. It holds some limitations but also opens up opportunities, as reflected below.

1. Limitations:
   - Initial difficulty when experiencing, for the first time, a tool that uses sound as the main transmitter of information, outside the usual comfort zone of the professional.
   - Translating physical and sensory elements to a sound code. The sound database is still in development; it needs specific research and tests to improve its functionality.

Need to develop a digital application that uses GPS to locate the elements and convert them to defined sounds in the sound-library. This would allow easy public participation for the elaboration
and improvement of the cartography.

2. Opportunities:
- Possibility to work with real perceptions from a pedestrian point of view, giving equal importance to physical elements and immaterial ones.
- Ability to combine in the same tool elements of traditional cartography and other kind of mappings such as soundscape, smellscape, memoryscape...
- Tool not only for representation, but also for projecting. Listening to the information, instead of reading it, generates other kind of relationships between the elements. It allows us to think outside the box in landscape planning.

The mapping of spaces by digital means can be transmitted to professionals as well as citizens, by using ICT (such as mobile apps, open source maps...) allowing the public participation, and therefore enriching the information available in each city.

Conclusion
Here we present the methodology for a tool of representation and landscape project, focused on pedestrians and the timing of their walks, in which both physical and immaterial elements such as the memory of the place are equally important. The use of this tool would help professionals to achieve a more complete vision of a space that complements the traditional cartography, while it allows relating all the sensory experiences that now rest in separated fields of study such as townscapes, soundscapes, smellscapes, memoryscapes... achieving, in short, a public space focused on the needs and experiences of pedestrians, one of the challenges for the architecture and urbanism of the 21st century.

In the near future, we expect to be able to test the described tool, providing complete Sound Diagrams of an actual landscape project, and sharing the results with all the concerned
community.

Notes


Figure 1: ‘Visit-excursion’ Dada at Saint-Julien-le-Pauvre, Paris, 14 April 1921. (Musée d’Art et d’Histoire de Saint Denis). [4]

Figure 2: GUY DEBORD ‘Guide Psychogéographique de Paris’, 1957. [7]

Figure 3: MICHAEL SOUTHWORTH ‘Evaluation of part of the Boston Soundscape’ [14]

Figure 5: JOHN CAGE ‘49 Waltzes for the Five Boroughs’. From Rolling Stone, October 6, 1977. [20]
Figure 6: Author of this paper, 2011. Time-grid over the aerial view of Compostela. Each point is a 3-minute walk.

Figure 7: Author of this paper, 2011. Time-Diagrams. Each segment is a 3-minute walk; represented opportunity spaces, views of the cathedral and perceptions of the river, among others. First attempt making a music-sheet for the Sound Diagram.
Figure 8: Author of this paper, 2011. Distances table between interesting spots by walking (in minutes).

Abstract
Design is action at a distance
Robin Evans
Nature slowly and creatively reinvent the craters produced by the intense battle of Verdun (France). On the other hand, the First World War trenches’ wild outline in Somme (France) is smoothed out and turned into domesticated land-art passages to preserve memory though territory human made shapes.

These landscapes result from the overlapping effect of two key deviations: first, a war decision by which a specific kind of destruction is brought upon the territory while creating a new realm of relations and possibilities; and second, the decision of how to design and/or intervene in the resulting landscape.

Though separated in time, it is the mixed effect of these two actions that produces the landscape’s real memory.

We seek to understand this process through a series of study cases classified after the kind of relation established between territory destruction and creative landscape interventions:

a) Preserved composition (Somme battlefield trenches): expression of a common cultural duration. Design creatively mirrors itself, beginning a less intense dialogue with the past to let breathe the dynamics opened up through destruction while introducing an actively designed present line.

b) Enclosure of the past (Pointe du Hoc craters): using war as cultural reference for landscape design. Through formal trivialization and simulation, design exhausts the dynamic realm originated in the first deviation, thus, working just as the initial destruction did.

c) Ecological listening (Verdun battlefield ruins): silence as conscious action. Landscapes are reabsorbed in biological long-term durations that subsume culture in a radically different way.
Design is fragmented and landscape co-produced while no authorial line of action prevails.

In 2006, the scientists Joseph P. Hupy and Randall J. Schaetzl, coined the term *bombturbation* to refer to the geological effects caused by the detonation of explosives on the surface of the Earth. Their article, *Introducing “bombturbation”, a Singular Type of Soil Disturbance and Mixing* describes what occurs at a geological level on a battlefield on the basis of the cause of the mixing of strata [1]. The analyses performed in their study provide evidence that the consequences of the impact of a bomb are similar to those caused by a meteorite strike. Although the latter are uncommon, the craters formed by some of them are preserved around the world [2]. The depths of these immense holes makes us aware of the force of the universe, and we recognise cosmos’ supremacy over man in them. Their remains became kind of sacred spaces, and they still fill us today with the same awe and silence as they did our ancestors.

If we compare the surface of the Earth with our skin, the impact of a meteorite is a wound that becomes gradually scarred in a natural way until it is hidden by new cells which occupy the vacuum left by the displaced material, until it blends into the rest of the damaged tissue. This is a process of regeneration in which nature heals its own injuries.

Europe still has many open wounds produced by the impact of bombs and the excavation of trenches during the First and Second World Wars. These entail, in addition to geological variations, a modification of the form of the outermost horizons of the Earth’s crust [3]. The efforts to preserve these transformations of the ground lead us to ponder how that destruction can lead us to devise actions which can make people aware of the history of Europe through its landscape.
Destruction is also, in origin, construction. The words destruction and construction share the Latin root *struere*, meaning ‘to join together or pile up’. Both describe an action which relates individual elements by means of a distance. If the pieces of the assembly move away from the starting point, we speak of *destruction*, while if they move closer together, we can identify *construction*.

Constructing or destroying a landscape has to do with the relation between man and environment. People choose the point from which to bind together a series of independent elements (including themselves) so as to build a recognisable whole. The separation between the setting and the plane of construction gives rise to a spatial and temporal distance pulling on the elements participating in the process and whose result we shall call landscape [5].

Whether in planning an attack during the war or acting later on the result of the same, man guides his acts through chains of decisions. In war landscapes, an initial decision taken remotely turns out to be the origin of their existence. Let’s imagine that a political leader decides to intervene in a zone from his war room, hundreds of kilometres away from the place to be attacked. In that case, those responsible for the destruction are physically distant, and their decision is carried to the site, yielding a new landscape as consequence. Chaos and destruction, assumed to be mere by-products of defence and conquest, show that man has an impact on the landscape through politics [6].

Long after the attack has taken place and we ponder how to preserve the traces of the event, we will always find an increasing temporal distance between the moment at which the changes took place on the ground and the present from which we observe the outcome of the war.

The cluster of distances and the actions carried
out on the ground at a battlefield converts its terrain into a topography - from the Greek τόπος (place), and ‘-graphia’ (description) -. In this, the acts giving rise to how they look can be “read” in a morphological analysis. Thus, war landscapes are at the same time narrative landscapes, capable of telling us their history for themselves. Their anomalies and singularities transform the horror of war into a strangeness in which we can find beauty by reviving a past action through thought [7].

The spectacle of force turns then into an aesthetic emotion which, combined with the narrative capability of the landscape, makes it necessary that we consider preserving these enclaves as cultural heritage.

Modern society, conscious of war landscapes values, manage aesthetic as a product. So that, war landscapes result from the overlapping effect of two key man-made deviations. First, a war decision by which a specific kind of destruction is brought upon the territory while creating a new realm of relations and possibilities; and second, the decision of how to design and/or intervene in the resulting landscape. Though separated in time, it is the mixed effect of these two actions that produces the landscape’s real memory.

We seek to understand this process through a series of study cases classified after the kind of relation established between territory destruction and creative landscape interventions. How can we preserve the traces of history in a living reality? How far is the plane from which the actions of intervention in the territory were designed?

Creation in destruction. Three positions for the construction of the landscape.

While politics has an effect on the landscape, managing war landscapes and designing conservation strategies are at the same time political tools which keep the cycle of influences between society and its environment open, in constant motion.

Through three outstanding enclaves of the
First and Second World Wars, we will analyse how far away the designer was with respect to the environment, so as to propose solutions of accessibility and conservation for battlefields, and also consider the strategy of relationship adopted to narrate an event through landscape.

In the **fields of the Somme and Verdun** (France), one hundred years on, many remnants of the two bloodiest battles of the First World War fought against Germany on the so-called Western Front still survive. During these battles, attacks with minefields and artillery were used, along with defence of the fronts from trenches dug into the ground.

The dimension of the *No Man’s Land* or the space between trenches was determined by the destructive power and reach of the weapons of the day. The ninety or, at the most, two hundred, metres between opposing trenches, defined a territory mauled by the explosion of grenades and medium-range projectiles. Thirty years later, those two hundred metres turned into vast unmanageable areas during the Second World War. The development of aviation and the rise in the destructive power of munitions increased the area affected in each attack, at the same time reducing how long offensives took. The traces of the explosion of bombs which are still preserved in the cliffs of **Pointe du Hoc** (France) show the astonishing increase in the scale of destruction in just a few years.

Standing between the Omaha and Utah beaches, its location turned Pointe du Hoc into a strategic point. Armoured with six long-range guns by the Germans, the position was attacked throughout the month of April 1944, two months before the Normandy landings. Finally, on D-Day, Pointe du Hoc was taken by American troops, in one of the toughest battles of the conquest of Hitler’s Atlantic Wall.

Craters and trenches are the signs which keep the battles of the Somme, Verdun and Pointe du Hoc latent even today. Integrated as backdrops to history, the authorities employ funds in preserving
these deformations, aiming to convey the horror of war through an unusual spatial experience.

War is then limited to the visible result of the destructive actions of humans, and the experience of the landscape is relegated into the background reducing all the agents involved in it to just one, converting the landscape into a formal representation of an event. While in the case of a meteorite impact, cause, effect and absorption of the geological and formal consequences are a task for nature, in the case of human landscapes, given their anthropic origins, these are deemed to be artificial constructions, and the aspiration is to recreate them as a controlled spatial experience. This turns out to be an incongruous task because it takes place in a natural setting, where the regenerative force is indomitable.

The difficulty of controlling the entire area bounded by any of the three events means that several conservation actions take place at the same moment. Engaging to a greater or lesser extent with the environment and history, these solutions become a common response to the same problem: how can we maintain a static form in a living environment?

Analysing the distance of the design plane from the landscape, the first stance for the construction is proximity. In certain actions, the designer comes so close as to choke the reality, and the design is imposed upon nature. This stance is easily recognisable in the main tracks for communication joining the interpretation centres to the physical limits (fences, monuments or memorials) which bound a “historic property”.

The landscape is treated as an object and endeavours are made to preserve a composition of forms at all costs so as to offer the visitor a spatial experience similar to the real one. The result is to turn the inhuman battle conditions into an agreeable caricature of what they were.

At the trenches of the battle of the Somme, explanations and interpretations get ahead of
reading the struggle in the topography. The trenches become agreeable winding tracks between piles of earth which bear little relation to the tombs of mud they were in their day, and the experience of the war landscape is limited to the reminiscence of a sensation by recreating a space through architecture.

The lack of distance between design plane and the reality leads the event to be trivialised and hollows it out. We think we know about the event because we can see it and touch it. However, reflection and analysis show us immediately that we know no more than its appearance [8].

In the case of Pointe du Hoc, the concrete paths that take the hurrying tourist directly to the most outstanding point of the visit contrast with the mud tracks that have sprung up to the points which arouse the curiosity of the visitor. It is the topography itself which leads to knowledge through exploration, and beyond the visual recognition of the form and the magnitude of the explosions, you undergo an unfettered immersion in the place. An island of the past in which the normalised activity of the present is introduced little by little, and in which the visitor is the author of the itinerary through their intuition and curiosity.

Nevertheless, in 2015 the ABMC (American Battle Monuments Commission) introduced a flock of sheep to conserve the 6000 m2 restricted area of the memorial at Pointe du Hoc [9]. Justified as an ecological and entertaining measure, an electric fence not only stops the sheep from escaping, but also prevents visitors from wandering among the craters, so avoiding erosion of the unusual shapes which attract so many tourists every year. Free exploration, which brings so much awareness, is curtailed, returning again to the formal preservation of the place.

Both at Pointe du Hoc and on the First World War battlefields, the zones beyond the controlled enclosures engender a new situation in which people listen to the landscape, from a prudent
distance. The shapes, invaded by time, become a ruin, symbolising our dissatisfaction with the contemporary [10].

The ruin reconciles the consequences of the past with the present, and the passage of time underscores life over tragedy. The design plane and the reality are joined by a virtual line. The plane recedes and draws closer along this, so moving as to maintain a constant tension, allowing dialogue between nature and the construction of the landscape.

Taking the ruin as starting point, the strategy of ecological listening proposes an active reading which fosters, at the same time, natural reconstruction of the ecosystem and virtual reconstruction of the event by the memory.

If we observe some stretches of the trenches of the battlefield of Verdun, we see that time, rain and earth have filled the ditches with organic matter. Their depth has decreased over time, the sharp edges become blurred, but it is easy to imagine the dreadful conditions by recomposing the proportions of the depth, walking along a narrow path, bounded by the ends of the buttresses which still stick out of the ground. Even though we cannot experience what it is like to hide in a foxhole, we relive the crudeness of the conditions in our effort to understand the landscape completely.

Similarly, vegetation now sprouts out of the craters and deformations of the ground, and a new geological period gets under way making the environment the owner of no man’s land. The topography echoes with the narration of history. Without imposing any reading, the gradual occupation and erosion offer one with not just a single meaning, and the territory no longer conveys the mere feeling of destruction, but also that we can learn the values necessary to get over a conflict from it.
'Aesthetics and ecology are more closely connected than one thinks, and [that] two things suffer whenever this connection is not considered, namely the natural regeneration of resources, and fulfillment of the observer’s expectations of the landscape.'

L. Burckhardt

Conclusions
The message of Lucius Burckhardt in his text Aesthetics and Ecology [11], underlines the importance of harmony between ecology and aesthetics in achieving a balance between natural resources and the cultural expectations of humans. Intermingled with the war landscapes, the efforts to preserve trenches and craters are equivalent to forcing our skin to keep a wound open.

Immersed in the debate between artificial and natural forms, landscapers and architects become responsible for constructing the memory of a landscape from the moment at which controlling the natural course of the ecosystem so as to preserve certain remains for as long as possible is mooted. Depending on the position from which they choose to project, either leading the design or as directors of strategies, the experience of the landscape offered will be more or less intensive.

Managing these places as tourist zones converts the unnatural into an object of consumption, and therefore the landscape is compromised in an assimilable, direct and indisputable way, reflecting the immediacy which prevails in any experience in the twenty-first century.

The “humanised” points you can see at Pointe du Hoc and the fields of the Somme and Verdun show us that the imposition of architectonic solutions for the preservation of territories of war displays a debatable proximity to the plane of the designer of the reality. The efforts to encapsulate history by preserving the shapes of bombardments and trenches precludes a possible joint development of ecology and aesthetics. Freezing the past, as a consequence of our fear
against contingency and the unknown effects of the passage of time, limits the landscape to its appearance, and thus an artificial design is imposed that underestimates the beauty of nature’s structures.

The distancing conferred by ecological listening entails opting for an invisible design. Control over the presence of the designer in those “architectonic” solutions which seek to make history accessible, is a strategy which multiplies the possible readings of the landscape and, in consequence, increases the values that the human being is capable of learning from the landscape. It is a radical vision which aims to overcome catastrophe by a sensitive approach to reconstructing the territory, letting the remains of human damage be reabsorbed by the ecosystem in a natural process. The surprise prompted by the growth of a tree in a bomb crater is prompted, above all, by the tingle linking life to the hostile soil of war.

How can we preserve, then, the traces of history in a living reality? The landscapes of bombs and trenches should be regarded as fleeting aesthetic events. The dynamic mapping and records of the metamorphosis of the topography are a vital instrument for conveying geological evolution and knowledge of the true history of a place. The mapping of the bomb impacts in Laos during the Vietnam war and the exhaustive study of the nuclear explosion craters in the Nevada desert are examples of how technology can help us to tell the story of a war landscape [12].

Deciding whence we build the landscape is an essential decision. Adjusting the tension between designer and reality, which changes with each case, we find the force necessary to convert a battlefield into fertile ground for relationships. Advocating nature as the principal conservation agent for the destructive acts of humans offers the ecosystem the time necessary for recovery, and, for us, it offers the best lesson in humility that can be learned by those who are receptive to it.
Notes


[2] Complete impact registration can be found online in the Earth Impact Data Base at Planetary at the Space Science Centre (PASSC): http://www.passc.net/EarthImpactDatabase/


[7] Thought which, as proved by French philosopher Henri Bergson can have deep aesthetic effects. Whenever we refer to aesthetics we will refering, not to styles or appearances, but to the whole realm of the embodied experience. Bergson, H. 1992 (1888). Cours, tome 2 : Leçons d’esthétique : Leçons de morale, psychologie et métaphysique. Paris: Presses Universitaires de France – PUF.

[8] Ibid., p.40.


[10] Ibid.

Drawing of the main crater of Kaali and four of its impact craters.  

Kaali Meteorite Crater.  
Source: www.amusingplanet.com

An aerial view of the shell-pocked landscape surrounding Regina and Kenora trenches on the Somme, fall 1916. Source: Library and Archives Canada.
Newfoundland Memorial Park and the preserved trenches of the Battle of the Somme

A man inside a Pointe du Hoc Crater

Trenches during the Battle of Somme by Ernest Brooks
Aerial view of Pointe du Hoc memorial

Current state of some areas of Verdun Battlefield
Abstract
Currently, bioclimatic design is an emerging research discipline in the field of landscape architecture. It has been developed especially in last 20-30 years and most of the researches were focused on hot arid [1] and hot humid climates [2]. Bioclimatic landscape design strategies for temperate continental climates have been developed in North America [3, 4], while Eastern Europe still lacks of such approaches. In most of the bioclimatic design studies and projects the woody vegetation is considered the main influencing landscape component in urban microclimate control.

In this context, the present study aims to develop a set of planting design principles, methods and norms for the Eastern European continental climate in order to improve the bioclimatic comfort and the quality of life in urban areas. The research methodology is based on integrating and synthetizing the actual state of knowledge from several disciplines which are strongly related to bioclimatic landscape architecture and planting design such as landscape horticulture, urban forestry, bioclimatology, environmental security and public health. The results of the research present a number of planting design norms, established according to a proposed bioclimatic zoning of urban green areas. Thus, the green spaces are classified depending on their specific impact on the microclimate. The covered issues within the bioclimatic planting design norms and guidelines refer to: vegetation type selection, tree cover percentage, leaf area index, habitus of plants, recommended plants species, etc.

The conclusions reveal the opportunity to create modular bioclimatic green infrastructure and to deepen the research in bioclimatic landscape and planting design in order to integrate the results both in the educational process and in the professional activities in landscape architecture.

Introduction and Methodology
Considering the major impact of the woody vegetation on the urban microclimate, on public health and environmental security, planting
design is a vital component in bioclimatic design, both in landscape architecture as well as in architecture and urban planning.

The research methodology is based on integrating and synthetizing the actual state of knowledge from several disciplines which are strongly related to bioclimatic landscape architecture and planting design. The approach is focused on adapting arboriculture and urban forestry principles to human bioclimatology parameters, the science which studies the influence of climate and microclimate on man. Thus, the study deepens the relationship between the bioclimatic factors, as they have been classified by Vogt and Amelung in 1952 [5], and the impact of the vegetation on microclimates and human security in urban areas. Bioclimatic factors that can be influenced at the microclimate scale through planting design include: air humidity; wind velocity; heat, ultraviolet and sunlight radiations; air quality (including oxygen level, chemical pollution, dust, allergens) and the degree of air ionization. Starting from the ability of the woody vegetation to modify the microclimatic conditions, a bioclimatic planting zoning concept for urban ensembles located in temperate continental areas is proposed (Figure 1). The covered issues within the bioclimatic planting design guidelines refer to: vegetation type selection, tree canopy density, leaf area index (LAI), habitus of plants, trees height (Table 1, Figure 2).

A comparative analysis of plants species has been conducted in order to identify the most suitable trees for each bioclimatic zone. The analysed species have been ranked depending on their microclimatic impact and eco-climatic resilience in metropolitan areas. The ranking of the species has been established considering specific factors for each bioclimatic zone, such as tree habitus, sunlight requirements, compatibility with built and paved areas, and general factors including leaf area index (LAI), life span, carbon storage capacity, canopy density, bioaccumulation of chemical pollutants, air ionization capacity, resistance to air pollution, drought tolerance.
Local context
The research was conducted based on the microclimatic and environmental conditions in Bucharest (Romania), situated in a temperate continental plain climate. The local climate is characterized by a regime of moderate rainfalls (about 600 mm/year) with dry summers (especially in the last decades), a significant difference in temperature between winter and summer, which range from an average temperature of -3°C in January to +22°C in July. The absolute records range from -32°C in January to +42°C in July. In winter, the prevailing cold winds from are from NE-E, while in summer the hot air currents from W-SW are predominant. Thus, the main challenges in the urban microclimate of Bucharest comprise: high summer temperatures, due to the high levels of sunlight and heat radiation, a low air humidity level and a reduced precipitation regime, especially in July and August. The bioclimatic discomfort is exacerbated by the relatively high degree of air pollution with noxious gases and dust, especially because of the heavy car traffic. In the winter, the bioclimatic comfort is affected by low temperatures and cold winds sometimes associated with blizzards and heavy snowfalls which affects the exposed areas. Also the bioclimatic conditions are affected throughout the year by a low level of ionization, oxygenation and carbon sequestration, due to lack of leaf area per capita. Studies conducted by the local authorities revealed that there is about one tree per capita in the public green areas of Bucharest. Considering that the private urban green spaces and the peri-urban forests were not taken into account in the above mentioned research, the number of trees per inhabitant is probably higher. Even so, other studies from USA [6] showed that about 25 trees are needed to ensure the optimal oxygen quantity for one person.

The planting zoning concept - “The bioclimatic green cell”
The bioclimatic planting zoning scheme proposed for urban ensembles located in temperate continental climate such as Bucharest
is based on the identification and classification of four major types of green areas with distinct bioclimatic roles (Table 1). The placement and sizing of the planting areas depend on the microclimatic impacts and on the impact radius of each bioclimatic zone. Thus, the four types of the planting areas include: A. Protection Zone (Shelterbelts); B. Mobility Zone (Green corridors and platforms); C. Buffer Zone (Green infrastructure which protects the built area); D. Complex Zones (The green-blue core has a complex bioclimatic role and serves also as a leisure area) (Figure 1). The conceptual hexagonal shape of the diagram serves to highlight the eco-climatic context and the possibility to develop bioclimatic green infrastructure networks using this module. Thus, in the case of further project implementations based on this concept, areas and shapes may vary subject to the proportions and conditions set forth below.

The “Bioclimatic Green Cell” concept is based on introducing shelterbelts around an urban or peri-urban ensemble (Zone A) to create a favourable microclimate by reducing the speed of the prevailing winds, purifying the polluted air, increasing air ionization, rising the atmospheric humidity level during summer and reducing the urban noise (Figures 3, 4). The shelterbelts are substantially wider in the areas exposed to the prevailing winds. So, three types of shelterbelts are proposed: A1 - summer deciduous plantations - (located on the W-SW side); A2 - winter mixed plantations (on the NE-E side) and complementary shelterbelts otherwise (Zone A3). The shaping and sizing of such a green micro-system in terms of planting design depends on the bioclimatic impact radius of the shelterbelt, which is usually 20 times higher than the average height of the planted area [7]. Thus, a 20 m height shelterbelt can provide protection against wind and pollution over a distance of about 400 m, which means that the optimum average area of an urban bioclimatic ensemble cell is about 10 ha, while the minimum area should be about 3-5 ha. The most suitable deciduous trees species for the shelterbelts include Carpinus orientalis, Ulmus glabra, Fraxinus angustifolia and Celtis
autralis, while the recommended coniferous species for the winter mixed shelterbelts are Juniperus virginiana and Pseudotsuga menziesii. The Mobility Zone (B), used for parking, accessibility and ventilation corridors, is planted with deciduous trees especially with a high capacity to absorb the direct and indirect solar radiation, being characterised by a medium LAI level, a tree cover percentage higher than 50-60% and wide tree canopies. The most valuable species for the mobility zone comprise Fraxinus excelsior, Fraxinus angustifolia, Tilia tomentosa, Carpinus orientalis and Acer platanoides. The Buffer Zone (C) includes green infrastructure features located close to buildings such as deciduous trees and shrubs on the SW facades (Zone C1) and a high percentage of coniferous on the NE sides (Zone C2), green roofs and green walls (lianas) which serve to provide thermal insulation, increasing the energy efficiency. The height of the buildings must be correlated with that of the trees in order to have an optimal microclimatic impact. Thus, the maximum recommended height for buildings should be 7 levels (about 23 m) in order not to exceed the tree crowns. The green areas between the buildings (Zone C3) comprise mostly deciduous trees in order to provide shade during summer and sunlight during the cold season. The recommended species for the buffer zones include deciduous trees with vertical habitus as Carpinus betulus, Carpinus orientalis, Fraxinus ornus. As well as for the shelterbelts, the most valuable coniferous trees species are Pseudotsuga menziesii and Juniperus virginiana. The Green-blue core (D), located in the centre of the bioclimatic cell, offers a refreshing microclimate and comprises a water feature for thermoregulation and mixed multi-layered vegetation. It has an important recreational role, providing the best microclimatic conditions within the ensemble. Complementary, the bioclimatic cell includes two green ventilation corridors situated on the opposite direction of the prevailing winds to ensure the exchange of the air, especially in the summer or in foggy winter days.
and also to disperse the strong air currents from NE-E and W-SW (Figure 2). Due to the ecological and functional complexity of the green-blue core the trees species selection process may vary depending on the general landscape design concept. Even so, the planting solution should be adapted to the bioclimatic planting norms such as a high tree cover percentage (over 60%) and a relatively high LAI (>3) in order to ensure a significant favourable microclimatic impact on the surrounding areas.

**Modular bioclimatic green networks**

The bioclimatic cell concept can be applied in planning as a repeatable module with similar shapes and sizes also at the extended scale of the metropolitan green space system in order to create bioclimatic green networks to provide a high level of comfort and security in order to create resilient and sustainable communities (Figure 5). The bioclimatic neighborhood include a multitude of socially viable spaces such as public green areas, a functional network of bicycle and pedestrian trails, orchards and vegetable gardens. The social and environmental functions of the modular system increase the life quality of the inhabitants. Human security dimensions such as health security, food security, community security are also improved through the benefits of green spaces and farming areas which are integrated and interconnected into the urban form at functional and ecological levels. The modular network prevents urban segregation and promotes the social inclusion of different community groups (Figure 5).

**Conclusions**

The implementation feasibility of the concept is higher especially in peri-urban areas, where territorial availability allows better development perspectives of green infrastructure. Also, the development of bioclimatic green networks can contribute to control the urban sprawl phenomenon and its environmental and social negative consequences. The integration and development of bioclimatic planning and design into the educational process
and professional activities can increase the general level of human security by providing also additional benefits such as food security through urban agriculture development within the bioclimatic cells, a high economic value of the urban bioclimatic ensembles and a stronger biodiversity development.

Notes
Bioclimatic planting design guidelines

**Bioclimatic zones**

<table>
<thead>
<tr>
<th>Bioclimatic zones</th>
<th>Vegetation type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Protection zone</td>
<td>Mixed vegetation, medium height &gt; 20m, high density</td>
</tr>
</tbody>
</table>
| A1 Summer, A2 Winter, A3 Complementary | Deciduous trees (>90%), LAI* >4, canopy density >80%, belt width >20 m  
Deciduous trees (>40%), LAI*<4, canopy density >80%, belt width >20 m  
Deciduous trees (>70%), LAI* >3, canopy density >80%, belt width >10 m |
| B Mobility zone | Mostly deciduous, medium height > 15m, medium density |
| B1 Green corridors, B2 Planted parkings | Deciduous trees (>80%), LAI* >2, canopy density >65%.  
Deciduous trees (>95%), LAI* >2, canopy density >50%, wide tree canopy |
| C Buffer zone | Mixed vegetation, variable height, medium density |
| C1 Southern exposure, C2 Northern exposure, C3 Between the buildings | Deciduous trees (>90%), LAI* >3, canopy density >50%, vertical habitus  
Coniferous trees (<30%), LAI* >3, canopy density >50%, vertical habitus  
Deciduous trees (60-80%), LAI* >3, density >50% |
| D Green-blue core | Mixed vegetation, variable height, high density |
| D1 Green core, D2 Blue core | Mixed vegetation, LAI* >3, canopy density >60%, variable habitus  
Palustrine and aquatic vegetation |

* LAI = Leaf Area Index

**Legend**

- A: Shelterbelts (Protection zone)
  - A1 Summer (deciduous)
  - A2 Winter (mixed - coniferous + deciduous)
  - A3 Complementary (mostly deciduous)
- B: Green corridors and parkings (Mobility zone)
  - B1 Green corridors (mostly deciduous)
  - B2 Planted parkings (deciduous)
- C: Green infrastructure for the built area (Buffer zone)
  - C1 Southern exposure (deciduous, high density)
  - C2 Northern exposure (coniferous, medium density)
  - C3 Shaded areas between the buildings (mixed, medium density)
  - Buildings (height = 23 m, floors = 7)
- D: Green-blue core (Complex zone)
  - D1 Green core (mixed multi-layered vegetation)
  - D2 Blue core (water feature)

**Ensemble area = 10 ha**

**Green module diameter (d) = 350 m**

**Inhabitants = 2200**

The Bioclimatic Green Cell concept diagram. Bioclimatic planting zones
The Bioclimatic Green Cell concept diagram. The impact on the microclimate

Urban ensemble diagrams > Vegetation zoning

Urban ensemble diagram > Microclimatic impact

Section - Bioclimatic urban ensemble. The impact on the microclimate

Vegetation types and bioclimatic zoning diagrams
The modular green network proposal for bioclimatic neighborhoods
Abstract
On the 31st of August 2014 a forest fire broke out in Surahammars municipality, Västmanland County, Sweden (59.902’N.16.163’E). Six days later, this would become the largest forest fire in modern Swedish history. The fire decimating almost 14 000 hectares of production and recreation forest, and created a new geography. The physicality of the area drastically changed affecting how the landscape is now perceived; what its character is.

In this paper, we reveal how change of landscape character, recognised as a component of landscape identity, was perceived before and after this dramatic landscape change. In addition, we explore how the perceptions of those who had a close relationship and interacted with this landscape differs from experts who assess the landscape. In order to address these issues we first investigated, through questionnaire and interviews, how individuals who used the area as their every-day landscape experienced the area both before and immediately after the fire. We then examined how expert, as objective-outsiders perceive the same landscape and the landscape change through undertaking document analysis of landscape character assessments undertaken before and after the fire and interviews with practitioner and officials involved in the assessment process.

While some of the results from the public could be predicted - the area is less pleasant, more open and less ‘spiritual’. Other aspects produced more of a revelation; such as the topography is now less undulating. Further responses lift conflicting ideas when addressing perceptions of landscape; the burnt landscape is now more heavily influenced by man than the previous production forest. The expert depiction of the landscape as represented in the landscape assessment is a static view which addresses landscape as an objective ‘given’ in contrast to the subjective perceived landscape and landscape change experienced by those who interact with this landscape. This represents part from a larger project (Landscape up in Smoke), funded by Swedish Research Council Formas which deals...
questioning what happens to landscape related identity after a forest fire.

**Introduction**

Landscape is an entity that is perceived [1]. There are as many perceptions of a landscape as their individuals perceiving it, raising the question; whose perceptions are legitimised in decision making relating to the landscape? It has frequently been observed that planners struggle to handle emotional values [2], values which are significant for inhabitants of the landscape, and instead give precedence to rational knowledge as exemplified by outside experts [3, 4]. Yet how do outside expert views differ from those who inhabit the landscape? Further how do these views alter with landscape change and how can these different views be meditated?

To address these questions we use empirical data generated from the research project ‘Landscape up in smoke; revealing the changing landscape related identity among people who previously used the area in their daily lives’; a project is funded by the Swedish research council, Formas.

*The case of the forest fire*

On the 31st of July, 2014, a fire was inadvertently started during forestry work on an area of clear cut forest northeast of Seglingsberg in Surahammars municipality, Västmanland County (59.902’N.16.163’E) (figure 1). Due to a combination of environment and management factors the fire quickly spread into three neighbouring municipalities and was soon recognised as the largest Swedish forest fire in modern history. The fire claimed the life of a forestry worker, required approximately 1 500 individuals were evacuated with a further 4 500 inhabitants placed on emergency standby. It destroyed a large area of production forest, impacting over 200 forest owners; destroyed key biotopes, severely impacted (and revealed many new) archaeological sites and brought about a variety of physiological changes including depletion of topsoil and silting of watercourses. On the 11th of August, the fire was considered to be under control. Eight months later infrared
imaging showed that the fire was completely extinguished (Länsstyrelsen Västmanlands län, 2015). A month later on the 25th of May the area was finally open for the general-public again. For the nation this landscape became a place in the consciousness, yet for those who had connections to this landscape a new geography was created. The landscape has drastically changed with the individual practices and customs, which once defined the use of the landscape no longer fitting in to this now unfamiliar landscape (figures 2 and 3).

Figure 1. Location and extent of the forest fire

In this paper, we use the area affected by the fire to compare the differences in landscape perceptions between those who directly engage with the landscape and experts who framed the landscape through a landscape assessment. This case also allowed us to compare how individual perceptions and planning discourse are affected by this dramatic change. We undertake this through a multi-method approach drawing on both qualitative and quantitative data.

We begin by outline the conceptual foundation for this paper, briefly discussing the concepts of perception, character, forms of knowledge and their relation for understanding landscape. We then present the methodological approaches. This is followed by results from the study where we outline the difference between the individual perceptions and the professional’s description of the landscape. Finally we discuss the different knowledge produced, and the possibilities for mediating the differences between them.

**Conceptual base**

Perceptions of landscape

The recognition of landscape as a perceived entity and approaches for capturing perceptions have a long history in landscape studies [5]. It has received increased recognition in the rhetoric of planning through the European Landscape Convention (ELC), where landscape is defined as an “area, as perceived by people, whose character
is the result of the action and interaction of natural and/or human factors”[1].
Perception is the creation of a mental image of an object or phenomenon [6]; it is therefore how we understand the world, in the case of landscape how we understand a physical area. This means that all understandings of a landscape, whether an inhabitants recognition of their engagement with their surroundings or a scientific expert led study or anything between are perceptions.
Yet it is perceptions relating to direct engagement with a landscape [7] which is taken up in most academic texts on perception of landscape [5, 8]. Drawing on a more nuanced definition of perception, as the “awareness of the elements of environment through physical sensation” and “physical sensation interpreted in the light of experience” [6]. Rather than the outsider expert perception which tends to be founded on disciplinary interest and negotiated through a secondary representation e.g. mapped based or remote engagement.

**Landscape character**
When landscape is described in public discourse it has increasingly considered in terms of its character, being addressed through approaches such as Landscape Character Assessment (LCA) [9, 10]. Character refers to: ‘a feature used to separate or distinguishable things into categories’ [11]. Consequently landscape character is seen as the characteristics features that distinguish one region or area from another [10, 12]. The initial interest in landscape character reflected disillusionment with quantifiable concepts of landscape, based on the objective classification of mapped data [13]. As with Perceptions, the idea of defining character is subjective, the features recognized as significant for defining the character being based on individual or disciplinary appreciation [3, 14]. However, unlike perception studies, landscape characterisation focus on an expert understanding of landscape, tending to represents the physical aspect [14]. Landscape characterisation in the Cultural–Spatial manifestation of landscape identity, based on
features that can be commonly recognised or perceived in the landscape; spatial composition, land use, wildlife, vegetation and minerals, the colours, forms and patterns, building materials, etc [15]. Consequently these tending to be visual elements or physical elements, lead to classifications of areas on the basis of a limited range of features [14, 15].

Knowledge
These two concepts, reflect the distinction identified by Zube et al. [5] between the expert approach, where the focus is on characterising the landscape as an object; and the subjectivist approach, where the focus is on the viewer’s experience of the landscape and the perceptions this creates [8, 16]. This dichotomy brings into question differing understanding and values of landscape. With the values of those dwelling in the landscape often trivialise as emotional and irrational [17] as opposed to the perceived, objective rationality of experts [18]. Yet in line with the rhetoric of the ELC the perceptions, experiences and aspirations developed through encounters with the landscape are recognised as equally justified bearers of values as the knowledge held by disciplinary professionals and expressed through the public discourse of characterisation [19]. Thus the entire populace become recognised as ‘experts’ on their landscape [20] distorting the contrast between rational/civic interests and irrational/special interests; diminishing the idea of the expert as ‘all knowing’ [17]. This feeds into discussions around the over simplification of local knowledge, which in reality includes a variety of experiential understanding of a place, as well as specific local expert knowledge, relating to both tacit and explicit knowledge [21]. Raymond et al. lift various dimensions to knowledge which breaks down the local vs expert dichotomy; from local to general; informal to formal; novice to expert; tacit to explicit; traditional knowledge to scientific knowledge [21]. Consequently, approaches need to: ‘recognises a plurality of values that are socially formed both substantially and
Taking only an outsider view of landscape, built on expert values, results in an entity imposed on the public; a sectoral view, an abstraction of the landscape, which comes to represent the whole, leading to an impoverished understanding of what landscape constitutes [19]. In the remainder of this paper, we address these different forms of knowledge in the context of the area impacted by the forest fire.

Method

To understand the different knowledge attached to landscape we employed a multi-method approach, utilising questionnaires, interviews and document study (landscape assessments). We drew on the questionnaire and interviews to attain the perceptions of those who inhabit this landscape. The document analysis, with supporting interviews from consultants involved in the assessment, was used to understanding how landscape is dealt with in public discourse. The different approaches provided a means for understanding change of perceptions and differences between official discourse developed through the assessment and [23].

1. Questionnaire

A total of 2264 households living nearby the disaster area were sent a survey. They were randomly identified from a register of population. The survey comprised a number of sections including questions about landscape related behaviours, experiences, perceptions, and attitudes before and after the fire. After 3443 reminder calls 656 (29%) replies were obtained; involving 48.4 % women and 51.6 % men, distributed across seven age groups of 18-25 (3%), 26-35 (5.6%), 36-45 (10.2%), 46-55 (15%), 56-65 (26.4%), 66-75 (28.9%), and 76-85 (10.9%). Data on perceptual qualities of landscape before and after the fire related to respondents’ ownership (owned or leased land, forest and/or real estate in fire area) will be reported in this study. 489-513 (75-78%) respondents answered the questions related to the perceptual quality of the landscape.
In this paper, we will draw on four of the perceptual quality of landscape which were engaged with in the broader research project: Influenced by humans; richness of historic artifacts; and hilliness. Participants were asked to estimate the perceptual qualities of landscape before and after the fire on a 7-point scale, ranging from 1 (completely disagree) to 7 (completely agree).

2. Interviews
Semi-structured interviews were undertaken with 11 individuals who resided or had summerhouses in the area. The informants were identified through the questionnaire as as willing to participate in interviews. The interviews focused on individual relationship to the landscape before and after the fire, yet the semi-structures nature of the interviews allowed the respondents the opportunity to discuss the fire more broadly. The interviews were based on the findings from the questionnaires. The main aim of the interviews was to gain a deeper understanding of the relevance of the dramatic landscape change on people’s attachment to their landscape. Interviews were undertaken at the individual’s homes and lasting between one and two hours. We attempted to cover a broad spectrum of factors; gender (6 male, 5 female) length of time in the area (1 to 70+ years), ownership of land, age (30 to 70+), permanent residency, evacuated or not. The ability to cover all factors was restricted by the respondents who were positive to interviewing.

3. Document analysis
The final aspect of this study has been a document analysis of two landscape assessment documents, one from 2012 [24] and the second from 2016 [25] after the fire. The documents were studied in order to compare the landscape character document with the perception of those who inhabit that place and to study how the perceived character changed between the two documents. Interviews with consultants involved in the analysis were used to gain an understanding the background of the
assessment.
In both documents, the purpose of analysis was to gain further knowledge of the area and provide a support for discussion on land use, climate change and activities in the municipalities affected by the fire. The 2016 assessment is based on the 2012 assessment. The main difference is that the 2016 revision contains a separate appendix focusing on the fire area.

**Results**
The results of a questionnaire undertaken by residents of the area are presented and discussed first, followed by findings from interviews with selected individuals and finally we present findings from a document study of landscape assessment of the area before and after the fire.

1. **Questionnaire**
While it seems easy to comprehend how the perception of pleasantness has been drastically impacted by the fire; an area used for recreation and enjoyment of nature has been turned into what appears to be charred barren environment. This change of perception was common across the population. However, the analysis becomes more interesting when we consider the other aspects: The landscape is perceived as more influenced by humans after the fire than before; this brings into question how human is perceived. Prior to the fire, this forest was production woodland, very much the product of humans. This recognises the fire as a human event and can be seen as apportioning blame as is frequently observed after disastrous events [26]. There is also a perception that historical artefacts have been lost during the fire. However more historical remnants have been unearthed and a greater understanding of the landscape has been achieved.

The final perceptual element addressed in this paper relates to the topography, the physicality of this has not changed but how it is perceived has altered.

The background variables of age, length of residency and active engagement with the area had no significant effects on the four
aspects: influenced by man, rich in historical remains, pleasant and hilly. Overall respondents considered the landscape more influenced by man, less rich in historical remains and less hilly after the fire.

2. Interviews
In this section we will briefly outline some of the findings from the interviews relevant to how they relate/related to the landscape and how they describe the landscape.

Respondents tended to refer to the landscape in relation to the activities and experiences they had undertaken in the area such as swimming, foraging for mushrooms, hunting etc. However these activities tended to be just a starting point, recognising aesthetics qualities, relations to the others part of how they tended to be part of a more holistic understanding of landscape, relating to The descriptions attained the respondents blurred the distinction between character of the landscape and perceptions. “It’s was a really nice lake and surroundings (perception build on subjective preference). It feels almost like this almost like Norrland (the North of Sweden) a little bit higher and a lot of exposed rock (perception relating to a culturally common image of another place)... yes, cliffs and such. And there are small islands and islets in the lake. I was there lots as a child and also as an adult, we’ve been and swum and fished in the lake too (building on previous experiences and activities). It was so nice, and was very popular with people in the area, even farther afield (recognition of common perception of the area). But it’s been totally destroyed, it’s just a stone desert around the lake now ... it feels humble in some way. It was so nice there with the cliffs the gnarley pines Perceptions based on visual qualities... It was known as a beautiful landscape around here. But that’s all ...”

When the area was described prior to the fire, it was not recognised as a single area but was rather filled with a series of small places, which put emphasis on paths and movement through the landscape.

After the fire the area predominantly produced
negative perceptions, based on loss of favourite places, however those who had were more active in the area after the fire perceived change; a new physicality developing and new character of the area. For the first time the area is recognised as a whole, its boundaries created by the extent of the fire. The old places and perceptions of them live on as memories and new ones begin to develop, but for now area is perceived as whole.

3. Documents analysis
The assessments recognise the forest fire area as part of a character type defined as ‘water rich forest landscape’. Two separate character areas Nedre Bergslagen and Brukens skogar (figure 1), which are described in very broad, generic and objective terms.

Nedre Bergslagen “Rolling topography, ranging from between 50-100 meters above sea level. Contains river valleys and small plains that stand out in the forested landscape…. Areas of summerhouses, wetland areas, heathland create diversity in the forest area with few key biotopes. Predominantly large-scale forest production, distributed among a few large forest owners”. The description for Brukens skogar is in a similar vein with slight nuances ‘Relatively tight network of forest roads. Rich in marshes, big marshes, rich with reserve reserves’.

The forest fire area was never perceived nor characterised as a specific area, being considered part of a much larger scale entity. As with the perceptions of the public, after the fire the characterisation of the area also recognises the fires boundaries as a distinct character area. This is defined in the appendix to the 2016 document [25]. The smaller scale of this area means that a more detailed understanding can be addressed including activities: ‘The landscape is popular for outdoor activities such as mushroom and berry picking and fishing, as there are clear source lakes and large forest areas.’

The characterisation lifts the relevance of cultural historical elements which have arisen in the area: ‘There is also a network of charcoal paths through the forests, which have been used for a
Discussion
The descriptions presented in the character assessments, rely on the physicality of the landscape. It is constructed on information gleaned from secondary material and so the perceptions of the landscape are filtered through another’s perception. The perceptions which those who experiences the landscape describe are first hand, built an holistic understanding of the landscape based on the tripartite of physicality, relationships and practices [3, 27]. The insiders who inhabit the landscape define an individual and specific landscape contrasted with the general description presented in the analysis. Yet, the expert view represents a static perception of the landscape, as experienced from above; for those who experience the landscape recognize it as dependent on mobility, movement along paths between different places as an important aspect of perception of the place.
The original characterisation of this area deals with the landscape as a larger unit than is comprehended by those who inhabit the area. While the individual places expressed by the respondents can be too small to operationalise in the planning system. After the fire, the landscape assessment recognises the fire landscape as an element within the previously defined character areas. However for the residents, although there is still recognition of the past experiences and memories relating to specific places, the extent of the fire area is now seen as a new geography, boundaries defined by a specific event, the fire. As such the landscape change has brought about more correlation between these two views.

Conclusions
The discussion developed above may appear to supporting the local over the expert, but as can be seen from the questionnaire results, subjective perceptions are not necessarily reliable. It was considered that archeological elements had been lost, when in fact more were revealed and deeper knowledge of the landscape can now be read; the landscape is no less undulating even though long time.’ [25].
it is perceived so; and the idea that a production forest is less influenced by man than the forest fire area is at best questionable.
It needs to be remembered that the expert view is a specific perception as is the individuals view, and the individuals perceptions can also be the basis for characterisation, albeit at a finer scale. While it is not possible to attain and communicate the multitude of perceptions of ‘insiders’ in the assessment document, they can form part of the process, to understand how this landscape change affects those who are directly affected by change and start to develop a common understanding of the multitude of values connected to the landscape.

Notes
Agency

[24] Ek, M., Landskapskaraktärsanalys för
Table 1. Results of questionnaire.

Figure 3. Character areas Nedre Bergslagen and Brukens skogar
(figure 2. Character of the area after the fire)
Figure 1. Character of the area prior to the fire.
Abstract

One might say that immensity is a philosophical category of daydream.
Gaston Bachelard, The poetics of Space (1).

The paper examines the importance of landscape for a person who is living an extreme situation, such as the deprivation of his or her freedom in a prison environment.

An environment, which may cause disgust and opposition and result in Action-Reaction social behaviour, as the person responds negatively to the situation. However, what happens if we turn this situation into one of Creation-Reaction? To what extent and by what means can architecture and landscaping contribute to changing the mind-set of the incarcerated person by affecting positively on their lives?

In a broader sense, how important are the memory, transcendence, and perception of nature, art and poetry in relation to the landscapes, which come to mind in difficult vital situations? How we are able to build and represent ourselves in these inner and outer landscapes will have a significant influence on our vital experience. This concept can be extended to other more common experiences, such as the fear of being trapped in our everyday routine or the sense of complete loneliness in our later years.

The paper considers the context of the Panamanian’s Governments reform of the country’s penitentiary centres, by meet the three main objectives of:

- Security
- Respect for Human Rights
- Rehabilitation and social reintegration

To respond to the questions posed above, the paper looks at the winning proposal submitted for the Female Rehabilitation Centre in the City of Panama project, examining the main components: the confinement area, university and chapel. This architectural program of the
centre is analysed to consider both small and big creations that can be introduced to impact positively on the lives of the women living and dreaming in this environment. The landscape is an important element of this project and is considered one of the keys to achieving the three main objectives of security, respect for human rights, rehabilitation, and social reintegration. Going beyond these objectives, landscaping will provide a more humane environment for the women living in deprivation of liberty, setting the stage for a relationship of care and belonging, while maintaining a link with the outside world, their past and their future as free people.

The architectural program deals with landscape as a link between the inside and the outer world, between imprisonment and freedom, between dreams and reality.

Female Rehabilitation Centre In The City Of Panama

The General Directorate of Prisons (DGSP), under the Ministry of Government of the Republic of Panama (MINGOB), is responsible for the planning, organization, management, coordination, supervision and direct operation of the various classes of penitentiary centres in the country. They work within a framework of respect for human rights, the principles of security, rehabilitation and social defence, and the application of scientific advances in their management practices.

MINGOB has reiterated its concern about the implications of the overcrowding of people deprived of liberty in their facilities, and recognizes that the construction of new centres is one of the indispensable steps for the transformation of the Penitentiary System.

The vision of MINGOB for the country’s Penitentiary System involves transforming it into a safe system, which is respectful of human rights and capable of rehabilitating persons deprived of liberty. With this in mind, specific actions must be undertaken to increase the level
of professionalism of the prison staff, improve existing prisons, and build new centers that meet international standards. Furthermore, effective rehabilitation programs should be implemented to provide prisoners with the necessary tools for their reinsertion into society.

In view of the above, the prison administration is focusing on three basic pillars: 1) respect for human rights; 2) security for persons deprived of their liberty, visitors, prison officials and the community in general, and 3) rehabilitation for social reintegration. This, in compliance with national and international regulations, which reflect the continuous challenge in the approach of prison design (2).

In this context, the Panamanian State took the decision to invest in the construction of a Women’s Rehabilitation Center with the capacity to alleviate overcrowding in the existing Cecilia O. de Chiari Women’s Rehabilitation Center.

Therefore, MINGOB launched a competition for the design and construction of a Women’s Rehabilitation Centre to accommodate 732 female inmates and 72 residing prison officials.

The consulting, engineering, and architectural firm IDOM, following the criteria established by the MINGOB, presented a proposal, which included important landscape strategies, to comply with the three basic pillars or principles of:

- Security
- Respect for Human Rights
- Rehabilitation and social reintegration

The proposal of IDOM was the winning bid, and it is currently being developed for construction.
Design For Hope

It is hope, above all, that gives us strength to live. Vaclav Havel, *Disturbing the Peace* (3).

It is generally accepted that the design of a prison can impact on the behaviour, attitude and feelings of the users (inmates, staff and visitors), although “often, no clear relationship can be established between behaviour and design, as too many other variables exist to challenge the results. Changes in behaviour may be as much a result of management procedures and personal characteristics of inmates and staff as of their environment. Architectural design is only one of several variables, and it is not always easy to identify its effects separately.” Leslie Fairweather, *Prison Architecture. Policy, Design and Experience* (4)

The same applies to landscape and environment design, where there is even less evidence to determine its impact on the users. This concept has, to date, been largely ignored by standards agencies. Nevertheless, scientist and designers have, in recent years, begun to study the impact of environment on inmates and the effect of the therapeutic uses of nature.

According to Richard E. Wener in his essay *Therapeutic Uses of Nature* “inmates and staff are exposed to multiple environmental stressors whose effects may be magnified by the time of exposure and the difficulty in avoiding them. Inmates commonly need to cope with lack of privacy, high levels of crowding, isolation from needed human contact, constant high levels of noise, poor lighting conditions (too little in the daytime and too much at night) and little access to nature or nature views.” (5).

In his essay ‘Correctional Environments’, Keith C. Russell provides an overview of the therapeutic use of nature, stating that “our growing separation from nature is a driving force behind a multitude of physical, psychological, and emotional ailments pervasive in modern-
day society.’ (6). This is obviously more intense for prison inmates, as ‘the prison experience is traumatic and stressful for most inmates, and detrimental to the physical and mental wellbeing of many.’ Leslie Fairweather, *Prison Architecture. Policy, Design and Experience* (7).

‘Architects cannot determine with precision what effect their buildings will have on the users.’ Leslie Fairweather, *Prison Architecture. Policy, Design and Experience* (8). However, we believe that both building and landscape design can support the rehabilitation process and offer a humane environment for staff, inmates and visitors, while positively impacting on their lives. Hence, our approach to the design of the new Women’s Rehabilitation Centre has been to explore all the possibilities that design can offer to improve the psychological effect of the prison environment for its users.

**Design For Life**

*Human life deprived of beauty is not worthy of being called so.*

Luis Barragán, *Pritzker Architecture Prize Ceremony Speech.* (9)

1. *World of senses*

We believe that an important element of psychological health is the provision of an adequate space within which to live, work and rest. Hence, the project pays special attention to environmental perception, focusing on the building and landscape design and in the interaction between them.

While the design of some elements, such as windows and lighting, is dedicated by current prison standards regulation, other aspects such as noise, day light, views and colour are often viewed more as peripherals rather than critical environmental conditions and are largely ignored in standards.

This project goes a step forward and brings sensory enhancement to the forefront. Natural
light, windows with views of nature; use of colour to differentiate areas while creating a sense of belonging; direct contact with open spaces; noise reduction and heat control contribute to creating a landscape for a more decent and hopeful existence.

The relationship between the windows with the exterior will be optimum, with views of the garden and vegetation. This will avoid the sensation of claustrophobia and guarantee permanent natural ventilation. Colour is used to achieve a greater individualization of households. Thus, each home unit is painted with a different pastel colour.

In order to guarantee a sufficient degree of freshness inside the buildings, a metal overlap roof is designed. This double roof is the most effective method to combat excess solar radiation while contributing, in a decisive way, to maintaining the correct temperature inside the buildings. In addition, the double roof is tilted slightly towards one side, in reference to vernacular architecture, offering the inmates a certain degree of familiarity.

**Form and Function**

*As L. Fairweather notes in her book Prison Architecture. Policy, Design and Experience, ‘Design has largely been backward looking, and related more to expediency and cost than to the latest penal ideas and philosophies.’ (10).*

The project aims to transcend a purely functional response to the problems of a penitentiary centre. It sets out to be a landmark in its environment, an avant-garde and transcendental architectural contribution over time. The design of the penitentiary centre, both internal and external, presents a non-hostile image, with the inclusion of new architectural tendencies in penitentiary projects, the consideration of the climatological conditions of the country, and the culture of its users.
One of the main objectives of the design and construction of this Rehabilitation Centre is to optimize operational functionality by creating a clear differentiation or zoning of the different components of the project. The Master Plan design will propose an open layout, optimizing the relationship of the buildings with the outside space. Each zone will have its own individual access and free areas and gardens. Inmates and visitors will be allowed to occupy the gardens depending on the corresponding level of security.

The organization and implementation of the modules follows a clear order. This not only reduces the lengths of paths, but also helps to orientate the users inside the enclosure and conveys a sense of order and calmness. To achieve this order, a regular portion of the site has used to develop the compound and a distribution ring has been created in the dwelling enclosure area. A canopy covers the ring, which gives access to the different enclosures within the home units. This reduces the length of the canopy and visually commands the assembly, which facilitates the control of the area.

Clear linear circuits or paths will prevail in order to assure straight visual perspectives and ensure no dead visual spots. The aim of this approach is to optimize safety within the prison, ensuring the integrity of inmates and staff. This will reduce the human resources and techno surveillance required and promote the correct level of interaction between staff and prisoners.

2. Everyday Life
The general layout will divide Inmate housing into small groups, dividing the institution into semi-autonomous units of up to 220 inmates, which share the infrastructure of the entire facility. This will considerably affect the apparent size of the institution and allow staff to recognise every inmate and develop efficient interface. This strategy will also ensure safe and decent housing conditions for all inmates, promoting better interaction between them and aiding
the rehabilitation and re-socialization of the incarcerated persons.

Inmate accommodation will be provided in houses for up to 22 inmates. Each house will have its own kitchen, living room, bathroom facilities and porch. Houses will form groups with common open areas for recreation and sport activities. The design of the open areas will promote the possibility of social relationships and outdoor activities.

The minimum and medium security housing units have been designed in such a way that there are no corners or elements on the facade that generate hidden areas. This reinforces security, which benefits both staff and inmates. Inmates will have the feeling that they are guarded at all times and will not be exposed to dangerous situations.

A porch has been located at the front of each home. This porch or terrace serves as a meeting place for women living in the same household while, at the same time, inviting them to approach or visit the porches of the neighbouring homes and establish relationships with their neighbours. Covered gazebos complement these areas, serving as common covered areas for gatherings, communal meals, and general recreation.

The gazebos and exterior areas form benches and concrete tables around which the inmates can sit, form groups and interact with each other. The pavement design uses with compacted earth, natural grass and concrete, small gestures that improve the design and the general perception of the space. Local leafy trees will provide shadow and freshness.

A well-proportioned, rectangular building with individual rooms is designed for the maximum safety unit. The rooms are organized around a closed patio with a covered area. Given the nature of this unit, where inmates require higher control and are not allowed to use free open areas, the landscape design of the inner courtyard will be
crucial to integrate these while maintaining the harmony of the unit.

3. Personal Growth


This central plaza, containing the chapel, the temple and the kiosk, is located within the dwelling enclosure area. This plaza is the heart of the rehabilitation complex and is reminiscent of a “town plaza”. The intention is to create an area for recreation and spiritual growth. A place to remind the inmates of life outside the centre, where they can interact with each other, buy items of necessity or general goods, and cater for their spiritual needs, just as they would in their home town or village.

A second plaza will be designed within the campus enclosure, where the university, the auditorium and the radio workshop will be located. This plaza symbolizes culture as a means for social reinsertion and personal growth. Here, the inmates can meet before or after classes, events in the auditorium, or radio programs. This plaza is, along with the “town plaza”, a symbol of personal and social growth within the Women's Rehabilitation Centre and hope in the future.

4. Special Needs, Ageing and Maternity

*In her report, Getting it Right. Services for Pregnant Women, New Mothers, and Babies in Prison, Jenny North concludes that women in prison will benefit disproportionately from good care and support - and these services will have effects that will last not only for the rest of a mother’s life, but also that of her baby.* (12)

Both the enclosures and the public and service areas must have adequate and differentiated facilities for the care of children, the elderly and the disabled. Maternity is in itself an intense vital situation.
Maternity in imprisonment requires special handling and care, both with the mothers as with their children. Mothers will be located with their children (up to 36 months) in a separate enclosure, especially designed for babies and toddlers. The mother/child home is designed to optimize the amount of day light inside the home. A sloped roof is proposed to convey a greater feeling of home. All furniture and equipment used will orientate towards the use of children. A children’s play area will be located next to the gazebo. This area creates a ludic landscape, away from the traditional image of a penitentiary environment.

5. Care and Belonging

It is the time you have wasted for your rose that makes your rose so important.” Antoine de Saint-Exupéry, The Little Prince (13).

Horticultural therapy is a time-proven practice. A large garden has been included where women can cultivate vegetables and care for small livestock to be used in their daily diet. Gardening is considered a fundamental element in the training and reintegration of women deprived of liberty.

6. Receiving

If, for example, you come at four o’clock in the afternoon, then at three o’clock I shall begin to be happy. Antoine de Saint-Exupéry, The Little Prince (14).

There is always some nervousness and anticipation for everyone who pays or receives a visit. This feeling is even stronger in prison visits. How the visit develops has an important impact both on the visitor as on the inmate for the following days and even weeks. An effort will be made to provide visitors with a relaxed and safe atmosphere. There will be a separate visitor enclosure with open and sheltered areas. Visitors with children will have a separate zone with adequate facilities and
play areas. The area for general visitors will be designed to create a pleasant environment for family and children’s visits. Outside space and lush vegetation are integrated into the visitor’s area. A play area is located in an area specially designed for children’s visits.

Conclusion

*I have walked that long road to freedom. I have tried not to falter; I have made missteps along the way. But I have discovered the secret that after climbing a great hill, one only finds that there are many more hills to climb.*" Nelson Mandela, *Long Walk to Freedom* (15).

The Government of Panama has given us the opportunity to design a state of the art Women Rehabilitation Centre.

The design of the Women’s Rehabilitation Centre has considered landscape design to be an essential element to contribute to the well-being, socialization, personal growth and social reintegration of these women who have been deprived of their liberty and who temporarily reside there.

Architects and landscape architects cannot determine with precision what effect this centre will have on the users. However, their designs can be carefully thought out to foster the rehabilitative process and offer a humane environment for staff and inmates.

Our society should strive to create prison environments that enhance the dignity of the prisoners, staff and visitors. National and international regulations can be developed to include environment perception and landscape design criteria in the form of guidelines or standards.

There is still an extensive field of investigation required, in order to examine to what extent landscape design can influence the behaviour,
attitudes and feelings of the prison users. The design of the Women Rehabilitation Centre has taken an empirical approach to these issues. As the centre goes into operation, in the following years, we will have the opportunity to study the impact, of the management procedures adopted and design strategies used, on the general behaviour of the inmates and to what extent landscape design has influenced behaviour.

Landscapes of freedom may be travelled, no matter whether in extreme situations or in everyday life. Landscape design can help to find the way.

Notes


Abstract
There are currently numerous emerging and maturing technologies that will have significant implications to the way in which we interact and experience our environments. Mixed reality (MR) devices can allow for many augmented spatiality’s which respond dynamically to user interaction and thus may function as vital quantizing organs to an emerging cybernetic regime of immaterial or quasi-physical space.

As a slumbering dreamer will simultaneously create and experience their dreamscapes, reacting to their own constructs and creating further scenes in a feedback loop; MR technologies will allow for communal or private augmented environments that respond to peoples actions and reactions.

The emerging technology of noncontact haptics, specifically by means of ultrasound is currently little well known but is developing rapidly and being deployed widely; is one such technology that when combined with the maturing technology of augmented reality head mounted displays (AR HMDs) gives a remarkable and newly achieved presence to digital content.

Today there are many signs that MR is the next computing platform, not least the world’s top tech executives proclaiming so. Last year at Facebook’s F8 conference keynote, Mark Zuckerberg announced his belief in AR as the next platform and correspondingly his focus towards achieving it ‘we’re going to have what looks like normal-looking glasses that can do both virtual and augmented reality. And augmented reality gives you the ability to see the world but also to be able to overlay digital objects on top of that’.

MR needs to be better understood by designers of the environment. In addition to reviewing key MR technologies; the Mixed Reality Field which is an expansion of the MR continuum (the MR continuum can be attributed to Milgram & Kishino, 1994) is presented by the author as a new paradigm for better understanding, deploying and responding to Augmented Reality.

Keywords:
Mixed Reality, Landscape, Architecture, Landscape Architecture, Emerging Technologies
for the designed environment.

**Introduction**

Augmented Reality has now become ubiquitous with smartphone saturation, but remains a relatively minor consequence of such powerful technology. However, with the rapid development and maturing of augmented reality head mounted displays and other key technologies, mixed reality is poised to radically alter the way we interact with and experience the environment. As designers of the environment it is critical that we understand this shift and can respond to it. Our pocket computers, smartphones, have had a great deal of impact on the way in which we interact with the world, and more relevantly; the environment. One consequence of global positioning system (GPS), high processing power, inbuilt sensors and other defining elements, high quality camera and display, of smartphones, was the broadening accessibility of locative art, or ‘locative media’. An example being 110 Stories (2011) [1]; an app that orients and augments an outline the twin towers and encourages capture, comment and share. More recently AR leapt into mainstream with the release and following mania of Pokémon Go [2], the geolocated AR Nintendo game.

AR and VR can be understood as end sections on the Mixed Reality spectrum, as illustrated by Microsoft [3] and derived from Milgram & Kishino’s MR continuum [4]. Generally, when referring to MR we indicate a broader more central section and not the entire range, however many tech pundits are now referring to AR in a much more broader sense thus becoming interchangeable with MR.

Mixed reality is anticipated, by the leading behemoths of technology, to become the next mainstream computing platform, superseding smartphones as smartphones did desktop PC’s. For example, quote Tim Cook in Bloomberg May 2017; ‘I think it (MR) is profound. I am so excited about it, I just want to yell out and scream.’ [5].
The most obviously crucial and specific technology to mixed reality is the MR headset, which fully extrapolated would become absorbed entirely by the Neurolace. In the short-medium term the furious race between technology companies is to achieve a result that physically resembles a device close to regular glasses as possible. The MR headset is able to conjure visual-audio responsive cyber worlds that mix with our standard space. Another exciting emerging technology, Ultrahaptics, massively enhances the visual-audio presence of digital content by providing non-contact haptic feedback. With these technologies maturing a new regime of cybernetic quasi-physical space emerges.

Until now however the relevance and interest of AR to designers of the environment has largely been limited by the relatively slim intersection into mixed reality that smartphone provides; a palm sized screen with possible audio. However, with the prospect of deeply powerful MR technology inevitably maturing towards slick usability and affordability, arrives the possibility for creating hybrid environments and responsive multi-places of varying communality and customization.

To understand the potentialities and principles of such enabling technology is now urgent. This paper introduces key MR technologies, specifically the MR headset and non-contact haptic devices, and while highlighting the potentialities of such technologies, seeks to open questions of how designers and stewards of the environment might begin to construct strategies and frameworks for the design and implementation of mixed reality environments.

**Introduction to the Augmented Reality Head Mounted Display**

In his 1997 ‘Survey of Augmented Reality; Ronald T. Azuma defined ‘AR as systems that have the following three characteristics: 1. Combines real and virtual 2. Interactive in real time 3. Registered in 3-D.’ [7]. These criteria may be met with the use of Head Mounted Displays (HMD’s).

Key developments towards the modern HMD
Leonardo Da Vinci mused on the shortcomings of the single 2D image representing 3D [8], but it was not until 1838, narrowly pre-dating the birth of ‘practical photography’ - that Sir Charles Wheatstone presented his stereoscope which first enabled viewers to see drawings or engravings in 3D. Developing further towards stereoscopic Augmented Reality was ‘split-image stereoscopic space synthesis’ [9]; a split image montage or superimposition of spaces and objects.


The first see-through graphical interface, combining the real and virtual and interactive in real time, was the Mark II gyro gunsight developed by the British military in 1943 during World War II.

Computer graphics pioneer Ivan Sutherland publishes his essay *The Ultimate Display* in 1965; The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming such a display could literally be the Wonderland into which Alice walked. [13]

Later, Sutherland in 1968 helped develop the first augmented reality head mounted display, known as the Sword of Damocles (due to it needing to be suspended from the ceiling due to its weight) [14].

Our objective in this project has been to surround the user with displayed three-dimensional Information. Because we use a homogeneous coordinate representation, we can display objects which appear to be close to the user or which appear to be infinitely far away. We can display objects
beside the user or behind him which will become visible if he turns around.... The objects displayed appear to hang in the space all around the user. [15]

Sutherlands 1968 [15](p 295) paper ‘A head-mounted three dimensional display’, partially funded by DARPA, covers the fundamental issues of AR HMDs.

The original HMD operated with special spectacles which contained miniature cathode ray tubes to display the 3D objects, one of two experimented with head position sensors; one mechanical and the other ultrasonic, and a computer with software programs that would compute a rotation and translation matrix for each viewing position relative to the room coordinate system and generate stereoscopic perspective images of three-dimensional information.

Displays:
Today there are many different types of AR HMD, and all rely on the use of image generators, be that by pico-projectors or LED micro-displays that project the light to represent the 3D information, and combiners that combine that reflected light with the light of the real-world environment. An early example of a combiner is Pepper’s Ghost of the year 1862, used in theatre where the reflected rays from an angled glass combine with the light from the stage to produce the illusion of phantoms.

Pepper’s Ghost [16]
Waveguide holograms ‘extract progressively a collimated image guided by Total Internal Reflection’ [17]; waveguides transmit a light within a volume internally forming holograms and out into the eye.

Waveguide [17]
Focus
When we observe the world, our eyes focus on things in two simultaneous ways. **Vergence** is when the angle between the eyes is adjusted; the
eyes will move out towards parallel for viewing infinity and angle towards each other for closer objects. Accommodation is the adjustment of the lens for focal power. In natural scenes, the level of vergence and accommodation will always be aligned to the distance of the object of focus, however in stereoscopic images when the image is at a fixed (usually close) distance but the visual cues of the image suggest a depth and distance beyond that, a problem arises called vergence-accommodation conflict, which may cause visual distortions [18].

Vergence-accommodation conflict [20] This vergence-accommodation conflict is a problem that only recently has started to become addressed in 3D screens, AR and VR, but is one that appears to be solvable by using the waveguide platform to create multiple focal planes. A Patent awarded in 2015 for Magic Leap Inc., Three Dimensional Virtual and Augmented Reality Display System, describes a diffraction grating waveguide system that projects light into the eye at simulated focal depths; 12 in total which correspond to the approximately 12 layers of depth based on radial distance that the eye can interpret, per their research. The 12 layers of depth are between about 25cm to 3m, beyond 3m focus remains at infinity [19](Magic Leap US8950867).

3D Tracking, Calibration, Registration: To measure and align objects in AR, three important aspects must be considered: 1. 3D tracking of the view display of the HMD device in six-dimensional pose as measured by degrees of freedom (DOF) which are; three measurements of position, X, Y & Z, in a local or global coordinate system and three measurements of orientation, Roll, Yaw & Pitch. 2. Calibration of the HMD and the reference device or coordinate system. 3. Registration; the alignment of the six-dimensional pose of the HMD and the virtual world coordinate system and virtual objects.

X, Y & Z + Roll, Yaw & Pitch [20] With AR, there are multiple coordinate systems and transformations between the objects, real
world and camera that need to be considered: Using a standard computer graphics pipeline, independent of the type of display, to create the imagery for AR consists of 1. model transformation; which describes the relationships between local 3D objects and 3D global world coordinates, both real and virtual objects although only real objects require tracking. 2. view transformation; which describes the relationship between the 3D camera coordinates and the 3D global world coordinates. 3. projective transformation; which describes the relationship between the 3D camera coordinates and the visual display coordinates [21].

There are multiple ways to track for AR; sensor fusion is the use of multiple sensors in combination. GPS satellites broadcast radio signals that contain their position and time, with a GPS receiver fairly accurate position information can be generated; the mean average for accuracy using a smartphone GPS receiver was 4.9m in 2015 [22]. There are ways to greatly improve this, such as differential GPS (DGPS) which additionally uses signals from a base station to help correct distortion, or Real-time Kinetics (RTK) which may bring accuracy within centimetres, but which currently relies on rather large antennas. Other wireless network infrastructure such as Bluetooth, WiFi and mobile masts may also be used, often in conjunction with GPS to help determine more accurately position.

Sensors used to determine orientation include electric gyroscopes which are combined in a micro-electromechanical system (MEMS) to give accurate 3DOF measurements. For sufficient registration, however, these techniques are often not accurate enough; optical tracking should also be used. Using images requires referencing them to a model. If a model exists before the tracking starts, it is referred to as model-based tracking, if no existing model is available, then the model will be built up on-the-fly; this is referred to as model-free tracking [23]. Illumination will either be passive, active, a mix of the two, or structured (Structured light for gesture tracking is discussed in the next chapter). Markers such as fiducials
like QR codes are clearly distinct images, and, given that a relative, full 6FOD position can theoretically be obtained from only three points; a square marker will accomplish this. Given that markers may only be placed in certain controlled environments, natural features are then used to identify images; interest points or key points are higher contrast areas forming an irregular pattern that can then be recognised [24].

**Visual Coherence**

An important visual cue, occlusion of virtual objects by each other or by real objects is fairly simple to achieve, occlusion of real objects by virtual ones may be more difficult due to the often translucent qualities of the augmented imagery. Three main solutions to this are as follows: 1. The brightness of the occluding object is increased to dominance; however, this may cause detrimental effect to the overall scene. 2. A LCD panel is inserted between the combiner and real world image, which can selectively make pixels opaque or transparent. 3. In controlled environments, computer controlled projectors may selectively illuminate, so keeping real objects to be occluded by virtual, dark as non-illuminated [25].

Another important aspect that contributes to the realism and presence of virtual objects or environments in AR is photometric registration and common illumination; the registration of the global illumination (the full complex behaviour of light interacting with entire scene) the conditions of the real-world scene to model it and the virtual scene so to compute the augmented scenes common illumination. Common techniques to achieve real-time common illumination, include creating incident light cube maps which surround the virtual scene by means of analysing specular reflections (reflections from shiny objects), diffuse reflections (reflections from matt objects) or shadows in the real-world scene. Another technique is to recreate the light sources of the real-world scene with virtual lights in 3D model space [26].

**Foveated rendering:**

Although Sutherland noted that it was fortunate that the perspective picture presented need only to be updated when the head is moved, not the
eyeballs [27], Foveated Rendering is a technique currently being pursued in which eye tracking is key and where the ‘falloff of acuity in the visual periphery’ [28] is exploited to greatly accelerate the computation of graphics. Essentially only the spot of focus is rendered to full resolution and concentric outward layers progressively less so.

Non-contact Haptic Feedback
Presence is a key concept used in Mixed Reality (MR) often as defined by Lombard and Ditton in 1997 as ‘the perceptual illusion of nonmediation’ [29]. This may mean in fully immersive VR that one feels as if they were there, and not in their physical location or in AR that the mediated aspects are physically present [30]. The word Haptics is derived from the Greek ‘haptios’ meaning ‘something which can be touched’ [31]. To achieve presence in MR, haptics is crucial [32].

Haptics in MR have largely relied on either ‘static haptics’ [33], also referred to as ‘time-invariant systems’ [34]; simple physical proxy objects, or ‘feedback haptics’ for which there are two main types. The first type is that of wearing tactile devices on the body, such as the Dexmo exoskeleton glove [35](dextarobotics.com) or Cyber Glove Systems series (cyberglovesystems.com). The second is responsive proxy objects such as the robotic arms of the Geomagic Phantom series [36](geomagic.com), although this technique is also achievable using magnetic levitation. These two techniques suffer major drawbacks in that in the first case participants must wear often bulky equipment which itself will impart physical sensation, and in the second case the robotics will have a strong physical and visual presence and a limited haptic volume. In addition to wearables and robotics there is the possibility of providing haptic feedback from a distance through the air using air jets or as T. Hoshi et al proposed at the University of Tokyo in their 2010 paper ‘Noncontact Tactile Display Based on Radiation Pressure of Airborne Ultrasound’ [37]; ultrasound.

‘Noncontact Tactile Display Based on Radiation
Pressure of Airborne Ultrasound’ [39]
Developing further from T. Hoshi et al.’s ultrasound tactile display at the University of Bristol, B. Long et al. produced the ‘first non-contact haptic feedback system capable of producing feelable three-dimensional shapes’ [38]. From that point the researchers at Bristol went on to found the company Ultrahaptics. As with T. Hoshi et al.’s prototype, the Ultrahaptics currently use an array of ultrasound transducers, the same as those used in cars for parking guidance. It should however be possible to develop and produce smaller versions specifically engineered for the device, capable of producing higher resolutions and increased perceived and actual resistance.

**Tactile sensations** achieved by the Ultrahaptics device are caused by ‘acoustic radiation force’, a non-linear effect of focused ultrasound. This force produces a shear wave in the tissue of the skin, triggering mechanoreceptors, the sensory receptors in the skin. As the tactile receptors are generally sensitive to changes, the ultrasound is modulated at a frequency corresponding to peak sensitivity. Hoshi et al. [37] used the transducer array to create a single focal point of ultrasound; these points are referred to as control points. In order to create 3 dimensional volumes an effective matrix of many control points and corresponding null points which cancel out interference is processed by algorithms [38].

**Ultrahaptics** [39]

To track movement and build 3D models of environments on the fly: stereo, structured light and time of flight are the primary 3D camera technologies currently deployed. Structured light cameras project an active pattern, often using infrared, and analyse the deformation of the pattern to obtain depth; the first-generation Microsoft Kinect uses such a technique. One drawback of this technique is that despite light filtering, the structured light method is still susceptible to ambient light interference; making
it only suitable for indoor close-range use. The second-generation Kinect, the Kinect One, uses time of flight. Time of flight in the Kinect works by generating a reference signal that modulates at a specific frequency (typically between 50-150 MHz) which synchronizes an emitted strobe light to a sinusoidal pattern. On receiving the reflected signal, distance, thus depth, can be calculated by determining the phase difference; the time delay of the two signals [40] (Kadambi p4:24).

**Conclusion**

There is a trend driven by the biggest tech players towards consumer marketisation of Mixed Reality. The associated devices, software and network capacities are maturing and developing to form a new consumer prosthetic, the impact of which on our daily experience of and interaction with our environment is unprecedented. Networked MR devices and applications will serve as quantizing organs for unique and responsive environments that integrate into our regular environment. The questions now arise to how as designers of the environment we will respond to and involve ourselves in this emerging spatial regime. I present the mixed reality field; a dimensional expansion and development of the mixed reality continuum. The mixed reality field, in addition to the axis indicating levels of physical/digital environment and content, provides an axis for communality; a vital dimension to mixed reality which will be quantized and rendered by individually worn devices and informed by a mixture of individual and communal data. How these digital environments interact with one another and the regular environment on what scales of geographic mapping, levels of immersion and how the design of the regular environment is altered to better accommodate digital content are all newly relevant considerations for designers of the environment.
Notes:


Pokémon Go [2]

Mixed Reality, Microsoft [3]

Milgram & Kishino [4]
Mark Zuckerberg’s primary focus at 2017 F8 Conference: AR [6]

Example of split-image stereoscopic space synthesis [10]
Mark II gyro gunsight [12]

'Sword of Damocles' [15]

Pepper’s Ghost [16]
Waveguide [17]

Vergence-accommodation conflict [20]

X, Y & Z + Roll, Yaw & Pitch [20]
Nvidia foveated rendering [31]
'Noncontact Tactile Display Based on Radiation Pressure of Airborne Ultrasound' [39]

Gesture recognition with 3D camera [41]
Abstract
We are living in what Sanford Kwinter once described as the “Age of the Algorithm,” but what opportunities and challenges do algorithmic methods present for landscape architects? The profession has traditionally operated on a range of scales from small projects to large regions. Smaller scales are open to a range of design methodologies, including algorithmic design, but indeterminacy is usually of minor importance, while at the larger scale, a systematic methodology, often incorporating algorithmic methods through GIS models, becomes essential, but creative formal outcomes are usually limited. At the intermediate scale, however, the landscape architect still has an opportunity to manipulate the form of space, while having to constantly contend with dynamic forces and actors. It is at this scale that algorithmic methods may have the strongest potential, serving to mediate between indeterminate forces and specific formal outcomes.

This research presents a series of algorithmic methods to model interventions associated with five pilot projects in an informal settlement in Medellin, Colombia. The methods are based on an initial study, carried out by a multidisciplinary German-Colombian collaboration, which hypothesized that various bottom-up, soft, and self-directed strategies could be used to control rapid growth in dangerous, landslide prone sites, primarily by assigning productive land-uses to sites before they were occupied. A second set of strategies aimed to reduce landslide risk by mitigating dynamic, destructive landscape processes through similar sets of self-directed strategies. The follow-up study presented here proposes that informal and bottom-up processes, as well as strategic interventions, are particularly well suited to analysis and design with generative, algorithmic tools. This research tests this hypothesis and shows the results of modeling several systemic landscape processes in a dynamic peri-urban context, and reflects on the potentials and challenges of an algorithmic approach in the intermediate and indeterminate.
Introduction

Recent design discourse in landscape architecture has shown a prejudice against rigid formal systems, underscoring instead the importance of self-organization, emergence, indeterminacy, as well as non-linear systems and thinking. A growing number of landscape architectural practices have seized upon the thinking and tools associated with dynamic systems in order not only to create new types of formal expression, but in the hope that more performative landscapes can be conceived and implemented. The role of the designer in such projects shifts from that of the artist who gives the project its concrete form to that of the engineer of a system[1] who sets in motion a process or series of processes that will ultimately lead to a range of possible futures and associated forms.

The development of algorithms or codes presents a way for the designer to more rigorously study the behavior of complex systems and the formal, spatial, and evolutionary implications of dynamic processes. Already, disciplines at the edges of landscape architecture have expanded their thinking through algorithmic simulations and models, in order to answer fundamental questions concerning the behavior of dynamic systems and the emergence of form in nature.[2] At another extreme, computer scientists have been particularly interested in an algorithmic description of natural systems to aid in generating believable digital worlds and environments or to create artificial intelligences.

In the context of landscape architecture, despite early advocacy for computational methods in the analysis and design of landscapes at the landscape planning scale by figures such as Ian McHarg at UPenn or Carl Steinitz at Harvard GSD, there had been a general reluctance to adopt computational methods as a design tool to explore landscape expressions and forms.[3, 4] This attitude is rapidly changing, with numerous
practitioners beginning to experiment with algorithmic methods. So far, implementations of this tend to be at smaller scales, but the promise is that algorithmic methods can begin to mediate between the smaller scale of the constructed project, and the open, non-linear system dynamics of the larger landscape. To test this hypothesis, this paper presents a brief overview of an ongoing joint research project between a team at the Leibniz University in Hannover, Germany and the design think tank Urbam at EAFIT University in Medellin, Colombia, and describes several algorithmic methods developed in conjunction with the broader research project to model and test potential landscape interventions in a dynamic and complex landscape context.

**Project Background**
As cities rapidly urbanize throughout the developing world, formal methods of planning and allocating housing cannot keep up with the burgeoning demand. Informal urban growth in many developing contexts often happens in areas deemed least suitable for housing, which includes sites with high natural risk factors, high ecological sensitivity, or a combination of both. In many mountainous metropoles, this development often happens on steep, mountainous terrain, especially prone to landslides after heavy rains. One metropolitan area where the convergence of these factors can be clearly seen is the fast growing Colombian region of Medellin. Following a 2010 disaster in the peripheral suburb of Bello where at least 85 lives were lost in a catastrophic landslide (Fig.1), Christian Werthmann (Leibniz University Hannover) and Alejandro Echeverri (Urbam-EAFIT) formed a research collaboration funded by the municipality to examine the phenomenon of informal growth in the region along with the incidence of landslide risk. By 2013, the study had focused on two rapidly growing informal neighborhoods located in close proximity to the city center in an especially dangerous context at high risk of frequent, devastating landslides, owing to an especially erosion prone underlying geology.[5]
Owing to the limited municipal resources which could be allocated to address the ongoing problem, the team sought new, low-cost but high-impact strategies which could be used to deter occupation of sites in zones with high geological risk by giving such sites a productive, alternative land use, and to mitigate risk in already occupied medium risk sites to reduce the likelihood landslides being triggered and to improve slope stability.[6] With these goals in mind, the team proposed five sets of compatible, replicable strategies that could be tested in small, pilot projects. (Fig.2) The lessons learned from the pilot projects could in turn inform comparable projects on other, similar sites in the metropolitan region. The research concluded with a publication designating potential sites and sets of strategies, but the spatial implications of these strategies at specific sites in the neighborhoods were not yet tested.

**Algorithms for landscape planning**

During the initial research, few specific algorithmic methods were employed, and then only at the larger planning scale utilizing in particular methods similar to those proposed in Ian McHarg’s Design with Nature or those developed by Carl Steinitz using GIS based overlays at Harvard GSD. In these methods, layers of information are assigned with specific parameter weights in order to understand its operations, evaluate its strengths and deficiencies, and evaluate the impacts of changes, ultimately in order to make well-informed decisions.[7] In this particular case, the team developed two separate regional-scale models, one to assess risk and the other to forecast growth. The risk model accounted for the presence of unstable soils, heavy rainfall and flooding, as well as high slopes.[8] The growth model accounted for four specific ‘attractors’ which contributed to an overall anticipatory model of growth. The attractors included proximity to existing informal settlements (informal urbanization tends to initiate a self-reinforcing feedback loop), proximity to public services, proximity to major roads, and proximity
to protected areas or the urban boundary.[9] Weights and ranges of influences were assigned to the four parameters based on empirical observation of historical maps.[10] The presence of multiple attractors pointed to areas at high-risk of informal growth in the coming years, and could be overlaid with the risk map to identify “hotspots” where informal growth and destructive landslides would likely occur together.[11] (Fig. 3)

While the forecast for future growth at the regional scale seemed reasonable for identifying potential areas of conflict, the usefulness of this methodology at a smaller scale seemed to break down. Soon after developing a similar model correlating risk with anticipated growth at the scale of the neighborhood, specifically forecasting a high likelihood of informal growth in specific parcels, the team realized the model stood on a shaky footing when in a follow-up visit, in one area identified as having a “low-risk” of future occupation, a dense cluster of 30-40 small wooden houses had sprung up seemingly overnight while the team was miles away in the lab refining their model. Obviously, the model was not working—either the parameters were not properly calibrated, or a larger issue was at play—while a model may be useful at a larger scale, or to extrapolate general trends, the feasibility of the model to predict specific actions at a smaller scale can seemingly defy rational quantification. There are many reasons for this, but even the most powerful quantitative model must take into account things that are not easily countable, or as Einstein said, “not everything that can be counted counts, and not everything that counts can be counted.”[12] The behavior of actors in complex, changing milieux may become predictable in an aggregate sense, but not their discreet actions. It is also a weakness of the current geo-design methodology, recognized by Steinitz, that the interactions or relations between the various parameters or processes, rather than merely their overlay, are not adequately accounted for by current methods.[13] Whether taking these
factors into account would improve the reliability of the model, in the end, only a comprehensive evaluation of the model after the worst (or best) has occurred would point to its validity. Such studies of failures, or successes, however, are crucial to validating and improving the methods of algorithmic approaches to landscape planning.

[14]

Even with the seeming failure of the predictive growth model at smaller scales, it became increasingly evident that algorithmic approaches might help inform the project in other ways. The research itself concluded with a publication designating potential sites and sets of strategies and tactics, but the spatial implications of these strategies at specific sites in the neighborhoods were not tested, and the pilot projects themselves had yet been implemented. A gap between this strategic framework and first steps towards implementation could conceivably be filled by developing algorithmic methods for many of the strategies, and then testing the spatial deployment of the methods in a digital model of the settlement. These tests could then in turn inform plans for the first pilot projects and their method of implementation. In the preparation of preparing the research materials for two major exhibitions and for preparing a formal proposal to acquire funding for the project implementation, a series of algorithmic methods were developed by the author to test the viability of the strategies. Especially promising were algorithms related to describing and projecting morphologically complex spatial structures in and around the settlement, as well as algorithms using production rules to test the deployment of strategic landscape systems.

**Spatial structures**

As an example of an algorithm developed to project a complex spatial structure, the author developed a system which would allocate plots recursively based on complex initial conditions. A major strategy envisioned by the research for dis-incentivizing growth on high-risk sites was to give a productive land use such as agriculture
to land at risk of future development. In developing a model which would be appropriate for the urbanizing and complex topography around Medellin, a methodology for deploying a formal structure in a morphologically and topographically “informal” context had to be devised. In developing an algorithm to model the spatial deployment of a farming system, the author looked at a few case studies of successful micro-farming projects in the Colombian context, aerial imagery of terracing systems, along with a detailed evaluation of ancient Andean terracing systems led by Javier Pinedo, who in turn used this archaeological knowledge gained to develop new terracing systems in mountainous contexts.[16]

Before deploying the algorithm, the designer makes a rough initial set of divisions taking into account locations of man-make or natural objects, such as buildings, paths, groves of trees, large rocks or cliffs, as well as potential new features such as access paths, service buildings, etc. From here, the algorithm takes over to systematically adapt a potential field system to the topographic conditions. This is done by following a simple recursive process that alternates between dividing a parcel along a contour line with a second series of perpendicular downslope divisions. For the first division, the algorithm finds the center point of the overall parcel to be divided, and then traces the slope contour passing through this point. This divides the parcel into two sub-parcels. Each of these sub-parcels is then populated with a number of points (based on its overall size), and at each point the downhill slope vector is identified. All of these vectors are then averaged to find an average overall downhill vector for each sub-parcel. This vector is then traced through the center point of the sub-parcels, dividing them into two halves. The initial partial is now divided into four parts. (Fig. 4)

The process continues along these lines until one of several conditions are met to remove the parcel from the sub-division algorithm when the
average local slope in the parcel is low enough or if certain minimum size thresholds are met. If the parcel leaves the algorithm because it has achieved the minimum size, a final decision is made to determine if the average slope in the parcel is still too excessive, in which case slope stabilization measures, such as terracing, will be needed, or if the parcel can stand on its own without additional slope stabilization. What this slope is depends on what crops will be planted, their ability to grow on steeper sites, and their ability to slow soil erosion. (Fig. 5)

This fairly simple process of recursive slope divisions yielded results that took on a character surprisingly close to that of terracing systems around the world. (Fig. 6) The algorithm can and should be refined based on the specific requirements of the system being used, but overall it shows significant promise. It can also be deployed rapidly and effectively over large areas, if not to design the system itself, at least to show the visual character, the potential spatial dimensions, and the visual impact of the deployment of such a system. Additionally, the algorithm gives hints as to how the construction of the system could be implemented by community members and workers in the field, who would use a process and logic similar to the algorithmic process when deploying the system, dividing space by alternating between divisions along a contour and against a contour in a manner similar to the algorithm.

**Landscape systems**

A second algorithm developed by the author explored the spatial arrangement of a landscape system whose production rules were clear as a typological template for local conditions, but unclear in terms of how the elements interacted as a networked system. In the research, the team proposed deploying several bio-engineered slope retention and drainage improvement systems to both mitigate landslide risk in and around existing settlement and to facilitate speedy ecological restoration in areas deemed at risk of potential future settlement. A potential
bioengineered system that could be used on site to improve slope stability and to promote good drainage while encouraging rapid plant colonization is the living slope fascine, a system of plant material interconnected to improve drainage and encourage the growth of plant material which mechanically stabilizes slopes. In establishing the system, however, slope steepness must be carefully accounted for, as the system requires specific configurations and spacing of elements and overall orientation with respect to the fall of the slope. As described in Studer and Zeh’s Soil Bioengineering: Construction type manual, three specific configurations are given described with a vignette and typical plan.[18] (Fig. 7) It is then up to a design professional to translate these templates into an arrangement which works on a specific site.

The straightforwardness of the method in light of the topological variability and complexity of the slope and in the context of existing features of the settlement suggested that this was another system that could lend itself to study and spatialization through an algorithmic method. The logic of the algorithm developed merges a local reading of slope steepness with the three distinct spatial configurations suggested for the three categories of slope steepness in Studer and Zeh’s manual. To begin, slopes are read in the computer model with an initial 2m grid. To account for sudden local variations, which may reflect errors in the computer model and not necessarily actual conditions, the downhill slope vectors are also normalized based on their neighbors. Then, the slope vectors are sorted into three categories associated with the three configurations described in the manual, being respectively, slopes from 20-50%, slopes between 50-70%, as well as slopes steeper than 70%. The algorithm also sorts out slopes less than 20%, where it is assumed the living slope fascine method would not be needed. The next step is to rotate the slope vectors based on the local configuration of the drainage fascine system recommended at each point
as per Studer and Zeh’s technique. Depending on slope, this vector may be perpendicular to the fall, or rotated 30 to 90 degrees. The final stage is to connect the various localized vectors into a coherent, complete network. (Fig. 8) (Fig. 9) While several methods of doing this were tested, in the end the algorithm uses the logic of a growing plant, an algorithm known as the Auxin Canalization method to create the network, an algorithm described and refined the group ‘Algorithmic Botany’ at the University of Calgary and used in many applications of generative and computational art.19 Here it is used to create an “optimized” network, where the local segments of drainage fascines are recursively aggregated to the overall network based on a logic which minimizes travel distances. (Fig. 10)

This initial test showed that the algorithm could be very useful, at least for establishing an initial configuration for the network. Some segments are not able to be effectively connected to the network and further consideration needs to be done to decide how to deal with these cases, usually occurring in the vicinity of the high slope areas which need special slope retention measures. The designer must be aware of the limitations of the algorithm, and some care must be made in setting up the initial conditions, in terms of potential receiving streams and the area where the fascines are to be deployed, based on local micro-drainage basins.

**Reflection**

Many other algorithms were developed to test the strategic deployment of landscape systems, a full description of which is beyond the scope of this paper. Many of the algorithms could also be refined in a number of directions, and should only be seen as starting points for further exploration. An important distinction, however, should be made between the development of algorithms in the context of landscape design and those for computer science. The disciplines and end goals are fundamentally different, and the goals of the algorithms must also be different. A computer programmer knows that the debugging process
to make an algorithm foolproof and to account for every possible scenario of use or misuse, needs to be considered, and can easily involve a process much longer than the initial programming itself. When programming algorithms for design use, this may not be necessarily the case, and the investment of significant amounts of time into minor refinements needs to be considered in light of other project goals.

A second important consideration revolves around the importance of scale when considering the potential benefits and setbacks to using algorithmic methods in a project. Smaller scales are open to a range of design methodologies, including algorithmic design, but indeterminacy is usually of only minor importance, and in this context, the use of algorithmic form can be seen largely as an expression of goals relating to aesthetic goals or design philosophy. At larger scales, a systematic methodology, often incorporating algorithmic methods through GIS models, becomes essential, but creative formal outcomes are usually limited. At the intermediate scale, however, the landscape architect still has an opportunity to manipulate the form of space, while having to constantly contend with dynamic forces and actors. It is at this scale that algorithmic methods may have the strongest potential, serving to mediate between indeterminate forces and specific formal outcomes. As codifications of repetitive knowledge and formal structures, they also have the potential to address the issue of scalability when it comes to strategic design in contexts with limited resources to invest in comprehensive or traditional design approaches.

Notes
6 ibid. 137-155.
9 Ibid, 56-57.
11 Ibid, 72-89.
12 attributed to Einstein, as quoted in Steinitz, 183.
13 Steinitz, 182-183.
14 ibid, 192.
15 ibid, 206-207.
18 Ibid.
Figure 1: Landslide in Medellin, 2007 (source: Department of Administrative Planning, Medellin)

Figure 2: Areas of intervention for the five Pilot Projects. Rehabitar la ladera, 227.

Fig 4: Areas of intervention for the five pilot projects derived from GIS overlays of risk, occupation levels, and nature protection categories. Rehabitar la ladera, 227. Clockwise from top-left.

1-High Risk/Settled - Early Warning
2-Medium Risk/Settled - Mitigate Risk
3-High Risk/Not Settled - Microfarming
4-High Risk/Environmental Protection
5-Low Risk/Not Settled
-Sites & Services
Figure 3: Attractors are overlaid to identify a model for potential growth by the year 2030. Shifting Ground, 67-68.

Figure 4: Steps of the recursive plot division algorithm to divide one parcel into four parcels.

Figure 5: Algorithm after 10, 30, 60, and 99 time steps. Colored parcels have met one of the exit conditions while grey parcels will be recursively further subdivided.
Figure 6: Final arrangement of terraced fields generated by the algorithm in a digital context model. Buildings were generated through a separate algorithmic process not described in this paper.

Figure 7: Three configurations of slope fascines based on slope. Studer and Zeh, 234-235.
Figure 8: Steps of the fascine drawing algorithm.

Figure 9: Proposal for slope fascines using an earlier method where the endpoint of each section is connected to its closest neighbor, after which several smoothing operations are performed.
Figure 10: Alternate method to create a network for the fascines based on the auxin canalization method.
Time, Patination and Decay: The Agents of Landscape Transformation.

‘One hopes one builds forever, but one has either to anticipate or accept change and its effects ...’ S. Child [1: p303]

In landscape architecture the optimal condition is often not reached at the time of practical completion, projects mature through time and patination throughout the project lifecycle. The processes of patination and subsequent deterioration leave traces on the surfaces of the built environment which highlight deficiencies in design and detailing, construction and maintenance. Patination is a process of addition to a surface acquired through age and exposure. This process is followed by decay, a process of subtraction from a surface which is detrimental to the fabric. The transformation between these two processes can be quickly exceeded due to unfavourable design, detailing, construction, weathering, usage and/or maintenance.

Current research at the Technische Universität Berlin is based on the hypothesis that it is possible to optimise design, detailing, construction and maintenance techniques by monitoring and evaluating projects at regular intervals after completion. A low-threshold and non-destructive monitoring method to ‘read’ and decipher these traces of time is being developed in order to pinpoint the agents of landscape transformation and identify frequently occurring points of weakness in built landscapes. The methods being developed align with the principles of construction pathology by identifying a relationship between the ‘visual signs and symptoms’ (effects) observed and ‘pathological conditions’ (causes). This enables causes to be determined and recommendations for the most appropriate course of action to be made [2].

Inherent weaknesses are an inevitable and unavoidable factor of all structures resulting from the form of the structure, material properties
and wear and tear; for example, mechanical
damage to exposed table corners or the natural
discolouration of wood (greying). Inherent
weakness can be optimised, but not completely
eliminated, through improved design, quality of
materials and maintenance.

Weaknesses can, however, also be caused by
misjudgements in the planning and execution
of the design, low quality materials, poor
workmanship and maintenance, which are
often the result of budgetary restraints. These
weaknesses can be minimised or avoided through
increasing awareness of previous failures through
feedback loops to the profession – thus avoiding
the repetition of failures.

`... every new piece of construction
is to some extent a hypothesis and
its performance in practice is the
experiment. But where are the designer/
experimenters?´ B. Bordass [3: p29].

Most construction projects include experimental
or innovative aspects such as a special form,
new materials or surface treatments [3: p29].
Furthermore, so-called ‘standard details’
are actually work in progress, and need to be
updated on a regular basis to suit specific site
requirements. This acquired knowledge from
experimentation, innovation and development
needs to be feed back to the profession for
research and development purposes. Feedback is
however not routine and therefore weakness and
failure persist. [3: p23].

The field research focuses on projects within the
city of Berlin; which ensures the comparability
of social and microclimatic characteristics. It is
based on multi-temporal photographic surveys
which form the basis for the subsequent analysis
and evaluation. The core period of research
covers the first 5 years of post-completion
project development, further surveys of older
projects allow for a period of up to 25 years to be
analysed. Data collection reports and project data
sheets provide important background information
on site specific data and other observations. The photographic recordings are assigned metadata (e.g. location, completion date, facility, material) and stored in a database. The analysis and evaluation of the data is carried out both quantitatively and qualitatively. By comparing selected images from the initial state with the associated subsequent recordings, the process-dependent changes become visible. Frequently occurring areas of deterioration highlight points of weakness and vulnerability. Comparisons of the rate of change between different objects and projects allow premature ageing to be determined, and the common causes identified. Expert interviews will be employed at a later stage to develop prevention, minimisation and protection strategies in order to counteract the problems identified.

The agents of landscape transformation seldom act independently of one another but are interrelated and complex. The following list of main causes has been established through an initial analysis of 400 case studies. These cause criteria are subdivided into those relating to the Context, Component Quality, and Operating Conditions. Due to the complex nature of these processes some of the criteria inevitably overlap with one another [Fig. 1] [4: pp166-177] [5: p398].

The following detailed discussion of the causes and commonly found effects of these agents is not exhaustive and will be added to or adapted during the ongoing analysis of further case studies.

Context

1. Site and contextual factors
These factors include the specific geographical location, microclimate (urban, coastal, upland and forest microclimates), degree of exposure, aspect (slope), and the influences from surrounding elements such as buildings and vegetation. Factors such as the degree of exposure, topography and aspect strongly influence the intensity of microclimatic agents. Organic matter such as leaves, fruit, flowers,
seeds or sap from neighbouring vegetation is transported to the lowest points of our built works through runoff and erosion. This accumulation of organic matter slowly decays leading to increased moisture retention and initiates soil formation which in turn provides the perfect physical and hydric conditions for spontaneous plant growth [6: p13] [7: pp 63 et seq., 80]. Vegetation can also influence the built environment through direct contact causing abrasion and increased shading, in turn creating an increased level of humidity and an increased rate of degradation. Progressive root growth may penetrate into built elements causing direct damage, or beneath structures, which can cause heave, displacement, breakage or foundation failure [8: pp 10 et seq.].

Soils that are prone to volume change are particularly problematic in the built environment. Periods of drought may cause soil shrinkage which can lead to structural subsidence. Prolonged periods of rain can lead to soil expansion (heave), which may also cause structural damage.

Other contextual factors include the surrounding traffic, which can influence the site through airborne pollution, and mechanical damage.

The effects of contextual factors:
- Airborne sediments are mainly deposited in the lower-velocity lee of vertical elements such as walls, edgings, kerbs, bollards, at the base of street furniture as well as in the corners and joints of built elements [Fig. 2a].
- Drainage channels and gullies, being at the lowest point of the built landscape, are particularly prone to this form of decay [Fig. 2b].
- Many cases of surface damage to paving caused by occurrences of root heave have been identified [Fig. 2c].
- Intensive shading by vegetation, nearby buildings or other built elements is a common cause of increased surface moisture, surface soiling, and spontaneous vegetation growth [Fig. 2d].
- Structural subsidence has also been
observed, caused by soil shrinkage, settlement, excessive loading or deficient foundations.

**Component Quality**

1. *Design and detailing factors*

These include change due to the quality of the design and detailing and insufficient or defective durability features.

‘Designers repeat details and reuse certain materials ... In this way, ‘learning by mistakes,’ rules of thumb, and various shorthand methods and detail practices are established over a number of years, to be repeated, elaborated on, or, as is sometimes the case, misappropriated and lost over time.’ N. Kirkwood [4: p183]

In the design phase conceptional ideas are transformed into tangible design solutions. The specific geometry and form of each element needs to allow not only for the appropriate usage, but also for weathering (e.g. rainwater runoff) and ease of maintenance through time. The site programming (functional concept) can lead to conflicts of usage, and in turn to detrimental change.

The detailing phase acts as an intermediary between the design process and project realisation by relating material to form and function. The main stimuli for change are due to the suitability of the selected material and surface finish for the specific use. Through ensuring ease of maintenance and repair, it is possible for elements to reach their optimal service life.

Good detailing relies on a thorough understanding of design concepts, construction techniques and material properties over time. Many detailing factors influence time based change:

- Design and technical design in general: e.g. form, material selection, fixings, jointing and compliance with construction standards
- Structural design: e.g. dimensioning, stability
- Drainage: surface and sub-surface drainage, rainwater runoff in general
- Maintainability: ease of maintenance and repair
- Durability features: all methods of constructive protection including drip edges, copings, and surface treatments.

A few examples of design and detailing problems from the field research are listed below:
- The form of construction elements often determines the patterns of change and decay. For example, objects with very acute angles, such as edgings and short walls, often become chipped or broken through mechanical damage [Fig. 3a]. Also, non-chamfered or unrounded edges of paving elements are frequently chipped, especially at the turning points of vehicular traffic [Fig. 3b].
- Structural design issues such as the bending of low steel railings or the wooden laths of benches bending between the supports [Fig. 3c] have been identified.
- Minimal drainage gradients are often found leading to a reduced rate of runoff and an increased rate of sedimentation and decay in the joints and on the paving.
- Many elements suffer from the accumulation of waste or the development of spontaneous growth within or beneath the construction, which is often only removable with extensive maintenance [Fig. 3d].
- Constructive protection measures such as wall copings are often not implemented leading to extensive staining.
- Irrigation systems have been found to cause severe staining when directed towards walls and paths.
- ‘Desire paths’ (paths created by erosion) are often found due to a lack of paths in the desired route. Also, right angled path junctions often lead to damage by users and/or maintenance traffic rounding off the corners.

2. Material specific factors

‘The effects of age and wear are powerful
Various material specific factors influence change and deterioration through time. These factors relate to the quality and durability of the material and its surface protection. Durability characterises the ability of a material to perform its required function over its expected service life under scheduled maintenance. Each individual material reacts differently to the influences of weathering, use and maintenance over time. Practitioners need to understand the strengths, weaknesses and other unique characteristics of each material and forecast how the material will endure through time. Selecting the right material and surface finish for the job also relies on knowledge of the desired object form, function, site of installation, the intensity and frequency of use, and the foreseen level of maintenance and repair. Another consideration is that the site of installation may be located in an aggressive environment influenced by intensive use or misuse, intensive freeze-thaw cycles, or where grit or de-icing salt is spread in winter. Surface finishing can enhance material properties for specific applications.

Material change through time can be classified into those which influence the aesthetics, and those which lead to a reduction in functionality, stability, and/or durability. Time often improves the look of materials by blending imperfections on surfaces, highlighting surface structure through deposits of dirt, growth of lichen or by fading colours. These continual processes of change can be regulated through regular maintenance and repair in order to achieve an optimal service life.

Many material related weaknesses have been observed through the field research, some of the main factors are detailed below:

- The greying and cracking of wood and the discolouration of synthetic surfaces occurs rapidly in exposed locations due to ultraviolet radiation.
- Water absorption of materials is a major factor, especially for horizontal surfaces that
are subject to intensive cycles of wetting and drying, freezing and thawing and increased staining from airborne sediments [Fig. 4a].
- Insufficient or defective coatings and finishes such as paints or powder coatings leads to moisture penetration below the surface coatings which cannot easily escape and therefore leads to an increased rate of decay.
- Fixings such as screws, bolts, rivets and nails are the source of many problems. Screws and nails in wood and wood-plastic-composites often lift over time due to the flexing of the timber through use [Fig. 4b]. Corrosion and/or contact corrosion of fixings due to inappropriate specification is commonly found, this leads to staining and structural damage.
- Jointing is a common source of weakness mainly due to the loss of jointing material and spontaneous vegetation growth.
- Many cases of `picture framing´ (darkened perimeters of paving materials formed by efflorescence being transported from the bedding material between the joints) have also been identified on concrete and natural stone paving.
- The erosion of embankments through cycles of use, weathering and landslides was often identified [Fig. 4c].
- Elements that are subject to mechanical surface damage through use such as bike stands or bollards are particularly susceptible to corrosion.
- Production process faults, for example due to the soiling of concrete formwork, or insufficient compaction, were often found. These often become more visible through time due to the effects of weathering. [Fig. 4d].

3. Implementation factors
These agents include the quality of implementation, workmanship, site supervision, construction technique, and conformance with construction standards.
during construction often leads to deficiencies in the construction work. Thus, in the implementation process, recognised rules of technology are often violated or construction plans are deviated from.’ C. Bahr, K. Lennerts [10: p27]

David Pye views workmanship as an extension of the design process; he states that ‘... design can only become manifest through workmanship’ [11: p9]. The quality of workmanship is dependent on the qualifications and experience of the construction staff, managers and site supervisors. Mechanical damage and/or surface soiling can occur throughout the construction process from material transportation, to assembly and the use of machines on site.

Frequently found points of weakness due to implementation factors include:
- Efflorescence and spots of rust staining (from exposed reinforcement) on the surfaces of concrete elements were frequently identified [Fig. 5a].
- Asphalt surfaces with a rolled on crushed stone finish are often not evenly coated, with time and wear the surfaces become increasingly irregular. [Fig. 5b]
- The Settlement of paving elements surrounding facilities such as manholes, where compaction during construction is more difficult [Fig. 5c].
- Cracking or breakage of large in-situ concrete surfaces, especially those with specific forms [Fig. 5d].
- Many cases of repairs (mainly to concrete and stone elements) from the construction period were found, which often become more evident due to weathering through time.

Operating Conditions

1. Environmental processes
These agents include weathering, climate, chemical and biological agents which affect materials in differing ways depending on the surface properties. These processes occur
in a cyclic manner; from daily cycles (e.g. temperature, precipitation) to seasonal cycles (summer, autumn, winter, spring) throughout the entire lifecycle of the project. The intensity of these agents through time highly influences the rate of deterioration.

**Climatic agents** include factors such as water, ice, frost, snow, sun, wind, humidity and temperature. In sunny locations colours generally fade; synthetic materials become brittle, wood twists and cracks. Thermal expansion and contraction from **temperature** change and **relative humidity** places stress on many materials leading to cracking or the fracture of surface coatings.

**Rainwater** is a major cause of erosion and transporter of airborne sediments (e.g. particulate matter). The surface flow of water on built elements is highly influenced by the object form, material, surface properties and the proximity to the ground. Ground proximity is a major problem due to the splashback of rainfall which, depending on the surface properties, reaches a height of 20-30cm.

**Wind** can cause direct stress to the structure and also transports pollution and sediments.

**Chemical agents** are mainly airborne pollutants (e.g. industrial, marine pollutants) or aggressive soil conditions that attack the surfaces of built elements. The deposition of dust, dirt, pollen, and other **atmospheric contaminants** on the surfaces of built elements leads to **surface soiling**. This deposition is increased on rough and/or structured surfaces, surfaces prone to frequent wetting, as well as in joints, gaps and surface imperfections.

**Biological agents** include vegetation growth and animals such as dogs, foxes, birds (especially pigeons) insects and rodents [12: p127] [13: p283].

**Spontaneous vegetation growth**, generally due to a lack of maintenance over long periods of time, leads to an increased rate of decay through increased shading, moisture retention and root actions.

A few examples of environmental impacts identified via field research are listed below:

- The climatic effects on horizontal surfaces
were found to be particularly pronounced especially on unbound surfaces. This leads to an increased rate of soiling and natural succession [Fig. 6a].
- Surfaces below objects, such as under waste containers, which are particularly undisturbed through use and/or maintenance, are susceptible to increased rate of succession.
- Surface soiling at the top and base of built elements, was frequently found [Fig. 6b].
- Cases of spontaneous vegetation growth are widespread throughout the city, especially in the recesses, corners, edges and joints of built elements [Fig. 6c].
- Many cases of damage from dogs digging next to benches, and rodents burrowing under surfaces or into embankments have been identified [Fig. 6d].

2. User actions / usage

‘Science .... has not enabled us to predict the behaviour of people; which very many designers need to be able to do. ... We design failures chiefly because we cannot make reliable predictions about responses.’
D. Pye [9: p27].

Humans cause physical stress to the built environment through use, misuse or underuse, which is difficult (if not impossible) to foresee in advance. Therefore, in an optimal situation, the level of maintenance and repair needs to be adjusted to the resulting situation. In structural terms, usage is a form of loading which can be static or dynamic, and exerts force upon the structure. The intensity and frequency of these interactions dictate the impact of these forces over time.

**Overuse** describes a space or element with an excessive frequency and/or intensity of use causing detrimental deterioration.

**Misuse** refers to the impact of wilful destruction (criminal vandalism) and use appropriation (uses of an object for a purpose or in a manner other than intended). In this research project, these forms of misuse are evaluated purely on their
impact on the specific structure.

**Underuse** describes a space or element which is used less than expected. This reduced rate of trampling often leads to an increased rate of spontaneous vegetation growth [14 p96] and therefore to an increased need for maintenance.

Many problems developing from usage over time have been identified from the field research, including:

- In many projects, intense use is focused on certain areas or objects whereas others remain disused.
- Overuse often leads to severe surface erosion especially to unbound surfaces (e.g. grass areas, compacted gravel) [Fig. 7a].
- Many different forms of accelerated deterioration through wilful destruction were identified [Fig. 7b].
- Chewing gum trodden flat by human traffic is especially frequent near building entrances and public seating [Fig. 7c].
- Many forms of use appropriation, such as using bike stands as benches or play equipment, have been observed, leading to unintentional soiling and damage.
- Underuse often becomes visible through an increased rate of succession [Fig. 7d].

3. *Maintenance and repair*

`Feedback into the growth or decay of a landscape allows the landscape architect to have a positive, creative role in its development, rather than a negative, mitigating view of change, which is encompassed in the notion of ‘maintenance.’` J. Raxworthy [15: p193]

Maintenance and repair operations involve performing repeated cycles of routine actions which aim to keep the project in working order, prevent problems from arising and restore dysfunctional elements. The quality of the maintenance operations is dependent on the qualifications and experience of the maintenance staff and site supervisors. The **frequency**, **quality**
and intensity of these operations highly influence the rate of deterioration through time.

**Insufficient** or **incorrect maintenance** often leads to accelerated deterioration, reduced usability, a downward spiral of decay. **Incorrect maintenance**, for example by using abrasive brushes, or aggressive chemical solutions, can cause surface discolouration or abrasion, thus leading to corrosion, erosion and/or permanent surface damage.

It is therefore essential to know the available level of maintenance, type of equipment, and skills of the maintenance staff in the planning phase so that the planning can be adjusted accordingly.

The problems resulting from maintenance and repair in Berlin are extensive; some of the main findings are listed below:

Insufficient maintenance is a significant factor in most of the field studies leading to spontaneous vegetation growth in corners, joints and drainage elements [Fig. 8a].

Particularly difficult to reach surfaces are often not maintained, for example surfaces behind railings or areas between the wood laths of a bench.

A few cases of surface erosion/abrasion from mechanical and/or chemical maintenance have been identified [Fig. 8b].

Insufficient repair is a major problem which can also lead to risk of injury. For example warped boards or protruding screws on wooden decks [Fig. 8c].

Graffiti removal often leaves visible residues, especially on coloured surfaces [Fig. 8d].

4. **Force majeure**

This factor covers the level of impact of unforeseeable natural disasters such as flooding, earth movement (e.g. landslide, earth quakes), extreme storm damage and human factors such as war, terrorist activities and riots. The visible signs of such events are specific to the individual event itself; generally however cause extensive damage over wide areas.

Very few of the Berlin case studies can be linked to this factor; however fallen trees and damage resulting from traffic accidents have been documented.
Conclusion

`The `research´ of detail has previously been considered of little significance in practice. ... the results of the studies were rarely made available to others´ N. Kirkwood [4: p183]

The methodology being developed within this research project enables a formalised monitoring of built works and a tool for continuous improvement. This enables an iterative learning process from previous innovations and problems in order to optimise the performance of future projects in the design, detailing and construction phases of the project. The results can also be used during the post-occupancy phase to compare the developing condition with a catalogue of case studies in order to take appropriate measures to counteract negative change.

The initial case study evaluations display a great diversity of weaknesses throughout public space in Berlin and generate a wide range of detailed knowledge on project development. Raising awareness on weakness and problems is however problematic within the profession; no one wants to take the blame, be faced with ruined reputations or legal liability issues. Without learning from past problems, and passing this knowledge on to others through publications and teaching, they will continue to be repeated. This is shown by the repeated occurrence of many weaknesses and failures observed throughout our field research. Learning from problems is a form of `lifelong learning´ from built works and should become a standard part of `research and development´ within the profession.

The landscape architecture profession needs to develop a culture of criticism, reflection and learning from the detrimental processes of change through time. Several publications and platforms are available for buildings such as the `Journal of Performance of Constructed Facilities´
and the web platforms ‘Failures Wiki’ [A] and the ‘Building Failures Forum’ [B] [16 p.328]. A confidential journal or web platform for the dissemination of specific knowledge related to innovation, weakness and decay in landscape architecture projects is long overdue.

Notes


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Translated by Simon Colwill


Websites

[A] Failures Wiki; Available online: http://failures.wikispaces.com

[B] Building Failures Forum; Available online: http://buildingfailures.com
Fig. 1: The AGENTS of landscape transformation. [4: pp166-177] [5: p388].

Fig. 2: a) Deposits of airborne sediments: year 1/ year 10. b) Airborne sediments causing blockage: year 1/ year 8. c) Root actions causing heave: year 1/ year 4. d) intensive shade leading to succession: year 1/ year 6. (Photos: S. Colwill)
Fig. 3: a) Breakage of acute angle: year 1/ year 7. b) Chipped non-chamfered paving: year 1/ year 11. c) Structural design weakness: year 12. d) Spontaneous growth below bench: year 7 [Photos: S. Colwill]

Fig. 4: a) Water absorption increasing staining: year 8. b) Lifting of screws: year 4/ year 7. c) Embankments erosion: year 01/ year 07. d) Weathering highlighting production faults: year 7 [Photos: S. Colwill]
Fig. 5: a) Efflorescence and spots of rust staining: year 1/ year 8. b) Surface becoming increasingly irregular: year 1 / year 7. c) Settlement of paving surrounding facilities: year 7. d) Cracking of in-situ concrete surfaces: year 2/ year 5 [Photos: S. Colwill]

Fig. 6: a) Increased soiling on horizontal unbound surfaces: year 2/ year 7. b) Increased succession in undisturbed areas: year 3. c) Spontaneous vegetation growth: year 01/ year 07. d) Dogs burrowing beside benches: year 2 [Photos: S. Colwill]
Fig. 7: a) Overuse causing surface erosion: year 2/ year 7. b) Wilful destruction: year 01/ year 07. c) Chewing gum trodden into surface: year 15. d) Increased succession due to underuse: year 5 [Photos: S. Colwill]

Fig. 8: a) Insufficient maintenance: year 1/ year 6. b) Surface damage from maintenance: year 01/ year 06. c) Insufficient repair leading to risk of falling: year 10. d) Visible residues from graffiti removal: year 1 [Photos: S. Colwill]
Abstract
This paper focuses on the impact of climatic forces on built landscapes through time. It explores the initial results of a research project at the Technische Universität Berlin (TU Berlin) exploring the dynamics of change to built landscapes through time. The impact of climatic processes on built landscape is determined by the level of climatic exposure together with the form of the structure itself and the properties of the materials used such as surface finish, albedo and heat storage capacity. Climate is however not a constant factor, it follows cyclical rhythms for example from morning to night and seasonal change, which are often disturbed by unpredictable incidents such as storms and other extremes. This leads, together with other ageing factors such as usage and maintenance, to surface patination and eventually to deterioration and decay.

Workshops were held in cooperation with the climatology department at the TU Berlin over a one year cycle aimed at exploring the impact of climatic processes (e.g. temperature, humidity or solar radiation) by ‘mapping’ the traces of weathering on built landscape elements in various materials. A thermal imaging camera, hygrometer and other diverse climatic instruments were utilised to gain detailed readings from the objects themselves and their surrounding contexts. The results enable climatic impacts on various structures and materials to be determined and points of design and constructional vulnerability to be identified. The data resulting from the workshop enables a detailed interpretation of the visible signs of decay from the research case studies, and a deeper understanding of the causative processes involved.

These research results will be presented in the form of case studies, illustrating and analysing the impact of climatic agents on built landscape.

Built landscapes undergo constant dynamic change due to exposure to environmental...
forces, the processes of use and misuse, and the intensity and frequency of maintenance and repair. One of the key factors in designing and detailing durable projects is in understanding the climatic parameters of the specific location. Climatic agents such as precipitation, wind, sun, humidity and temperature highly influence the performance of landscape architecture works. This is due to the physical distress caused, for example, by repeated cycles of wetting and drying, freezing-thawing, wind, and fluctuations of temperature. These processes occur in repeated cycles; from daily cycles (e.g. temperature, precipitation) to seasonal cycles (summer, autumn, winter, spring) throughout the entire lifecycle (cradle, grave) of the project [FIG 1] [1]. The intensity, frequency and variability of these climatic agents dictate the extent of climatic impact over time. In order to counteract these agents construction materials can be enhanced through finishing (e.g. polishing) and the application of surface coatings (e.g. paint, impregnation).

The effect of these climatic agents leads to a process of patination and, if disregarded, subsequently to deterioration. The visible signs of climatic decay are for example greying, cracking, roughing, surface soiling and spontaneous vegetation growth, which can lead in the long term to a reduced load bearing capacity and destruction. Through analysing these traces of time on the surface of built landscape the aggressive agents influencing change can be identified and frequently occurring areas of conflict identified.

This paper presents initial research results of a research project at the Technische Universität Berlin (TU Berlin) focused on monitoring the development of built landscapes through time. The results will be presented in the form of case studies, illustrating and analysing the impact of climatic agents on built landscape.
The main climatic agents identified during the course of the research are temperature, relative humidity, precipitation, direct sunlight (ultraviolet radiation - UV) and cycles of freeze-thaw.

**Temperature and relative humidity levels** determine the level and rate of biodeterioration, corrosion, rot and atmospheric staining [2: p 20]. These fluctuations can also cause severe damage due to thermal material expansion and contraction. Furthermore, temperature variations induce thermal stress generating a thermal gradient between the exposed upper surfaces and the surface below which can lead to cracking (e.g. concrete) and/or deformation (e.g. asphalt) [2: p 5]. This is particularly problematic for large components (e.g. large concrete surfaces) or constructions that do not allow for the necessary expansion through expansion joints [3: p 29, 4: p 29].

**Exposure to direct sunlight** (ultraviolet radiation) results in the UV degradation of UV-unstable materials [4: p 96-98]. UV degradation and weathering cause the natural processes of greying, cracking and warping of wood [4: p 98], synthetic surfaces often discolour and become brittle [Fig. 2a, 2b] [5: p 151].

**Shaded locations** allow for a reduced rate of evaporation and cooler temperatures which leads to increased levels of humidity and biological growth [Fig. 2c, 2d] [6: p 24, 7: p 154].

**Precipitation** (rain, sleet, snow, hail, drizzle etc.) is a major climatic agent and transporter of airborne sediments (e.g. particulate matter). The surface flow of precipitation on built elements is highly influenced by the object form, material and surface properties. Furthermore, ground proximity is a particularly major influence due to rising moisture from the soil and splashback which reaches a height of up to ca. 30cm. Materials with a higher water absorption capacity (e.g. sandstone) are particularly subject to intensive cycles of wetting and drying, freezing
and thawing [3: p29, 2: p 2] and also to the formation of substrate suitable for plant growth [Fig. 2d] [6: p 22]. Water flow patterns on the surface result in the relocation of propagules and other sediments often leading to stains from colonies of cyanobacteria [8: p 625].

Precipitation also influences the ground beneath the construction by entering the substructure and groundwater table [2: p 15]. Soils that are prone to volume change are particularly problematic for the built environment; periods of drought may cause **soil shrinkage** which can cause structural subsidence, prolonged periods of rain can lead to **soil expansion** (heave) which may lead to structural damage. [2: p 20].

**Wind** causes direct stress to the structure and also transports airborne pollutants (e.g. industrial, marine pollutants, vehicular traffic) and sediments [2: pp 6-7]. The deposition of airborne dust, dirt, pollen, and other atmospheric contaminants on the surfaces of built elements leads to **surface soiling** [Fig. 3a, 3b]. Factors that contribute to soiling and staining include the material properties (e.g. chemical composition, water absorptivity and porosity), degree of exposure, surface roughness (structure) and wetness [8: p 623]. This deposition is increased on the lower-velocity lee of vertical elements such as walls, edgings and at the base of street furniture as well as on structured surfaces and in the corners, joints, gaps of built works. Surfaces that are vulnerable to frequent wetting or where surface moisture is continually present are particularly prone to soiling. This process not only highlights the surface structure but also surface imperfections through time.

Another major climatic influence is the frequency and intensity of **freeze-thaw cycles**. Frost induces stress in the material itself which can lead to cracks, surface scaling and roughness. Severe frost-thaw cycles can also cause frost heave leading to cracking, structural damage or subsidence. This is due to an upward volume expansion of soil caused by the freezing of...
moisture, the melting of this frozen soil can then lead to a weakening of the bearing capacity of the substrate [9: p60].

The climatic factors mentioned above also have a major influence on the location, spread and rate of growth of spontaneous vegetation growth. The growth is focused on niches, corners, joints and cracks of the built environment that have the ideal climatic, moisture and soil conditions for the specific species [Fig. 3c, 3d]. Norbert Kühn defines spontaneous vegetation as ‘... all plants that develop without intentional Horticultural input .... It grows at no financial cost, is authentic and is always appropriate to site conditions’ [10: p 47].

Surface growth is mainly initiated by bryophytes, lichens, algae and fungi that are largely not detrimental to the material itself and contribute to the development of surface patina. This can however lead to more damaging species of vegetation taking hold such as trees and woody plants that may damage the construction through acids produced by the roots, direct contact, and physical penetration by roots [6: p 25, 11: p 101]. In general, more aggressive woody plants and trees that can severely damage a construction require higher levels of substrate [12: pp 359-366, 6: p 24]. The intensity of growth is determined by the availability and quality of rooting substrate, the exposure, moisture availability and the frequency of disturbances from use (trampling) and/or maintenance [Fig. 3c, 3d] [6: pp 16, 23, 13: p 5, 11: p 94]. Existing plant cover also protects against evaporation, sun exposure, and regulates relative humidity therefore supporting further growth [14]. Our research results show that damp, sheltered and shaded locations generally support more growth than exposed locations.

The reflection of short-wave solar radiation is termed albedo. Its value is expressed by the percentage of the total incoming radiation that is reflected, from total absorption (0%) to total reflection (100%) [15: p32]. Albedo is mainly
influenced by the colour and brightness of a material surface and the intensity of sunlight (illumination) [16, p.35]. It is also influenced by factors such as surface roughness, the wavelength of the incoming solar radiation and its angle of incidence [16: p.52]. Due to the decreasing angle of incidence, the albedo value increases from the equator to the poles [16: p 35, 15: p32]., Darker and rougher surfaces (lower albedo) lead to an increased absorption level, rapid heat transformation on the material surface, leading to increased evaporation and lower surface moisture [16: p 35,160]. Lighter and smoother surfaces (higher albedo) reflect more solar radiation leading to a reduction in surface temperatures. [15: p32]. This increased solar reflection from lighter surfaces can however have a negative effect on surface brightness (glare) and increase thermal stress/discomfort for pedestrians. [17: p 384]

These climatic agents are influenced by the degree of exposure, aspect (slope), relief, and the degree of sheltering of the structure by surrounding obstructions such as trees or nearby buildings [16: p 54]. The agents seldom act independently, more commonly they act in combination with one another. The following diagram divides the built landscape into three main climatic zones [Fig. 4]:

**Open ground** with no obstructions nearby is exposed to direct sunshine, frost actions, increased wind velocity and high levels of precipitation. These locations lead to an increased rate of drying, increased solar ultraviolet radiation, low humidity together with high precipitation and frost intensity. This climate is the most extreme and therefore aggressive for many materials; colours generally fade; synthetic materials become brittle, wood twists and cracks [Fig. 2a, 2b]. Direct exposure to sunlight and wind often lead to desiccation thus limiting the growth of spontaneous vegetation [18: p 31, 19: p 65]. Construction materials best suited to these areas are therefore tolerant to high levels of ultraviolet radiation, thermal expansion, cycles
of precipitation, and frost-thaw. A relatively light surface (high albedo) is favourable in reducing surface temperatures and material stress (e.g. thermal expansion), very light surfaces should be avoided due to glare and thermal stress for pedestrians [17: p. 384].

**Semi-open ground** with low nearby obstructions is subject to moderate climatic exposure. The increased surface moisture through partial-shading (decreased rate of drying) together with increased deposition of airborne sediments increases the rate of spontaneous vegetation growth,

**Sheltered locations** with significant surrounding obstructions are generally protected from the direct actions of precipitation, direct sunshine and wind. These locations lead to a reduced rate of drying, increased humidity and therefore to an increased rate of biological deterioration [Fig. 2c, 2d]. Airborne organic matter and other sediments often accumulate in these lower-velocity areas leading to increased moisture retention and soil formation which in turn provides the perfect physical and hydric conditions for spontaneous vegetation growth [20: p13, 19: pp 63 - 80]. Construction materials for these areas should be resistant to moisture, biodegradation, quick drying and simple to clean. Unbound surfaces and paving with a high proportion of joins (e.g. setts) generally require increased maintenance in these areas.

*Note: Due to the complexity of the interaction between climate and the built environment there are many special climatic locations, for example those influenced by up-draughts on facades, which are not covered by this simplified zoning diagram.*

**Case Studies**
Workshops were held in cooperation with the climatology department at the TU Berlin over a one year cycle investigating the climatic impact on built landscape elements in various materials.
These were held as student field research activities using a thermal imaging camera, hygrometer and other climatic instruments. The data resulting from the workshop enables a detailed interpretation of the visible signs of decay from the research case studies, and a deeper understanding of the causative processes involved.

The research site was the forecourt of the architectural building of the TU Berlin. The space is oriented towards south east and comprises mainly of sealed surfaces with two planters containing shrubs and trees. The surface temperature and surface moisture were measured at 14 standpoints at regular intervals from 8am to 8pm. Air temperature, relative humidity and wind were recorded using a multi-functional instrument. A thermal imaging camera was also used to gain a greater coverage of readings from the objects themselves and their surrounding contexts.

The first summer recordings took place on 25.05.2016, a cloudy day on which the albedo effect, for example on dark and light paving slabs, was almost insignificant, which demonstrated the significant relationship between albedo and the level of sunlight. The field research was then repeated on a sunny summer day on 08.06.2016. Sanda Lenzholzer explains that on a sunny day at noon in central Europe an open surface can receive up to 1000 watts per square meter, compared to 500 watts on a cloudy day and a mere 100 watts in deep shade. [15: p31].

In the following section the summer workshop results from 08.06.2016 will be discussed together with the findings of the research project in order to explain the impact of climatic agents on vertical and horizontal elements of the built landscape. The air temperature was recorded on the TU Berlin rooftop weather station.

1. Vertical element: FREESTANDING CONCRETE WALL
The highest temperatures fluctuations were
recorded on the most exposed surface at the top of the wall, whereas the more constant temperatures were distributed at the base. The recorded surface moisture was the lowest at 8pm due to the heat storage capacity of the material. As Darlington [13: p 17] observed, vertical elements lead to an interruption of horizontal air currents and therefore to increased deposition of sediments and propagules compared to horizontal spaces. He states that ‘In assessing the ecological potential of any wall, general considerations include its dampness, texture, thickness, inclination, orientation and position ...’ [13: p 5]. Thicker walls are capable of retaining more moisture and are therefore more prone to surface vegetation. [13: p 5].

The climatic evaluation of the wall is divided into three zones, the Top, Face and Base.

**Top:** This zone is characterised by extremes of wetting and rapid drying, the highest moisture and temperature fluctuations, and the accumulation of airborne substrates. The values at the top of the wall in full sun rose rapidly in the morning and reached up to ca. 16°C above the air temperature, cooling occurred after sundown. Particles accumulate on the horizontal surface at the top of the wall due to air currents, precipitation, surface erosion and transportation by animals (e.g. birds and ants), enabling biological growth. Wall copings are a form of constructive protection that reduce staining by shedding precipitation away from the face of the wall. The field research results show that copings are often not implemented, leading to many cases of surface staining.

**Face:** This area is characterised by the lowest levels of surface moisture, little staining and substrate deposition and rapid drying. The temperature of the face of the wall reached its peak of 31°C in the early afternoon, in the early evening it remained 11°C warmer than the surrounding air temperature due to the heat storage capacity of the material. The incline of the wall affects moisture and substrate retention,
more vertical surfaces are predominantly dryer, and therefore fewer plants can establish [13: p 5, 8, 18: p 39]. The upper area of the wall face is influenced by the runoff of sediments from the top of the wall which often cause vertical biological staining (e.g. cyanobacteria, algae, mould) [8: p 625]. This process leads to a highlighting of the surface structure of the wall. Walls from individual units (e.g. bricks, stone, concrete) and vertically structured surfaces lead to a more even spread of surface soiling. Surface irregularities, for example due to production process faults such as the soiling of concrete formwork, can also become more visible through soiling. The bottom 20-30cm of the wall is strongly influenced by rising damp and the splashback of rainwater which often leads to soiling, biological growth, staining and material deterioration [8: p 629]. Surface soiling on smooth and light coloured surfaces (e.g. smooth exposed concrete) becomes especially visible.

**Base:** This is the wettest zone due to direct precipitation, runoff from the wall face and moisture rising from the soil due to capillarity [Darlington: p5]. Spontaneous vegetation growth is predominantly found at the base due to the increased levels of moisture, low evaporation levels due to shading, and the increased availability of rooting substrate [13: p5, 6: p20]. The substrate accumulates through the direct deposition of airborne particles or from being washed from the face and/or top of the wall by precipitation. This niche is seldom disturbed by human trampling and is particularly difficult to maintain, which often leads to an increased rate of growth.

2. **Horizontal element:** GRANITE PAVING SLABS, LIMESTONE SETTS, ASPHALT, TOPSOIL

The darker granite paving slabs and limestone setts had a consistently higher surface temperature and lower surface moisture than the lighter surfaces. Some lighter slabs with significantly rougher surfaces attained similar measurements to the darker surfaces; this
surface roughness leads to a reduced albedo. The highest surface temperature of ca. 50 °C was reached at 2pm on the dark granite slabs on open ground, which was over 20 °C above the surrounding air temperature. Therefore, materials and joints for exposed locations need to withstand the internal stress and expansion resulting from this extreme temperature variation, together with physical loading.

The higher pore volume of the gravel joints results in reduced maximum temperatures. Spontaneous growth mainly occurs in these joints where soil and moisture can accumulate, especially on shaded surfaces that are seldom disturbed by trampling and/or maintenance. Shading leads to reduced evaporation, an increase in surface moisture retention and reduced maximum temperatures, thus aiding vegetation growth [Figure 7] [16: p. 57]. The recorded surface temperature difference between sunny and shaded locations of limestone setts reached ca. 18°C at 2 pm, whereas the difference was down to ca. 2°C at 8pm.

The growth of paving vegetation is also dependant on maintenance regimes such as brushing or road salting. This vegetation is often maintained in a perpetually early state of succession due to trampling and limited soil accumulation [11: p99].

The recorded temperature of the exposed black asphalt surface (low albedo) reached a maximum of ca. 46°C in the early afternoon which was ca. 20°C higher than asphalt in a shaded location. These high temperatures can lead to a softening of the asphalt binder leading to deformation and rutting [21]. In the late evening the surface temperature was ca.10°C higher than the air temperature demonstrating its high heat storage capacity. The field research shows that repeated cycles of expansion and contraction often lead to surface cracks and the breaking of the adhesive bond with the peripheral edging which leads to spontaneous vegetation growth.

Low temperature and moisture fluctuations
characterise the soil surface due to the high pore volume and moisture retention properties [16: p. 50]. The soil temperature rose to ca 10°C above the air temperature in full sun, in the full shade the temperature remained within ca. 3°C of the air temperature.

Conclusion
The initial research results display a great diversity of weaknesses due to climatic agents throughout public space in Berlin, some of which are depicted and discussed in this paper. The data resulting from the workshops enables the specific characteristics of climatic vulnerability on various structures and materials to be determined thus generating a wide range of detailed knowledge on project development. Landscape architects can combat these climatic agents through the optimisation of design, detailing, construction processes and maintenance regimes throughout the project cycle.

Climatic factors also have a major influence on the spread and growth rate of spontaneous vegetation. Maintenance operations should aim to halt the processes of succession to the early stages that are not harmful to the material or structure. Insufficient or incorrect maintenance can lead to the continued growth and succession of grasses and woody plants that can lead to deterioration and/or structural damage.

Factors such as the degree of exposure, relief and aspect strongly influence the intensity of microclimatic agents. This indicates the necessity for selecting the right material and surface finish for a particular geographical location. Furthermore, knowledge of the specific climate factors and the foreseen level of maintenance and repair are required. No two locations on a site are exactly alike; therefore different materials or surface treatments may be necessary to implement an object in various situations. For example, in an exposed open location a hardwood
bench may well be treated with UV protection oil, for a sheltered location under lime trees a painted finish is most probably more appropriate.

Existing signs of climatic degradation also act as a ‘climatic indicator’, providing an expectation as to the type and extent of climate induced deterioration. Therefore, regular monitoring of post-completion development together with the implementation of necessary design and/or technical alterations and/or maintenance strategy can avoid premature deterioration.

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Notes


Weather in the city. How design shapes the urban climate. Rotterdam: nai010 publishers.


Fig. 1: The cycles of landscape transformation [Diagram: S. Colwill].

Fig. 2: a) Greying of wood (exposed location): time of competition/3 months later. b) Discoloration of synthetic surface (exposed location): year 1/year 3. c) Comparison of strongly shaded locality and an exposed sunny location 2 years after completion. d) Water absorption increasing staining (sheltered location): year 8. [Photos: S. Colwill]
Fig. 3: a/b) Deposits of airborne sediments on concrete wall (exposed location): year 1 / year 10. c) Biological growth on wooden deck (sheltered location): year 17. d) Biological growth only on riser due to reduced trampling and maintenance (semi-exposed location): year 1 / year 7. [Photos: S. Colwill]

Fig. 4: The zones of climate exposure [Diagram: S. Colwill].
Fig. 5: Thermographic analysis of a freestanding concrete wall over a one day period. [F. Zwangsleitner]

Fig. 6: Thermographic analysis of dark and light coloured granite paving slabs over a one day period. [F. Zwangsleitner]

Fig. 7: Thermographic analysis showing the effect of light and shadow on limestone setts (Diagram: F. Zwangsleitner)
Abstract

This paper examines the fundamentals for a metropolitan curriculum shaping the new metropolitan discipline for the quality of dwelling in the Bigness-Era.

In fact, we think that as Metropolitan experts we have to improve the competence on shape and build the Metropolis for a wise metropolitan resistance. So that, our aim is to take care about a fragile territory for:

The right to the city
The right to the Landscape
The right to the Life style

Starting from an environmental perspective we would like to evaluate the relationship between city and country side, metropolis and region as well the settlement patterns in contemporary metropolitan dimension, referring to a new idea of metropolitan public ream. In particular, to restore the confidence of citizens in institutions on promoting work opportunities giving an answer to the lack of resources and a low quality of public services and quality of life. The goal is to reconsider the relations between the natural and built space, re-valuating the question of citizenship from the metro-dimension point of view.

We intend to divide the analysis of the new metropolitan discipline into three parts:
1) History / Theory
2) A competence
3) The proposal

Then, we want to demonstrate that is necessary to re-conceptualise the space in between the infrastructure networks and the new epicentres, finding again the physical and environmental characteristics of the local site. So we are talking about a hybrid territory (McGee,1999).

The idea of a hybrid metropolitan landscape and a related hybrid architectural entity is relevant because we have to live these metropolitan models anyway with our body, which is small, and we have to find ways to understand our real need for the metropolitan projects, their living spaces that today are required at higher scales. In short Metropolitan Discipline (Metrodology), together
with Landscape Urbanism, becomes fundamental to study the size of the net city (Shane, 2005) and especially the hybrid landscape that lies between the networks and is rarely still conceptualized as a living space and as an accessible one: it has to be considered the true realm of the contemporary res publica.

Introduction
The rapid urbanisation in the past few decades changed the scene of urban life on a global scale radically. With the advance in technology that supported the economic growth, the urban development brought opportunities and prosperity to many parts of the world. However, the extremely efficiency-based development also has compiled a set of serious negative externalities as time passed by. The issue of Metropolisation - its spatial extension and temporal acceleration (Gregotti, 1966) - demands a complex approach and new techniques to structure and intervene on the big scale. The pure growth is no longer the only issue, and therefore, the Metropolitan Approach to Complexity is defined as the endeavour to communicate the need for a new vision with a multidisciplinary perspective, moving away from the traditional urban goal of efficiency. The approach rather focuses on the wellbeing of the citizens living in the new dimensions of the metropolitan era, which does not only require the functional effectiveness of the urban structure.

One of the primary goals of the Metropolitan Discipline is to study the evolution of the traditional urban methodologies related to the form issue at different scales in the metropolitan context. The landscape becomes a possible unit of composition, considering the vast physical extension of the metropolis. Moreover, developing the competence, both theoretical and technical, in shaping the metropolitan anthropo-geographical landscape (Gregotti, 1966) becomes important. For Gregotti, architecture is a synthetic way to define a place constituted by both built and natural environment; according to him, it is the “technical description” and the
project related to the “surrounding”. We define the Metropolitan Architecture as the realisation of the Metropolitan Discipline, following this idea of visualising the “total environment” (Lynch, 1960): The construction of the landscape is embedded in the practice of the discipline.

In the following text, we introduce the theoretical approach and the technical competence of the new discipline. Also, the work of the MS Lab in Politecnico di Milano related to the discipline and the framework of the metropolitan curriculum that we are developing are followed.

1. History and Theory

Every Discipline should start with history, not because history itself would legitimise or justify anything of the future, but because in the history of a discipline we can find every cultural question concerning a specific theme. History, in fact, is where we can find the original question of a research and in case, where to propose the questions of the present time.

A project at the metropolitan scale is a social work that involves the history and the geography of a place establishing a discontinuity within the continuous relation with the collective memory of a territory. According to Gregotti (1966), an architectural issue in the context of a rapid urban growth is not only about the shift in quantity (the size); rather, it is closely related to the shift in quality. An architectural project is a “total landscape” that can engage the leap in scale, embedding the multiple scales within it.

Secchi (1986) points out that the evolution of urban and architecture discipline has been diminishing the importance of the ground by erasing the physical traces of history and geography, condensing the function and meaning of the ground into built forms, and considering it as a simple base for the technical elements of fluxes and economic values. He argues that to engage the urban challenges of present days, a
contemporary city project has to be a project of the ground.

The Metropolitan discipline departs from these urge of change in the urban and architecture discipline. It is an effort to consider the transformation of the context involving the ground and the new dimension of the urban sector; the dimension of a metropolitan architectural project is about one kilometre by one kilometre in size. This scale requires new urban strategies and tools that are different from the traditional ones. It also needs to work with an image and vision to meet the expectation of the global development without losing the quality of culture and identity in the local scale.

_The environmental issue. The condition to define a new way of a Metropolitan Architecture._

The landscape is not only a productive field but also a meaningful cultural element in a city per se. The landscape produces the entire metropolitan city’s identity. (Lynch, 1960) In the Metropolitan Discipline, the landscape is not only a scientific process concerning a small group of technicians but rather a linguistic corpus, within its new syntax, grammar and vocabulary, visualising the total physical ambient. The landscape that is constructed with the values and ideas of a specific social group reveals the collective memory and identity of the society.

In the metropolitan context, a large part is non-built, where the urbanity diffuses and is fragmented. Viganò (2012) talks about the space as space in between yet in sequence, having the potential of being used differently. She also argues that the Landscape Urbanism movement brought back the importance of landscape being the essential component of urban space.

A Metropolitan Architecture project that has a new structure and imageability is needed not only to provide a new urban fabric but also, as Lynch mentions, to reshape the existing environment
sensitively. The highly technological approach in landscape nowadays reduces the value of the local characteristics of a place. The role of the metropolitan project is to construct a non-static identity through relations between local and global, by evaluating the local characteristics of a place and connecting them to the network of the global cities. Therefore, the continuity of eco-armatures (Gouverneur 2016) and the relation with the grey infrastructure are important elements in creating the connection between the scales.

The awareness of this new territory is demonstrated through the imageability of the environment. According to Lynch (1960), “a powerful civilisation can begin to act on its total environment at a significant scale.” The local identity, the urban structure, and the underlying natural system are revealed as a complete scene through the image of the territory. Colin Rowe (1980) also identifies the Belvedere as an important element of the construction of the city, emphasising the issue of the environmental imageability. Today we are witnessing the rapid development of new cities with new functional units every day thanks to the advance of technology. However, the question of how to construct a total scene for the people to recognise the parts and structure the whole image of the metropolis remains unanswered. As Lynch reminds us, quoting Suzanne Langer, who set the issue of the definition of architecture, we must build a metropolitan city so that “its total environment is made visible.”

*The type-morphological role into the Metropolitan discipline*

The role of the traditional type-morphology in the Metropolitan Discipline is to articulate the different scales in the metropolitan context. It can help to qualify the locality through a selected formal solutions with multiple possible uses and meanings. At a metropolitan scale, to “pin” down the metropolitan images, the memorable elements in the metropolitan scale, it requires a
coherent order “to see the hidden geographical forms and their meanings in the vast sprawl of our city.” (Lynch, 1960)

Bernardo Secchi (1986) argues that we have to take into consideration the differences and specificities of different parts of a city and its territory. However, the typical classification for documentation is not the goal of the study of morphology. The aim of the analysis is, rather, to recognize the generative processes or the system of relations, which have produced these differences in the city. Therefore, the perceptual characteristics of the parts, which have their morphological features, are relevant to describe generative processes of an integrated territorial system. In the end, to enlighten the different spatial metropolitan articulation levels, we have to mark the leaps in scale; this is exactly the Metropolitan Architecture’s aim.

The quality of an object, according to Lynch, that is imageability, provides a high probability of evoking a strong image to any observer. The object is placed in the environment and makes the vividly identified, powerfully structured, and highly useful mental images of the environment. This is when the total landscape becomes visible.

*Phenomenology of metropolitan contexts // Relations among scales*

The Metropolitan Discipline can be defined, starting from the analysis of the scale relationships among the different levels of the territory that make up the metropolitanisation phenomenon.

There are four basic relational levels of the metropolitan city. According to Shane, it is a net-city and could be determined by:

- interaction between the Intercontinental metropolis;
- interaction between the metropolitan scale and the different regions;
- interaction between the urban centres and the suburbs;
- collaborative interactions between
neighbourhoods within the urban scale
Starting from these relations, the Metro-
Discipline will determine some integrated
projects dealing with interface-spaces and
related functions to allow the possible scale
relations. The metropolitan contexts could be
divided as follows:
- Near-spontaneous sprawl next to regional
  roads. Hybrid Gound (Rural-Urban)
- The ground as amorphous support of
  the infrastructural network (grey and web)
  hyper-planed. Strategy for a new coexistence
  between old and new portions of the city
  (intimate time) and the planning of hyper-
  infrastructure networks
- The natural ground. Eco-Armature, porous
  space, connected and permeable
- The Object that absorbs the ground.
  Metropolitan epicentres as public realm:
  hybrids or distributed.

2. A competence. The project for a metropolitan-
urban form between architecture and landscape
for a good metropolitan dwelling

Our competence focuses on the study of the
urban form and urbanity of the contemporary
city. Drawing from David Grahame Shane,
the net-city as the “form” of the contemporary
city has been largely described under the
geographical, socio-economic, political and,
cultural lenses, but it has been hardly tackled
and engaged by design disciplines; this
formation is mainly referred to as shapeless,
or as an urban archipelago, a collage of
scattered entities. From the “good city form”
(Lynch, 1981) of the current dispersed urban
territories, we assume the metropolitan-
urban form as a matter of concern (D’Alfonso,
1995) to understand and design it.

The Metropolitan Discipline puts the focus on
the landscape within Metropolitan Architecture
as a way of dealing with the urban form of the
contemporary city. Recently, the subject of the
landscape has constantly been juxtaposed with
the urban issues. We are fostering landscape as a “lens” and a “medium” to represent and construct the contemporary city, thus assuming landscape as its “basic building block” and its “essential organising element” (Waldheim, Corner, 2006). In doing so, we also aim to recover landscape discourses on the shaping of the contemporary urban environment.

Drawing from Frampton (Frampton, 1983), indeed, we look at the landscape as an “overarching system” sustaining the production of an “architecture of resistance” capable of having the potential to give identity and (with) standing against the global space-endless and placeless megalopolis. The maps produced within Metropolitan Architecture studies are considered as the “project for the ground” (Secchi, 1986) and “constructed ground” (Pollak, 2006); The “maps carrying the traces of geography and history” (Secchi, 1986).

Therefore, the ground is engaged as a matter of design, whose elements compose a “logical geography” (Rossi, 1966) for the framing of a “conscious geography” (Gregotti, 1966) aiming at the “recomposition of urban territories to their geography” (Desvigne, 2012) capable of “sustaining a sense of place” and, at the same time, as a “catalyst for further development” (Frampton, 1999).

**Metropolitan Mapping project: Interpretative, interactive, composite images and mental maps.**

*Interpretative impact scenarios maps are the tools for the metropolitan spaces reading.*
*The collage dimension of the metropolitan topological experience: the invariable local variations are marked and become the metropolitan invariants to safeguard.*

The interpretive maps of impact scenarios is a cultural project. They are interpretative maps of scenarios that work at all scales, (Pollak, 2006) and reveal the meaning and the role of each element of the territory concerning other scales.
These maps identify a structural quality of the field of action (its settlement principle) that composes its images.

The interpretive maps are communicated through highly expressive images, which try to represent the quality of living spaces. These are relational maps that let us identify the durability of the relationship between the elements, in a precise area, revealing the city’s DNA. The maps are qualitative, open source satellite-based maps, which analyse and represent the impacts on different contexts of the transformation processes of the territories invested by metropolitan dynamics (Contin, Salerno, Paolini, 2014). They are functional tools for a project of spatial organisation and landscape definition. The Interpretative maps are the technical tool to outline the framework for a possible ordering of the urban inter-scalar dimension. These maps, in the end, offer a functional and figurative pattern of the built and natural landscape, representing the local structure of identity.

The Metropolitan Mapping project rises from various interpretative maps. The massive infrastructural armatures, both green and grey, are the main structural elements in the shape of metropolis. According to Corner, if a fine inter-textual reading were possible, “the subject would be highly situated in a network of relationships and associations that are perhaps best represented as a geographical map of collage dimensions at different scales: a topological experience that situates the body in different places and times”. Corner defines this map as composite images maps (2014) and suggests the practices of photomontage to depict the conceptual, experiential, and temporal dimensions of the nowadays landscape.

Conclusion: The Proposal

*Our field of action is the metropolitan scale of the city. Large metropolises are growing. Sometimes the old heart of the*
city is dismissed and transformed into a symbolical mediator. The new settlements are huge and full of abandoned spaces where the informal sector is increasing; the new metropolitan discipline and its interpretive educational projects for a metropolitan development became essential.

The Practice of Metropolitan Discipline

The Metropolitan Architecture is a hybrid territory that needs new tools of analysis, interpretation and project. The proposal for the Metropolitan Disciplines is an interdisciplinary and non-formal learning process involving both academic and practical field. Providing integral courses for Master and PhD while arranging informal training for the practising civil servant fit into this perspective: a “hybrid” learning system where the academia and the policy makers are the main actors integrating rather than adding up, with the mediation of “cross-intermediate bodies” (the local NGOs).

During this mutual exchange process, the academic body refines its point of view, and the practical field is advancing with the new knowledge. The intentions of the new Metro Discipline is to align research with the needs of each metropolitan area by promoting cooperation between public and private sectors through the establishment of metro-projects, that we name “metropolitan architecture projects.”

The Metropolitan Discipline aims to establish:
1) A theoretical-practical technique: an integrative methodology where the disciplines are incorporated and synthesised under a metropolitan framework;
2) An interdisciplinary and inter-scalar project;
3) An international culture: a transcultural synthesis where cultures could be integrated while differentiated for their specific dimensions;
4) Shared Ethics: efficiency and equity, dialogue and sustainability
This is an intensive interdisciplinary project brought together through collaborative research by higher educational institutions in partnership with public administrations and also educating the master and PhD students. It will develop issues of the metropolitan city that utilises new technologies, and is reinforced by the inter-scalar shared relation spanning among the economic, social and ecological issues.

The MSLab - Laboratory of Measure and Scale - of Politecnico di Milano has been researching and developing the idea of Metropolitan Architecture, collaborating with several national and international colleagues and partners. With the contribution of the senior planner, multilateral consultant Pedro B. Ortiz, we have been developing the MetroMatrix tool a “Practice of Metropolitan Discipline.” It is the training and guiding for architects, urban designers, and planners in the producing of “maps” as meta-projects for the shaping and the reshaping of the present and future urban environment where the work of architecture acquire meaningfulness for the metropolitan dwellers.

The MSLab's projects are projects of “urbanity” (Choay, 1994) to produce a “coherent civic form” (Frampton, 1999) expressing the form of collective living of our age. They also aim to re-semanticize the ground as the expression of an ecological and anthropological value related to the territory, enabling the architectural project to express its meaningful ground-marking potential. In short, the Metropolitan Discipline that is “Grounding the City” (Sanna, 2016) intends a willingness to engage the ground through a rethinking of geography viewed as not only from the metrical features and extension, but also as the ground marked by the history of a community that has interpreted it as a resource.

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Abstract
When addressing urban heat problems, climate-conscious urban design has been assuming that urban water bodies such as canals, ditches or ponds cool down their surroundings. Recent research shows that this is not necessarily the case and that urban water bodies may actually have a warming effect, particularly during late summer season nights. There are however indications that water can have a cooling potential if brought together with the right shading, evaporation and ventilation strategies. Yet, it is not clear how this should be achieved. Knowledge on such spatial configurations should thus be developed and made available to design practice. This challenge is directly addressed by the “REALCOOL” project, a research aiming to define design prototypes showing the physical processes behind the effective cooling potential of urban water bodies, that design professionals can take as conceptual design frameworks.

This paper addresses the first loop of the REALCOOL’s research through designing (RTD) method, in particular how different prototype design options were created and tested. We address the identification of testbeds – 3D visualisations of common Dutch urban water bodies upon which the design experiments were conducted through different configurations of shading, evaporation and ventilation strategies. These experiments were targeted at improving outdoor human thermal sensation. We further present how the different design options were tested against micrometeorological simulations, expert judgements and external feedback from design offices, consultants and municipalities. We explore the aesthetical, functional, economical and maintenance challenges upon adding a thermal regulation role to the common infrastructural and/or aesthetical conception of urban water bodies. The paper concludes about the cooling effectiveness of the outcomes of this first RTD loop and about the way these will inform the subsequent RTD loops.

Creating prototypes for cooling urban water bodies
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Introduction

In climate-conscious urban design, urban water bodies such as ponds, canals or shallow water bodies are assumed to cool down their surroundings. This assertion is usually based on scientific literature claiming that urban water bodies have a cooling effect [1, 2]. However, recent research shows that the cooling effect of most common urban water bodies in warm summer periods is quite limited during daytime and that water bodies may cause a night-time warming effect [3, 4]. A study analysing the surface temperatures of the 73 largest Dutch cities showed that those with a larger share of water surface have a larger night time surface heat island effect [5].

While the nocturnal warming effect of water bodies may exacerbate urban nocturnal heat during late summer and autumn [6], under specific circumstances water can indeed have a cooling effect. There is a body of knowledge on the potential of water to reduce the heat island effect mainly brought by the fields of meteorology, bioclimatic design, water-sensitive urban design and water management [2, 3, 7–10]. For example, Nishimura et al. [11] showed that water mist and waterfall features can reduce air temperature by 1-2 °C on the leeward side up to a distance of 35 meters. Robitu et al. [12] confirmed the cooling potential of combining vegetation with water. There are indications that shading water, vaporising water, and providing proper ventilation might help to keep urban water bodies and their surroundings cooler [11, 13, 14]. Yet, it is unknown how these strategies can be combined to achieve an effective cooling effect around urban water bodies. The implications of these combinations on criteria such as aesthetics, costs or maintenance are also unknown.

The challenge of designing cooling water bodies is addressed by the ‘Really cooling water bodies in cities’ (REALCOOL) project, a Research Through Designing (RTD) project aiming to define design prototypes showing the physical processes behind the effective cooling potential of urban water bodies. ‘Prototype’ should herewith be understood as a research output.
illustrating or elaborating a new perspective through design, resulting from a prototyping process which is itself a means of inquiry [15]. The REALCOOL prototypes will consist of evidence-based animated 3D scenes aimed at informing, not determining, design decisions. This paper addresses the way different combinations of urban water bodies with shading, evaporation and ventilation strategies targeted at improving thermal sensation were created and tested during the first loop of this RTD method.

**Methods and tools**

The RTD process, based on Lenzholzer et al. (2013), Breen (2002), and de Jong and van der Voordt (2002), is well-suited to the design-led objective of REALCOOL. RTD is a research where ‘designs are not made intuitively, but based on study (experimental design study), recording, examination and evaluation’ [19]. The defined methodological steps are closely related to this (Figure 1): Step after step, this iterative cumulative process will allow achieving consistent final design prototypes.

Four research loops are included to arrive at the final design prototypes. Each loop is based on a systematic sequence of designing (different combinations of shading, evaporation and ventilation around water), testing (educated-guesses and micrometeorological simulations) and assessing (external cross-sector feedback). This section describes the methodological steps and tools of the RTD’s first loop.

**2.1. Preparatory work**

The research started with an inventory of representative Dutch urban water bodies in order to set the design testbeds — 3D spatial reference situations upon which the design prototypes would be created. Nine cities across the Netherlands (Amsterdam, Delft, Den Haag, Dordrecht, Groningen, Leeuwarden, Rotterdam, ’s-Hertogenbosch and Utrecht) were selected based on soil type. Two main soil types were distinguished: clay and peat, where more permanent surface water (prone to heat up) can be found. All cities had a clear urban heat island effect according to the Dutch Climate
Impact Atlas (Klimaateffectatlas - http://www.klimaateffectatlas.nl/nl/). Geographic information system maps on land uses combined with the climatope definitions by Lenzholzer (2015), and Google Earth views were used for identifying the most frequent urban water bodies within heat-prone areas in these cities: The longest or largest water bodies within compact urban areas with high daytime and night-time use. A spatial analysis followed through in situ observations, measurements, photos and mapping.

The relevance of the resulting 33 water body types was critically assessed by the research team and an external committee of scientific advisors and representatives from consultancies, urban and landscape design offices, and municipalities (NWO Domain Applied and Engineering Sciences user committee). The number of water body types was brought down to 8 and called the REALCOOL testbeds (Table 1). These were categorised according to layout as ‘Gracht’ (canal), ‘Singel’ (boulevard), ‘Sloot’ (ditch) or ‘Vijver’ (pond).

Two simulation tools, Envi-met [21] and the Cool Water Tool [22], were simultaneously prepared. ENVI-met is a model widely used to describe microclimate and human thermal comfort, giving detailed spatial patterns of microclimatic conditions of urban environments. The Cool Water Tool simulates the water energy balance and therefore the water temperature of shallow water bodies under the influence of the weather. This tool is suitable to generate realistic time series of water temperature. Here, the Cool Water Tool was used to provide realistic initial conditions of the water temperature in Envi-met for a hot summer day, while Envi-met was used to assess the microclimatological performance of the water bodies. To this end, the Envi-met Winter1617 (V4.1.3) release was applied, which enables simulating turbulence mixing in the water layer. Water and air temperature, and the PET — Physiological Equivalent Temperature Index [23] were the evaluation variables. The thermal effect of water was simulated for a typical tropical day (Tmax >= 30 °C) and the
following night, when heat stress is severely felt. Average values for air temperature, relative humidity, wind speed, wind direction and cloudiness for tropical days based on data from De Bilt (1981-2010) were used. The summer solstice (around 21st June) was selected for the simulation because of its most critical (maximum) sun angle. Solar noon, in the Netherlands 1.40 p.m., was used to determine the shading patterns at the testbeds through 3D visualisations.

2.2. Designing
The design steps are the crucial component of the RTD process and were carefully prepared prior to designing. A design framework, i.e. the principles anchoring the design options made across the different testbeds, was defined for preventing randomness:

- **East-west (EW) and north-south (NS) orientations**, for exploring design solutions addressing contrasting exposures to solar radiation. This choice doubled the number of testbeds to 16. In the northern hemisphere, at solar noon, EW-oriented canyons have the north side fully exposed to the sun and the south side is self-shaded all day long. In NS-oriented canyons both sides have the same amount of sun hours a day whilst the centre of the canyon is fully exposed at solar noon. Blocking short-wave radiation at the sunlit areas is crucial. The shading patterns identified at the testbeds were used for determining the dimension of these areas. Design Principle 1 — for EW oriented spaces, to increase effective shading over the northern part of the water body and, for NS orientations, over the central part.

- **Vegetation and water features for increasing evaporation**. Vegetation has the largest cooling impact on the extremely hot days [24, 25] due to the combination of shading and evapotranspiration. Moving water or, especially, spraying it effectively cools the environment [20]. Design Principle 2 — to increase evapotranspiration through vegetation and evaporation through water features over the
whole water body.

- **East as the reference wind direction, shown to be the predominant direction during tropical days according to the data retrieved from De Bilt.** This is in line with the argument that easterly winds are ‘typically prevailing during summer heat waves in Western Europe’ [9]. Wind has three effects: it stimulates turbulent exchange and evaporative heat losses, it transports air above the water surface to the environment around it, and it reduces the PET during heat stress periods. Therefore, during a tropical day it is preferable to allow air flow over the water body. Design Principle 3 — to allow wind to flow over the whole water body.

- **Water at the centre of the design experiments (scope of the REALCOOL).** Design Principle 4 is thus developing design solutions directly interacting with water, either reducing water temperature or resulting in a synergetic cooling effect. Trees, shrubs, aquatic plants, vines, green walls, shading devices, and water features (fountains and water mist) were considered the most suitable design elements. The importance of other elements was acknowledged. For instance, paving materials can significantly influence the thermal performance of an outdoor space [26]. However, these were not considered here because they do not interact with water directly.

A design concept guided the combination of design elements. For the first loop, this concept dealt with achieving a maximum cooling effect through a strictly bioclimatic approach, that is, without considering other criteria like aesthetics or maintenance requirements. Traffic and water flow were the only non-bioclimatic parameters considered. Other overarching urban design parameters will be integrated in the second research loop. The designing took shape through sketching, 2D drawings, 3D visualisations, and physical models. Many design possibilities were systematically narrowed down through a design matrix rating the efficiency of the design solutions in meeting the goal of the research and
the design concept (Figure 2)
In Figure 2, the design elements, on the vertical axis, are cross-related to the research’s design strategies, on the horizontal axis using a qualitative five-point rating scale: -2 (very negative), -1 (negative), 0 (neutral), 1 (good) and 2 (very good). The designs were revised multiple times till the maximum rating was achieved. This revision went up to a point where no further options were offered by the layout of the testbeds. Note that we focused on the use of natural elements since the cooling potential and multiple benefits of plants in fields like urban ecology or psychological processes make it more attractive than artificial devices. Neutral impacts were considered on the positive side of the scale whenever no or negligible effects were actually desirable, e.g. inducing no changes to ventilation as a means of allowing wind to flow.

2.3. Testing
The testing of designs commenced with the educated-guesses, i.e. a critical discussion based on experts’ judgement and scientific evidence, on their cooling potential. We focused on the most influential biometeorological issues. The use of physical models of the designs facilitated the communication and allowed getting a better understanding on microclimatic effects. In some cases, an abundant increase of vegetation for shading was considered to hamper ventilation and thus evaporation, and also night-time cooling by long-wave radiation emission. This would be counter-productive and needed revision. The educated-guesses strongly impacted designs in the sense of a more synergetic combination of strategies. As an example, in GRACHT1 EW (Figure 3) a row of trees and shrubs on planting structures projected over the water is installed on the northern part of the water (Design Principles 1 and 2); aquatic plants, fountains and water mist dispensers are also placed along this area at the water level (Design Principles 1 and 2); Design Principle 3 is addressed by the quantity and irregular positioning of plants. GRACHT1 NS receives the same solutions, the only difference
being the focus on the central part of the water body. Here, trees and shrubs are grouped in small ‘islands’.

Testing also comprised micrometeorological simulations evaluating the current cooling, warming or neutral effects of the testbeds and its implications on the design. The current microclimatic performance of the testbeds and of a no-water scenario (a hypothetical situation where water is removed from the testbeds and the contiguous paving solutions extended up to its central axis) were simulated. The outputs of these simulations show that (1) the daytime cooling effect at the testbeds is small and there is hardly any contribution to night-time warming or cooling; (2) that the differences between testbeds are small regarding cooling effects in air and water temperature; and (3) that the highest shading level leads to the coolest conditions (GRACHT3).

2.4. Assessment

The TTW second user committee (UC2) assessed the designs on overarching urban design criteria: aesthetical appeal, functional match, costs, and maintenance requirements. The committee members assessed the performance of the designs on each criterion using the five-point scale of the design matrix (Figure 2). In addition, the reasons underlying each assessment were collected. From the different assessments and underlying motivations the following conclusions could be drawn. The designs:

- Entail positive aesthetic qualities although these should be further explored. Should this potential be carefully addressed the designs can favour the image of the city or, otherwise, problems might arise on coherence and visual connections.
- Have a predominantly positive match with pre-existing functions and may even enhance them. If correctly explored, the designs may reinvent the common way people use urban water bodies.
- Entail higher capital investments which can, however, be offset by the cooling potential
of vegetation and its additional benefits.
- Entail higher maintenance requirements although these can be offset by the delivered amenities. The optimisation of maintenance issues should be further explored.

Due to the multidisciplinary background of the committee, these outcomes refer to consistent assumptions based on both academic and practical experience. Therefore, they defined the refinement principles for the subsequent designing stage (Table 2).

**Discussion and Conclusions**
This paper presented the first loop of a RTD process and focuses on its interim procedures and results. We highlight the smooth transition between the different stages, from the identification of testbeds to the refinement principles — the methodological steps confirmed initial assumptions and lead to designs which, irrespective the required improvements, constitute a reliable basis for conducting the following research loops. The communication within the multidisciplinary research team was eventually the most important tool. Several discussions between urban designers, meteorologists and water specialists were turning points in the research. At each discussion, the scientific assumptions behind the cooling potential of water bodies were growingly given maturity. The openness to the different interpretations, meanings and procedures from the different concurrent disciplines was fundamental for achieving meaningful results.

Finding the right balance between shading, evaporation and ventilation was a major challenge. How to increase shade without hampering ventilation or how to increase evaporation without compromising water flow are examples of questions addressed, which still need to be kept in mind throughout the whole RTD. The educated-guesses provided fundamental assumptions and the design matrix set the base for different experiments. In the next loop, the validity of the fundamental
assumptions will be checked using further micrometeorological simulations. Moving to overarching urban design criteria, the following questions arise: how to increase vegetation without compromising aesthetics or function and even enhance them? How to offset costs and maintenance requirements which are necessarily higher compared to the testbeds? A compromise needs to be found between the generalized ‘cooling’ design solutions and overarching urban design criteria which are mostly site-dependent. Where are the solutions generalized and where do they become site-specific is a question to be further explored.

This loop came up with three relevant outcomes:

1. The testbeds have no relevant thermal effect, which confirms the need for developing really cooling water bodies in cities.

2. Shading seems to be the fundamental strategy for the cooling potential of water but also the major design challenge since it may compromise evaporation, ventilation and night-time cooling. Care should be given to the synergetic effect of strategies.

3. The iterative process resulted in designs that, based on rules of thumb, have an efficient cooling potential. Nevertheless, these should be further developed and quantified, as well as carefully brought together with aesthetical, functional, cost and maintenance criteria.

These conclusions provided the necessary refinement principles for the second RTD loop. The designing, testing and assessing stages of the first loop provided a consistent body of assumptions upon which to base the subsequent stages of the RTD. By systematically repeating its methodological steps, the designing process will be given systemic robustness, and scientific and practical relevance. By presenting the way we are conducting this RTD, we hope to contribute to developing the scientific debate within landscape architecture. Defining upfront a strong (yet flexible) strategy for preventing
randomness, and openness to inter-disciplinary communication seem to be crucial factors for giving this discipline a more scientifically-relevant dimension.

Acknowledgements
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References
[8] Heusinkveld, B.G., Steeneveld, G. J., van Hove,


Figure 1. Methodological steps

Figure 2. Design matrix for GRACHT1 EW

Figure 3. Designs for GRACHT1 EW (left) and GRACHT1 NS (right). Images credits: Jochen Muelder
Table 1. The REALCOOL testbeds. Images credits: Jochen Muelder.
<table>
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<tr>
<th>CRITERIA</th>
<th>REFINEMENT PRINCIPLES</th>
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<tr>
<td>aesthetical</td>
<td>develop the positive aesthetical qualities</td>
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<tr>
<td>appeal</td>
<td>openess-closure - exploring visual connections</td>
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<td>functional</td>
<td>develop the potential to enhance pre-existing functions</td>
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<tr>
<td>match</td>
<td>traffic - allowing the manoeuvring of boats</td>
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<td>costs</td>
<td>develop the cost-effectiveness potential</td>
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Table 2. Outcomes from UC2
Abstract
Since an early era in recorded history of Iranian architecture and landscape architecture, passages had a strong contribution into forming socially interactive open spaces. Bridge, as a form of passage, also performed much more than a simple connector. It was considered a place to stay, a viewpoint and a platform to interact with other users and the surrounding environment. Today, despite fundamental changes in physical, social and economic logic of city formation in Iran, resulted in degrading many urban passages into mere access providers, the deep-rooted heritage of using bridge as part of a landscape project to empower certain social behaviors, is still carried into contemporary design discipline. A careful study on different aspects and dimensions of this inherent design vocabulary could result in finding innovative design tools and procedures, which not only create more vivid and interactive behavioral patterns in contemporary urban open spaces, but also can help the design to respond and react as a resilient space at the moment of a contextual tension. This paper intends to explore the innovative design vocabulary which makes a bridge more than a connector and gives it the characters of a lively, resilient urban open space, through studying two prominent pedestrian bridges in Iran: Khaju, a historic brick bridge arching over Zayandeh River in Isfahan since mid-17th century and Tabiat a modern steel bridge spanning across a main highway in Tehran since only a few months prior to this study. Given the basic parameters in design of both bridges, and the frequency and quality of users’ presence on both promenades, characteristics and vocabulary of design extracted from these two precedents of ‘inhabitable bridge’, will be structured in three categories of ‘Location and Environmental context’, ‘Formal and Physical Aspects’ and ‘Programming’.

Introduction
Bridges are generally understood as connectors of segmented bodies of natural or built environment. However, “bridge as a place to
stay” can be considered an important creation for augmenting the quality of social life within the public realm, specifically in the context of contemporary dense and fast-growing cities; since it doubles the primary function of transportation with an opportunity for citizens to spend time in a public open space, and enjoy its physical and social benefits. Bridges can create public spaces, as prominent facet of cities and urban culture and centers of civic life which ‘provide opportunities for gathering, socializing, recreation, festivals, as well as protests’¹. And ultimately such bridges can behave as a form of green infrastructure throughout the metropolitan areas.

This concept, with a long history around the world (at least since medieval era in bridges such as Rialto in Venice; Ponte Vecchio in Florence; the Old London Bridge; etc.²) has been richly presented through the logic of city formation in Iran, specifically in the garden-city of Isfahan. Based on this logic, the design of passages had a strong contribution into forming socially interactive open spaces; and Bridge, as a form of passage, performed a similar role.

In this study, Khaju Bridge, arching over Zayanderud (Zayandeh River) in Isfahan, is chosen among many other previous and following examples of its kind, as a multi-functional bridge, which has been known as an optimization of form, function and structure in historic Iranian architecture and engineering³. However, social role of Khaju Bridge was never limited to being either a major connector, a gate to the city or a dam across a river in the capital city of the time, but it was initially planned and constructed as a public resort across the river⁴, offering unique visual and physical access to water.

Investigating the concept of ‘inhabitable bridge’ in contemporary landscape projects of Iran, the design language of Khaju seems to be interpreted into Tabiat Bridge as the unique example of a modern, pedestrian monumental bridge, extensively used by citizens and visitors in current capital city of Iran, Tehran; despite fundamental changes in physical, social and
economic logic of city formation in the country, which resulted in degrading many urban passages into mere access providers.
To extract the vocabulary of design for inhabitable bridges as a potential tool of creating more vibrant and interactive behavioral patterns in future urban open spaces, which can enrich and add to resilience of public spaces, followed by a brief account for each of these two precedents, their characteristics and design language will be compared and structured in three categories of “Location and Environmental context”, “Formal and Physical Aspects” and “Programming” as three fundamental base for every landscape project.

KHAJU and TABIAT: A Brief Account

Khaju Bridge:  Spanning over Zayandeh River, Isfahan, Central Iran
The bridge was built by the order of Shah Abbas II of Persia –of Safavid dynasty- around 1650 (no inscription or historical document to show the exact construction time), on the foundations of an older bridge\(^5\)(Figure 1). Khaju Bridge, spanning over Zayanderud was built as part of the king’s plan to connect Khaju quarter and the old city center in north bank of the river, to Isfahan-Shiraz road and Takht-e-Foolad (the historical cemetery of Isfahan since 12th century) at south bank\(^6\).

Zayandeh River originates from Zagros Mountains, a mountain range in West of Iran and supplies water for the city of Isfahan and all its surrounding agricultural lands, creating a gigantic oasis on the border of Iran’s Central Desert. The river naturally ends to Gavkhooni Swamp, 100 km further east of the city’s border; however, since a few years ago, the flow has been periodically restricted, by storing the water in a dam 110 km away from where Zayanderud meets the city (Figure 2).
Despite the drought and mismanagement of water in recent decade, which has dramatically changed Zayandehrud and all ecosystems supported by that, people still extensively use the pedestrian bridges arching over the dry riverbed as public spaces, among which, Khaju remains
Tabiat Bridge: Abbas-abad Lands, Tehran, Iran
In 1968 a master plan was provided for the capital city of Iran, Tehran, by Victor Gruen and Aziz Farmanfarmaian following the Shah’s land reform plan in 1963. Accordingly, a vast, virgin land, including Abbasabad Hills of Tehran was allocated for design of a new civic center, surrounded by man-made urban forests, known as ‘the Lungs of Tehran’. The plan of Tehran’s new civic center was generated in 1973-74 through collaboration of two of the most renowned architects of the time, Louis Kahn and Kenzo Tange, commissioned by the Shah to house embassies, government ministries, residential and commercial high rises over 623 hectares of open space. Kahn, who believed that ‘a city is more than the assembled institutions’, was inspired by both Persian and Western urban precedents and concepts to design the architectural form of Abbas-abad Lands (figure 4).

Despite the suspension of Grand Abbas Abad Development Plan (so-called Shahestan-e Pahlavi) for many years due to multiple reasons—most notably the Islamic Revolution and the consequent drastic alternations in management and planning of Tehran- new master plans and proposals were prepared for Abbasabad Lands after the revolution. Execution of different phases of the new development plan, presenting an overall theme of “cultural and political land use with an emphasis on green space” started in late 1980s with an accelerating rate during last decade.

The new master plan, proposed 3 pedestrian bridges connecting the eastern and western parts of Abbasabad lands, separated by Tehran’s one of the two earliest highways, Shahid Modarres, constructed in 1970s. In 2008, a competition held by Abbasabad Lands Renovation Co., called for design proposal for a pedestrian bridge, connecting a set of newly opened urban parks to the only planted urban forest in center of Tehran,
spanning over the separating highway. The winner design called “Tabiat” bridge –meaning “Nature” in Farsi- was designed to reconnect the separated flow of nature in Abbasabad lands and was opened in fall 2014, drawing numerous visitors to the site, who inhabit Iran’s longest pedestrian bridge, over a highway in the middle of a mega-city with no river (Figure 5).

Location and Environmental context
The environmental context and the choice of location for a pedestrian bridge is one of the influential factors in its process of formation. In an urban context, as the focus of this research, a pedestrian bridge can reconnect a broad range of city components –fragmented neighborhoods, prominent buildings, landmarks and natural phenomena or sites being of notable examples; and span a variety of natural or built components such as valleys, waterways, roads and railways. As varied as these examples and their strengths and restrictions are, a bridge should respond to specific needs, qualities and constraints of its own context to provide for a rich experience, attractive form and a well-functioned outdoor space, which gains flows of users.

1. Natural and Built Context
Khaju spans Zayanderud, where the flow of river historically formed a civilization, a city which embodied masterpieces of art, architecture and garden design, and a vast oasis in Isfahan, as well as a collective memory of national and international scale, which still brings large number of users to pedestrian bridges lying across, forming a behavioral pattern of spending time on and seeking refuge inside or under a bridge.

Tabiat Bridge offers an above-reality dimension -floating above a highway close to downtown of an 8+ million megacity, where the users are surrounded by urban forests and green spaces at east and west of the bridge; Alborz Mountains further north of the site and downtown in south, looking at the flow of cars beneath the bridge.
2. Location
The exact location of a bridge within its context determines aspects of its aesthetical pleasantness, parts of the safety factors, and also contributes into connectivity of the bridge to pedestrian networks and linkage with other modes of transportation, all being of key attributes of a high-grade walkable urban network and affecting the efficiency and quality of physical access into primary destinations (connected points) as well as the secondary points of interest adjacent to the bridge.

Khaju bridge was constructed on one of the main axes of Isfahan with the primary role of facilitating citizens’ access to towns, villages and neighborhoods located in south of the river, as well as Isfahan’s most prominent cemetery, visited as an important religious place. This specific location has offered an efficient access and connectivity to all transportation modes since Khaju’s construction era. Also, closeness to the peak of a meander bend provides for numerous unusual views to both river and the city from this bridge.

Tabiat Bridge, locked inside the network of central highways in Tehran, reconnects the pedestrian recreational paths on two sides of the highway beneath, and is thoughtfully located in an opening far enough from each set of vehicular bridges and highway ramps to offer the optimum visual interest to users, and also to be noticed as a landmark.

Contextual Constraints: Climate, Drought and Pollution
In addition to positive aspects and qualities offered by the context of a landscape project, both natural and cultural context can also present constraints. In a responsive, advantageous design, such constraints are addressed in a way that adds into desired qualities of the bridge as a place to stay and strengthens the relevant behavioral pattern of users.

Both cases of focus have coped with initial
contextual constraints, followed by extreme conditions in last few years. Given the context, these two bridges are located close to the center of cities, where extreme temperatures have always been an issue, affecting the physical comfort of citizens and visitors in long periods around the year\(^6\). In response to this climatic compulsion, both structures provide shaded, well-ventilated areas with roofed parts, yet open to their unique surrounding scenery, which act as microclimates, inviting users to a refuge in rainy condition of cold seasons as well as extremely hot condition of summer in Tehran and Isfahan.

Moreover, a decrease in precipitation level across central Iran and the subsequent water management policies imposed since a decade ago have resulted in restricting the flow of Zayandeh River through the city, leaving the riverbed completely dry for a total of 8-9 months a year. In addition, in recent decade, temperature inversion in Tehran causes severe air pollution in an extensive time across the cold season\(^7\), highly effecting Abbas-abad Lands, surrounded by many major highways of the capital city and close to its downtown. However, despite both major constraints, the bridges remain popular spots in the city even during the peaks of each condition (Figure 6-8). In case of Khaju Bridge, the part of structure historically performing as an urban dam is now conceived as a new (third) level by citizens. During long periods of low/ no water flow, people use the exposed parts of foundation as recreational areas (Figure 6).

This conveys that both designs, although highly harmonious with their surrounding environment, are independently capable of absorbing users due to their physical qualities and social impacts, discussed further in following sections. Thus, they reveal facets of a design’s capability in adapting to environmental change and challenges, while retaining their structure and function. This quality, analogous to resilience\(^6\), could be counted as a behavior of sustainable inhabitable bridges.
Formal and Physical Aspects

Analyzing the form and physical qualities of Khaju and Tabiat can reveal a common design vocabulary – while different in details, which is applicable to other urban structures that bridge the natural and man-made barriers in contemporary cities, as a tool of generating more public spaces and empowering civic life.

Complexity and Integrity

Both cases of study present complex forms, evolved from longtime practices of bridge building, which incorporate different levels, layers and spaces to furnish a wide range of visual and spatial experiences. As a bridge extends into multiple levels, not only more room is provided to accommodate extra spaces and activities – as in Tabiat bridge with panoramic platforms, a café-gallery and a restaurant entirely combined with the bridge structure\(^1\); as well as in Khaju with 2-story pavilions merged with the bridge, but also more points of access and connections to the context are provided.

While Khaju crosses the river with a conventional, firm geometry, defined through a straight line with two distinct levels, that each have a separate access on both sides, it still works well with the topography and connects into all adjacent sites\(^2\).

However, Tabiat is formed by 3 levels that flow from one to another in different points along the bridge by stairs and ramps, which merged with the subtle slope of first and second floor shapes an integral multi-level space. The curved lines adopted in multiple dimensions of this bridge, plus the branching ends of it on both sides, which blend into Ab-o-Atash (on west) and Taleghani (on east) parks and fade into the steep slopes on both ends, not only provides accessibility and comfort for users of varied ages and physical ability, but also turns the structure into an extension of the parks. This curved form of Tabiat also offers diverse perspectives and thus, contributes into intention of designers to create a place to linger\(^3\):

\[\ldots\text{The idea was to make a}\]
Movement and pause has been designed through defining different paths, levels, platforms, openings, connecting or viewing stairs and enclosed spaces (figure 9), however; in long-term, people define their own behavior pattern and not necessarily follow the anticipated routes.

1. Designing a Landmark
Tabiat is designed as an urban component, suspending across a highway, thus, seen and conceived from beneath as much as it is viewed from inside –if not more, while Khaju bridge sits straight on riverbed, seen from inside and looked at from more limited perspectives outside the structure. However, both bridges are designed as infrastructures with elegant architecture, precise execution, and a monumental form, meant to be seen from afar, and to be noticed as a landmark. Monumentality as a form that can ‘assign a proper place to events, actions and social roles’\textsuperscript{22}, grants more popularity to these infrastructures.

2. Micro-climate and green infrastructure
As mentioned before, both bridges shape microclimates, conceived as refuge in extreme climatic conditions of Isfahan and Tehran. Khaju adds the evaporative cooling to its shaded arched spaces and the downstream-side steps in presence of water\textsuperscript{23}. Also Tabiat Bridge, harmonious with surrounding environment, was designed with green roof and green walls,
covering sides of the bridge through years; however, the anticipated planting plan was never applied but reduced to beautifying limited parts of the roof with low shrubs and annuals. Although this idea was not well-implemented and also claimed by the designer not to be a ‘substantial’ aspect of the concept, could have been an elegant way of reinforcing this microclimate, specifically decreasing negative impacts of air pollution and performing as a noise barrier; thus, turning into a green infrastructure according to US Environmental Protection Agency.

**Programming the Space**

Given the initial premise of forming a place to linger in both bridges, it is critical to understand how programming the space contributes into this goal.

1. **Flexibility and Variety**

Although integration of architecture –as completely enclosed spaces in this sense- initially defined part of foreseen programming of both Tabiat and Kahju Bridges, it never stayed a crucial aspect of the urban life happening within these two structures. The pavilions of Khaju Bridge have been either closed or allocated to offices for many decades and Tabiat Bridge was opened and had gained extreme popularity before any of its programmed spaces open to public.

However, while these bridges do not dictate certain programs, they suggest and provide for a variety of potential activities in flexible open space, where people have choices for the “type” and “location” of their actions. The designer of Tabiat Bridge, emphasizing this quality, describes her project as a democratic space, where the users are just let to be.

2. **Dynamic Space, Loose Space**

Speaking about improvised uses in the urban system, Caroline Chen turns attention to what is called ‘loose space’ by K.A. Frank. Loosening the space happens when the users liberate the designed public spaces from the order and
limits of the designated original programs and define new functions, based on their own needs and desires. In Tabiat and Khaju, a variety of settings intentionally provided for different experiences such as sightseeing, walking, cycling or exercising; eating; socializing, engaging with nature, etc.; contribute into shaping a dynamic urban space. However, this dynamism and vitality also originate from improvised uses of space by people. This includes the spontaneous and temporal programs such as selling hot drinks on Tabiat Bridge by street vendors at winter nights, or continued behaviors like allocating arched spaces of Khaju to picnic spots for families, or singing practice of Isfahani citizens in lower vaulted rooms of the bridge and performance of some in the largest room (beneath the central pavilions) which has turned to a notable ritual in the city, gathering numerous people to audit and video specially on weekends (figure 10).

3. Night Life: Permanent Access, Safety
Whereas Khaju is always open to the public, Tabiat Bridge is closed from midnight to early morning. This closure, although planned due to safety reasons, contradicts the open and accessible nature of public open spaces and generates a cut in cyclic social life of the bridge. Revision of this plan can result in continuity of users’ presence as in Khaju Bridge, and if incorporated with appropriate lighting and night-time programs in integrated enclosed spaces of the bridge, can make a highly positive impact on livability and safety of inhabitable bridges, as well as parts of their adjacent sites during night time.

Historical Patterns: Garden Cities, Rooftops
Bridge as a destination has similarities with other historical typologies in Iranian landscape and architecture. In terms of concepts and patterns that create and affect the social role of a bridge, we can relate into particular qualities of Persian Gardens and Iranian garden cities. Creating a microclimate as a flexible, democratic space and avoiding over-programming; complementing the landscape with elegant architecture, which looks like an inseparable aspect of the space; providing
a place for individuals and the community to commemorate aspects and elements of nature either through contemplative private moments or social and communal gatherings; and integration of everyday life with a healthy, pleasant environment are all of the fundamental ideas in formation of Persian gardens, which were carried into Khaju and centuries later are still traceable in Tabiat Bridge, being valid design aspirations for contemporary landscape projects.

The other landscape component which relates to the physical and functional attributes of inhabitable bridge is the rooftop, historically used as an elevated, well-ventilated and partially shaded outdoor space with a communal role. Whereas Khaju is analogous to conventional categories of rooftops in hot central regions of Iran (semi-enclosed with short-usually reticular-walls) which were mostly used from evening to early morning, Tabiat Bridge is explained as a ‘building with a green roof’ by its designer, which reminds one of historic, stepped, multi-story mountainous landscapes of Iran composed of numerous rooftops as well as the recent interpretation of it in urban areas, going green. Merging aspects of rooftop (an element of architecture, conceived as part of the landscape which takes people’s everyday activities –and communal life- into outdoor space) and qualities of Persian Garden in bridge design, can result in sustainable bridges as pleasant places to linger in dense urban areas.

Conclusion
In the context of contemporary dense and fast-growing cities, where the majority of citizens’ experience of landscape is the urban landscape, there is an emergent need for more public spaces, thoughtfully engaged with urban ecologies. This need can be addressed through design of infrastructures such as bridges that enhance their primary function of transportation as destinations for social activities and interactions in the cities all around the world. This social role creates behavior patterns that turn into a ritual in the city and last for a long time and adapt into changes and challenges. These patterns and rituals,
themselves, become motivations to draw people to the infrastructure and have them inhabit the bridge even in absence of ideal contextual conditions. However, a set of design vocabulary is necessary to shape concepts for future sustainable and resilient inhabitable bridges, able to produce such social patterns. Potential of the environmental context and efficient choice of location (in terms of providing optimal access, connectivity with surrounding networks, visual interest and physical engagement with adjacent attractions) are important primary factors in design of inhabitable bridges. Contextual constraints such as climatic discomfort, air pollution and noise can be addressed by designing bridges as microclimates, either completely disconnecting users from the unpleasant surrounding or engaging aspects of the context –such as water, views, etc.; which combined with applied elements and technologies will generate a more powerful microclimate and turn the bridge into a green infrastructure.

Certain formal and physical qualities such as complexity, integrity –specially in multi-decked bridges- and monumental form, as well as integration of enclosed/semi-enclosed spaces and proper lighting help the structure draw more visitors and afford safety as well as variety and dynamism in users’ social interactions. While providing for a variety of foreseen programs, inhabitable bridges can perform as flexible spaces, where the users adopt to define their own preferred or improvised activities. Many of such activities, turning into rituals of personal, local to infra-urban scale, produce a behavior pattern and in long term, a culture of urban scale to inhabit such bridges. Thus, “Bridge as a microclimate”; “Bridge as a democratic public space”; “Bridge as loose space”; and “Bridge as an engagement with nature” are concepts for future designs that create inhabitable bridges as a tool to enrich contemporary (and future) design practice.

Acknowledgement

The author would like to thank Professor Charles (Chip) Sullivan for supervising this research
during its initial steps and Sepehr Zhand for his insightful and meticulous comments.

**Endnotes**


8 Ibid.


With mean annual temperature of 17 °C, hot season in Tehran lasts for 3.6 months from late-May to mid-September with average high temperature reaching 31°C in July, while in 3.5 months of cold season the temperature dramatically drops, reaching an average of 1°C and an average low of -1°C in January as the coldest month. Isfahan, with mean annual temperature of 16°C has a 3.7-month hot season with average high temperature reaching 35°C in July, and has a 3.3-month cold season with an average low temperature of -1°C in January as the coldest month. See: Esfahan and Tehran sections at http://www.weatherbase.com & https://weatherspark.com (Visited on March 2017).


20 The upper level connects directly to adjacent urban fabric, traffic network and the upper level riverfront parks; and the lower lever is accessed through riverfront linear landscapes and all along the bridge, provides access for users
to water through sets of steps on eastern side.


28 Closure of Tabiat Bridge at nights has a changing program: longer in cold season and shorter during spring and summer, with the exception of Ramadan month, when the bridge is open 24-hour, drawing tens of thousands of people each summer (Ramadan) night, based on reports of Ardeshir Nurian, the CEO of Abbasa-bad Lands Renovation Co. This latter experience shows that inhabitable bridges, if thoughtfully programmed, have the potential to serve a continuous urban life within them.

Figure 1. Khaju Bridge in Isfahan, Western façade and adjacent landscapes. (Source: Isfahan Municipality Portal, 2014)

Figure 2. Flow of Zayanderud from Zagros Mountains to Gavkhooni Swamp
(Base map credit: Google Earth 1984; Diagram by author 2017)

Figure 3. The five remaining historic bridges of Isfahan. (Base map credit: Google Earth 2015; Diagram by author 2017)
Fig 4. Kahn’s sketch for Abbasabad Lands, Tehran, Iran, 1974
(Copyright: The Louis I. Kahn Collection, University of Pennsylvania.)

Figure 5. Tabiat Bridge, the winner design; View from south to Alborz Mountains in north of Tehran. (Photo by M.H. Ettefagh, 2016.)
Figure 6. People using foundations of the bridge at low flow time as a picnic area, Jan 2015. (Painting by author, Mar 2015)

Figure 7. People visiting Tabiat Bridge on a snowy winter day (Copyright: Abbasabad Renovation Co. 2016)

Figure 8. People visiting Tabiat Bridge on a polluted winter morning (Photo by author, 2015)
Figure 9. Diagram of anticipated move and pause patterns on Tabiat (Left) and Khaju (Right).
(Base drawing on Left: www.casi.com 2016; Credit of base drawing on right: Pascal Coste, Accessed on 2017; Diagrams by author 2017)

Figure 10. People gather in the main vaulted space on a winter weekday to listen to a man singing.
(Photo by author, Jan 2015)
Abstract
After WWII, large scale road infrastructure in Europe, and particularly in Belgium, became an essential instrument in the construction of the welfare state. In the wake of the quantum leap of road constructions in the 1950’s, the Ministry of Public Works of Belgium was eager to mitigate the impact of the road projects on the environment by issuing the Plan Vert, or ‘Green Plan’. We argue that landscape was not just a way of reducing the problematic effects of the infrastructure project, but rather a possibility to create a modern, park-like infrastructural landscape for a modern society. In this landscape, oppositions between urbanity and rurality would make place for a hybrid concepion of the territory, guided by landscape design. Réné Pechère, an advisor of the Service du Plan Vert and a renowned landscape architect, was the key figure who injected landscape rationales within a discourse largely dominated by engineers. Influenced by the pre-war German ‘biotechnical engineering’, he formulated views on the landscape project of the Service blending the technological with the natural. In this paper, we will demonstrate that Pechère saw the marriage of infrastructure and landscape as an opportunity to create a new landscape and re-order ‘nature’ from wilderness to a garden of technonatural assemblages. A close reading of Pechère’s writings on the one hand, and an analysis of the connections he had with German engineering, on the other, reveals the relationship between the logic of infrastructure and that of the garden. Pechère considered aesthetic experience to be an indispensable part of car mobility, and more so urbanization, in Belgium.
Nature is one thing, and art another. As a work of art, the garden is humans’ work. Between the garden and untouched nature there is as much difference as between a cantata of Bach and the singing of birds. René Pechère, L’Esthétique des Espaces Verts [].

A policy of Gardens must provide a solution for the conflict between green spaces and the necessity of enlarging the built space. René Pechère, Par Delà des Haies du Jardin [].

Introduction

In 1957, in the midst of economic recovery and expansion through the start-up of large infrastructural investments, the Ministry of Public Works in Belgium published a booklet called the Green Plan, or Le Plan Vert. In a preface of the publication, the young Belgian King Baudouin expressed his concern about the modernization of the road network, which he considered to diminish the beauty of many Belgian landscapes and which whipped out a large amount of trees. Although he ‘understood the economic requirements of growing traffic’, he advocated for ‘regional beauty to be protected more effectively’ []. To that end, the Green Plan, although without any juridical power, gave a set of directions to be taken into consideration during the construction of infrastructural works. Short, textual instructions about the planting of greeneries where given for roads, highways, but also rivers, canals and the urban agglomerations. These directions where complemented with images that depicted the envisioned layout of the infrastructure. The Ministry established a Service du Plan Vert only three years later: a governmental unit that resided in the Ministry of Public Works, with the Green Plan as its ‘bible’. It was responsible for the planting of greeneries along infrastructural works; the management of parks and gardens in the Brussels agglomeration; and had an advisory function regarding the planting policies of other administrations []. Both the book and the Service where created by the then well-known landscape architect René Pechère. Pechère envisioned the future of the Belgian landscape through the construction of
large scale infrastructural works, and pushed that agenda through his connections with the Ministry of Public Works [5].

The Green Plan is positioned within a line of publications on landscape and infrastructure in Europe. Similar landscape policies from the 1930s onwards have been addressed, for example by Peter Merriman (on the UK and the M1 motorway), Thomas Zeller (on Nazi-Germany and the Autobahn), and others [6]. The quantum leap of motorway construction during the post-war period in Europe, as a means to build the welfare state providing state services for all [7], while at the same time destroying so-called natural landscapes, provoked reactions across different disciplines arguing for the mitigation of the effects of modernization on the European cultural landscape [8]. In this paper, however, we will demonstrate that landscape architects did not only consider the upsurge of infrastructural construction as a problem, but also as an opportunity to create a new, modern landscape that was based both on functional questions and aesthetic principles. Our review of the Green Plan and the work of landscape architect René Pechère will support our argument that post-war landscape design practices initiated an official policy to create a new kind of modern landscape in Belgium. Although mitigation remained an important reason for the ministries’ planting policies, we demonstrate that the Green Plan and René Pechère searched for a more sophisticated reaction towards modernization and its devastating effects, by bringing infrastructural expansion and nature development together in one model. In that sense, the Green Plan redefined the modernization process and introduced ‘another kind of modern’ [9]. We will argue that this policy was clearly influenced by two different practices in history. First, the autobahn-project in Nazi Germany, initiated by landscape architects Alwin Seifert and, secondly, the practice of the garden designer, who extrapolated the idea of the garden on the larger, territorial scale.
Redefining modernization: From upgrading existing infrastructure to superimposing the ‘machine’ in the garden.

In Belgian history, there is a clear difference between inter- and post-war policies regarding infrastructure planning. In the interwar period, the Ministry of Public Works reacted to the new socio-economic context of technological modernization by upgrading the existing infrastructural network. This resulted in a ‘complex integration of both existing and new infrastructure’ that harmonized with the existing urbanization \[1\]. Indeed, during this period highways were generally considered snobbish and anti-democratic. Influential engineers and policy-makers believed that the restricted access to highways for cars, prohibiting access of other transport modes as well as access to adjacent plots, would diminish the economic opportunities of certain regions \[1\]. These opinions gave way to a specific, local modernism, which Greet De Block and Bruno De Meulder called ‘iterative modernism’. This distinctively ‘Belgian’ design mode did not ‘aspire to the imposition of pure models, but tirelessly sought hybrids that combined modern ideas with existing structures’ \[1\]. The engineers of the Ministry of Public Works thus searched for ‘another modernity’, which eased the ‘transition between old and new’ \[1\].

After the war, however, the context changed dramatically. Through the establishment of a road fund in 1955, the minister of Public Works, Omer Vanaudenhove, financed and pushed the constructions of highways in Belgium. These highways were perceived, to quote Leo Marx, as ‘machines in the garden’, rather than being ‘part of the garden’ \[1\]. The highway did not relate to bordering developments, but became detached from their surroundings. It is in this specific context that the Plan Vert became a necessary tool to re-embed the infrastructure with its surroundings, or, at least rhetorically, by constructing an image that fell back on the aesthetic category of the picturesque, as it showed a new, hybrid landscape connecting the apparently contradictory components of technology and nature \[1\]. The images used in
the Plan Vert as illustrated in Figures 2 and 3, illustrate this visual reinterpretation. Although the publication of this Green Plan is the first official document that implemented a coherent, albeit very general, vision on landscape design in the context of infrastructural works in Belgium, many authors have already demystified this so-called lack of landscape thinking in the ‘ugly’ Belgian context [16]. The work of David Peleman shows that different actors, from engineers to road magazines, used landscape in their discourse. He stated that the Green Plan was only the ‘tip of the iceberg’ in relation to the topic of landscape and roads [17]. Advocates for the construction of car-based mobility infrastructure used images and discourses on landscape to promote their own projects, reworking the Belgian landscape imaginary to serve their own agendas. In that sense, landscape was a ‘vehicle’ to push their mobility agenda. Another example is the ‘iterative design mode’ which was present in the interwar public works, showing that landscape was crucial to not ‘unsettle spatial and social relations’ [18]. They relate these practices to the work of Lewis Mumford, who ‘advocated a careful integration of street, highway and landscape to tame the destructive impacts of the automobile’ [19]. Within this history, the publication of the Green Plan in the late fifties is highly significant, as it shows a shift of landscape awareness from the unofficial debates in magazines and ‘unconscious’ awareness for landscape in the designs of engineers, towards an official guideline, imposed by national politics. The changing design of infrastructure, first as being part of the existing landscape, and then as being a structure imposed on the landscape, clearly asked for an official policy to unlock yet an ‘other modern’, one that could assemble the now inevitable highway with the Belgian cultural landscape. René Pechère was key in this re-definition of the post-war landscape. He was responsible for green spaces at the different ministries of the national government immediately after the war until the foundation of the Service in 1960. In this capacity, he helped the minister of Public Works, Omer
Vanaudenhove to write the Green Plan and he was an essential figure in the establishment of the *Service du Plan Vert*, where he officially became a 'counselor for green spaces'[^20].

**Towards the territorial scale: German Technology and the Belgian Highway**

To this day, Pechère is mainly known as a garden designer in Belgium, who designed over 900 gardens, and shaped a number of public spaces, mainly in Brussels[^21]. He became widely known with his design for the garden of the Belgian Pavilion at the universal exposition in 1937 in Paris, praised for its elegance and floral arrangements[^22]. He was also active in the international scène, and participated in the first international Congress of Garden Architects at the same exhibition in Paris. Pechère also attended the second international Congress, in 1938 in Berlin, hosted by landscape architect Alwin Seifert. As Dorothée Imbert stated in her article on the international dimension of the landscape architecture, this second congress 'stressed the potential of landscape architecture as a means of structuring the national territory, and as a tool for ideology'[^23]. Through his contact with the German representatives on these congresses, Pechère came into contact with ideas about the potential of garden and landscape design in national politics. He was also present at the third international congress, in Zurich in 1939, where this 'shift in practice from garden and park design to planning' was confirmed[^24].

It is clear that the landscape praxis during the Nazi period influenced this international shift in landscape architecture from the local to the territorial scale. Thomas Zeller described the nature of landscape architecture during the Nazi period in his book on the construction of the *autobahn*. He showed that technology in Nazi-Germany was seen as a positive force that created 'new natures', unlike the vision of a nature that was destroyed by technology, which was common in other countries. *German Technology*, or *Deutsche Technik*, as it is called, proceeded without the rhetoric about the loss
of nature caused by modernity. Technological creations were perceived as cultural products, and engineers as cultural actors. They could elaborate both on things of nature and things of culture, and created a ‘harmonious coexistence of nature and technology’ [25]. Highways, in that sense, would merge with nature, rather than stand apart from it [26]. This German Technology, then, was a particular ideology that created an ‘other modern’, a modernity that erased the bad side-effects of mainstream modernization. From 1933 onwards, landscape advocates (usually landscape architects, experts who gave advice during construction works) in Germany were structurally involved in the construction of the German autobahn, conceived as the ideal project through which this new techno-natural layout could be created. Landscape architect Alwin Seifert was the head of these landscape advocates, and outlined the landscape politics in collaboration with inspector-general Fritz Todt [27]. The autobahn project functioned as a tool to enlarge the landscape architects’ view from the garden and park towards the whole territory, and indeed society. Indeed, it was also the autobahn project that Seifert presented on the international summits in Paris, Berlin and Zurich, and for which he received much acclaim [28].

Dorothée Imbert claims that the Second World War interrupted the exchange of ideas between landscape architects internationally for nearly a decade [29]. For Pechère, however, this was not the case. He was an officer in the Belgian army, and was sent to the front after the outbreak of the war. During the siege of Eben-Emael, he was captured as a war prisoner and sent to Germany [30]. In Germany, he came into contact with German landscape architects Alwin Seifert, Hermann Mattern and Heinrich Wiepking, whom all where participants in determining the landscape policy of the Reich. These contacts helped him escape imprisonment for a longer period of time, although he never really denounced his support for the Belgian crown [31]. Seifert gave Pechère work as a war prisoner for his administration, letting him draw
up plans for the *autobahn* around Köln [32]. His involvement in the *autobahn* project in his years of ‘imprisonment’ is evident, through his archives which hold a French translation of a German congress on the ‘autostrade du Reich’, where he was infused with ideas on the technical and cultural specificities of the building of a highway [33]. During his time in Germany, Pechère also started to study urbanism, for which he received his grade officially after the war, in Paris [34]. Although Pechère tried hard to cover up his connections with the German landscape architects after the war, his postwar agenda was clearly influenced by the German *autobahn* project and his connections to Seifert [35]. In a number of lectures and texts after the war, he elaborated on his vision of a greener Belgium, often with a focus on the landscape design of highways reminiscent of autobahn design. As we have seen earlier, Pechère was also counselor for the *Service du Plan Vert* until its abolition in 1989, and the German techno-natural landscape approach was a source of inspiration for his work. On the request of the minister Jos De Saeger, who placed him on a ‘special mission’, Pechère made a ‘General Report on the Aesthetics of the Route and its Plantations’ in the year 1970. In this report, Pechère elaborated on a number of subjects concerning the highways: ‘the integration of the route in the landscape’, the ‘landscape as seen from the driver’, the ‘roadsides’, ‘plantations’, and ‘protection of the landscape’ [36]. Pechère explained, through simple landscape drawings of highways, how the road should be formed from the viewpoint of the driver. He shows both good and bad examples. Although these drawings are by Pechère’s hand, the connection with German highway-publications is very explicit, certainly if we compare his sketches to Nazi-publications, such as *Trassierungsgrundlagen der Reichsautobahnen* [37]. Pechère used magazines and publications like these, that where published during the Nazi period in Germany, as a source for his drawings. Pechère also elaborated on the multidisciplinary character of the highway, stating that engineers should consult both preservationists and
During the Second World War, in a translation of a lecture by Hans Lorenz - a road engineer for the Generalinspektion für das deutsche Straßenwesen - Pechère wrote that the highway was both a technical and a cultural undertaking, which would serve Germany and a ‘united Europe’, thus rehearsing the techno-natural rationale of the Nazi autobahn. The construction of highways should therefore be a joint operation of engineers, architects, landscape architects and other specialists. Indeed, Pechère stated in his autobiography that the role of the landscape architect as an ‘advocat’ or consultant in the Service du Plan Vert was a direct copy of the German model.

**Designing the Garden: A useful metaphor for a modernizing country**

Despite the explicit choice for a multidisciplinary approach, Pechère’s vision was rooted in his experience as a landscape architect, and placed the specific praxis of garden design at the center of his vision on the Belgian highways. As David Peleman argues, his theories on highways and the territory were framed through the garden. For Pechère, the garden was a construct that was in essence cultural, but distinguished itself from other arts because it used living nature as its material. Having written extensively on garden design himself, his work shows that he projected the model of the garden on the territory by means of the infrastructure. Pechère’s garden was a useful tool to incorporate the techno-natural thinking and cultural construct of German technology into his discourse, without ever referring to it after the war. Both on the level of the applied sciences and the project, the natural, technical and cultural were fused into a hybrid considering the landscape as a cultural and societal construct based on techno-natural intervention. New sciences fusing the natural and social sciences, like phytosociologie, or plant sociology, were therefore of the outmost importance for the landscape architect. For Pechère, the garden was not wild or untouched nature, but consisted of complex nature-culture relations. Likewise, the Belgian landscape
had not been without human influence, and as such should always be considered as a work of art [47]. His vision on urbanism, therefore, were infused by his experience as a garden designer, scaled up to the territory.

Pechère was able to look at the organization of territory through highway projects, from his specific disciplinary viewpoint. He considered the modern road as mode of urbanization, generating a growth of cities into the countryside which would render the dichotomy between urban and rural zones obsolete. As an urban development model, he considered satellite towns in the green areas of the territory as the preferred future of urbanization in Belgium, with green spaces as parallel network in-between the network of satellite towns [48]. In an early publication in 1946 he already elaborated on the fact that the art of garden design and of urban design was analogous, and therefore necessarily interlinked [49]. A ‘policy of gardens’, then, ‘would be able to overcome the conflict between green spaces and the necessity to enlarge the build space’ [50].

Conclusion
Resolving the conflict, merging the machine and the garden
Indeed, Pechère’s work was about resolving this conflict. As a landscape architect close to the Ministry of Public Works, he influenced the ‘response’ of landscape architecture on the infrastructural boom after the Second World War by constructing his own, alternative modernization process, merging concerns about the destruction of the landscape with the project of the welfare state. Although the problematic of widespread construction and destruction was acknowledged, landscape policy and landscape designers searched for a complex and more fine-grained solution then mere protection of nature. Nature/Culture dualities were overcome by thinking the territory as a hybrid garden, where infrastructural construction was a chance to re-interpret its design and layout. Pechère was an essential actor in this hybrid construction (of metaphorically using the garden), as he opposed the Nature/Technology, the Urban/Rural and
the Engineer/Landscape Architect divide. By using the Garden as an epistemological tool to cross all disciplinary and spatial boundaries, he constructed a theory to envision a ‘garden territory’. Today, with the re-emergence of infrastructure as a guiding principle in urbanism and landscape architecture, the question of alternative modernization processes regain their importance. To merely pursue a policy of green-washing infrastructural planning would therefore be a missed opportunity to conceive infrastructure as landscape and vice versa [51].

Endnotes

8 [] Call for papers of this session.
9 [] ‘Another Modern’ is the title of a book of Tom Avermaete on the work of team X and the


12 De Block and De Meulder. 2011. Iterative Modernism: The Design Mode of Interwar Engineering in Belgium, p. 101. The iterative design mode is “a well-defined modernist goal – a new network idea of reorganizing national territory and society – by means of iteration, repeating a strategy for many fragments in order to yield incremental results to the desired goal.”

13 Ibid., 120.


19 [ ] Ibid.
21 [ ] See: Ibid. Pechère donated his extensive library on garden design to the city of Brussels, which is now called as the ‘Bibliothèque René Pechère’, and which is open for access.
23 [ ] Ibid., p. 12.
24 [ ] Ibid., p. 13.
29 [ ] Ibid., p. 13.
34 [ ] van Marcke de Lummen, A. n.d.. René Pechère.
35 [ ] In a letter after the war, Pechère “warned [the Institute of Landscape Architects] against reestablishing professional ties with Germany”. He said that “As a citizen of a country which suffered twice the German invasion, I am not allowed to shake Professor Seifert’s hand at the congress.” This clearly shows Pechère’s urge to take distance from his German contacts. Imbert, D. 2007. Landscape Architects of the World, Unite! p. 19.
Travaux Publiques.


42  [] In his PhD-research, David Peleman already pointed out that the framing through the garden was characteristic of Pechère. By looking at other texts written during that period, Peleman argues that framing the road project through the garden showed Pechère’s concern with the growing awareness of the public opinion regarding a healthy and green environment.


45  [] Ibid., p. 33.


50  [] Ibid.

Figure 1. An example of the images in the Plan Vert and the short instructions. Here, the text instructs that ‘a curved direction shall be preferred because it constantly changes the landscape, and drivers can have an overview of the region. The attention of the driver is assured, and the reflexes of the driver remain optimal’.
Figure 2. The fusion of highway and landscape in a picturesque image from the Plan Vert.

Figure 3. Trassenungsgrundlagen der Reichsautobahnen, 1943.
Figure 4. Drawings from René Pechère in his General Report on the Aesthetics of the Route and its Plantations, 1970.
Figure 5. Schematic drawing from René Pechère on the development of satellite towns with the green spaces in grey around the different centers, 1958
Figure 5. Schematic drawing from René Pechère on the development of satellite towns with the green spaces in grey around the different centers, 1958.
Abstract

Materials and landscapes associated with waste are perceived as objectionable. They are anthropogenic byproducts of single-stream, disconnected approaches to material lifecycles and the landscapes affected by their extraction, processing, production, distribution, use, and disposal. In the creation of waste, we react by pushing it to the periphery or disguising its grotesque nature—actions that are misguided by cultural misperceptions that it is useless, a detriment to society, and must be linearly managed and hidden away. By contrast, a design approach can reanimate waste as a dynamic contributor to local and regional contexts through reclamation and transformation. Diverse programs rooted in economy, ecology, and culture can form hybrid assemblages on waste sites, whose relationships are forged through the exchange of waste materials—a landscape lifecycle approach.

This paper investigates the Blue Lagoon and Svartsengi Resource Park in southwest Iceland as a landscape lifecycle case study: the project reconceptualizes and transforms undesirable materials and a waste landscape using diversified material recovery strategies and operative hybrid programming. Known for its bright blue color, the Blue Lagoon materialized as a spa industry out of geothermal waste effluent from the adjacent Svartsengi Geothermal Power Station: an industrial byproduct turned economic generator. Originally considered an environmental disaster, the Blue Lagoon is now one of the twenty-five wonders of the world. With a psoriasis clinic and a unique microbial and algal ecosystem that generates silica mud (the foundation of its skin product line), it is now a popular destination with both locals and tourists, hosting over 400,000 visitors per year. A human ecology and economy has developed out of supposed waste materials. This case study reveals the untapped opportunities of geothermal ‘waste’ in these emergent landscape conditions, which hybridize economies with recreation, research, and ecology, and shift the conventional relationship with waste materials.
Introduction
Waste is typically associated with the grotesque, perceived as a repugnant undesirable condition. Waste is considered the opposite of value—the resultant leftovers from the creation of capital and social value. It has its own aesthetics, described by terms like ‘unsightly’ or ‘hideous’. Vittoria Di Palma describes waste in the context of landscapes, or what she terms wastelands. Many authors have developed terms to describe this undesirable landscape condition [1, 2], which as Di Palma highlights, have ‘less to do with what they are than with how they make us feel’ [3]. Waste is a cultural term with a long historical and likely future trajectory embedded with anti-value. Such negative values [4] are assigned to both materials and landscapes perceived as decaying and abandoned. They are the anthropogenic byproducts of single-stream, isolated and disconnected approaches to the lifecycles of materials and landscapes. Materials affect countless discontiguoues landscapes [5] through their extraction, processing, production, distribution, use, and disposal. As social and cultural attitudes have evolved, so have our infrastructures in reaction to the creation of waste: it is spatially pushed to the periphery, aesthetically disguised through camouflage, or concealed beneath Earth’s surface [6]. Such responses to waste are misguided by cultural misperceptions of value (and that waste is the opposite of value). How can waste be valuable if it is perceived as its antithesis?

The concept of waste does not exist in ecological systems. All materials produced by one means are reused by others as matter flows through continuous cycles [7]. Humans are generating waste at an exponential rate, and infrastructural systems have not been engineered to recover supposedly exhausted materials and landscapes. As we continue to form new single-use material conglomerations incapable of being digested or disassembled, and are relegated to land-filled mountains of technofossils [8], we render
useless the limited reserves of Earth’s biosphere: the resources, energy, and labor embedded in the production of objects or landscapes which once had perceived value. Our designed built environment, from the surface to the subsurface, from our industrial and infrastructural systems to our social and cultural systems, all embodied within Earth’s ecosystems, must capitalize on waste materials and landscapes if humans are to continue growing in population and resource use in the Anthropocene [9].

Emerging waste management systems are beginning to recast waste as a 21st century fuel [10]. Concepts of industrial ecology, urban metabolism, cradle-to-cradle, and lifecycle assessment have arisen as material-waste recovery strategies in response to environmental sustainability. Industrial ecology generally focuses on the management, reuse, and reintegration of leftover energy and waste materials generated by industrial and manufacturing land uses for use by other industries [11]. Urban metabolism broadly focuses on the material, labor, and capital inputs and outputs sustaining and generated by cities. It frames the city as a living being with metabolic processes driven by physical and spatial activities, and material exchanges between organisms and their environment [12]. Cradle-to-cradle and lifecycle assessment [13] are material-focused. They both strive to understand the material inputs and outputs of commodified-material industries, and recalibrate the systems that maintain their development for greater efficiency throughout a material’s lifecycle. Cradle-to-cradle is specifically concerned with the afterlife of a material after its intended use, and how it can be cycled back into a technological and/or ecological system to continue its lifecycle [14].

However, these models have been limited in scope to industries, urban environments, and materials, are narrowly focused on specific topics and contexts, and are commonly applied in the analysis of existing systems. They leave out the rural landscapes that sustain these systems, and the physical landscape residues, fragments, and byproducts of these processes, such as
brownfields and landfills. With their abstract approaches and systems-based focus, they lack an exploration of the spatial, experiential, and aesthetic considerations of waste reuse, and the ecological, cultural, and social potentials that arise from interfacing and hybridizing the ecological with technological and anthropogenic systems. What are their implications for design? What would constitute a more comprehensive approach that accommodates and confronts all forms of waste, material and spatial, and engages with a broader array of users, both human and non-human? Landscape architects must engage with these concepts.

As we enter an era of population explosion, resource scarcity, and climate change, materials and landscapes associated with waste must be perceived as useful. Our linear approaches towards material and landscape-based systems must be reimagined as integrative and cyclical. An ecologically grounded landscape-based design approach can offer a comprehensive perspective of technological and environmental systems; one that does not see them as mutually exclusive or operating in isolation of one another, but recognizes that such systems are boundless and fluid. They ebb, flow, and operate across multiple scales from material to global, constantly affecting and influencing each other. Landscape lifecycles reactivates waste as a dynamic contributor to local and regional contexts. As a holistic approach, landscape lifecycles integrates multiple diverse programs rooted in economy, ecology, and culture to form hybrid assemblages in the transformation of perceived physical and spatial wastes. Their relationships are forged through the exchange of internally and externally sourced material byproducts that create new waste economies and ecologies, capitalizing on waste as a generator rather than a detriment. This method aspires to engender new landscapes of multiplicity that interweave local and regional economies, ecologies, and cultures, providing venues for multispecies users negatively affected by waste landscapes to participate in their transformation.
As part of a larger project to capture and document the potential successes and challenges of innovatively utilizing and reactivating waste materials and landscapes, this paper investigates the Blue Lagoon and Resource Park in southwest Iceland as a landscape lifecycle case study. The Blue Lagoon, formed by the waste effluent from the Svartsengi Geothermal Power Plant, converted spatial and material wastes into resources, creating a landscape with significant ecological, economical, and cultural value. The case study aims to unveil the opportunities, implications, and performative capacities of waste reuse on economies, ecologies, and social and cultural systems. Through the lens of the Blue Lagoon, this paper explores how reacting differently to the creation of waste yields creative acts of reuse. The value of design is in reframing waste as a resource with material, spatial, experiential, and aesthetic dimensions, which has the capacity to generate highly performative, diverse, and active landscapes as cultural destinations.

Blue Lagoon Beginnings – The Creation Of Geothermal Waste

For over a century, the small island country of Iceland has used geothermal energy for a variety of purposes. The Mid-Atlantic Ridge, consisting of the North American and Eurasian tectonic plates, emerges from the sea and traverses the country from the southwest through the north. These plates are slowly separating at a rate of 2cm per year [15], causing active geological conditions that yield high levels of geothermal activity. There are high and low temperature zones, with 200° Celsius as the threshold [16]. High temperature zones, located on and around the Mid-Atlantic ridge, enables energy production, while other activities occur in low temperature zones, such as fish farming, greenhouse production, and bathing [17]. However, domestic centralized forms of geothermal energy production have only emerged over the last 50 years, and the Svartsengi Geothermal Power Plant on the Reykjanes Peninsula (named
a UNESCO GeoPark in 2015 \([18]\)) in southwest Iceland, the location of the Blue Lagoon, was a pioneer in contemporary geothermal district heating and energy production facilities. Operated by HS Orka, Svartsengi is one of the oldest power plants in Iceland, and participated in technological developments that revolutionized the geothermal industry. It began producing geothermal energy in 1976, becoming the first geothermal Combined Heat and Power Plant (CHP) in the world \([19]\). It was also the first power plant in the country to combine electrical power production and energy development for home heating using subterranean steam. Over time, as the power plant expanded, technological innovations occurred in tandem. The plant was constructed in six phases, with the last phase completed in 2007 \([20]\). Today, it has an installed capacity of 75 MW for electricity production and 190 MW for heat \([21]\), providing approximately 45,000 people with electricity and about 17,000 people with hot water for central heating \([22]\) (Figure 1).

Seawater infiltration into the bedrock of the Reykjanes peninsula produces highly saline geothermal water, which contains unique minerals and gases. Due to its distinctive geochemical composition, it cannot be used directly for geothermal production. Instead, geothermal brine heats up freshwater to be distributed throughout the Reykjanes region. Steam is also extracted from geothermal water to run turbines \([23]\).

Any process that uses geothermal energy creates a byproduct: an output of cooler geothermal effluent. When Svartsengi initially began operations, they released brine effluent to the neighboring 800-year-old lava field in an attempt to regenerate the water table. However, minerals in the geothermal effluent quickly oxidized, solidifying and clogging cracks within the bedrock. This formed a steaming milky blue reservoir of warm brine adjacent to the power plant, covering approximately 8,700 square meters with an average depth of 1.2 meters \([24]\). The geologically significant lava field was destroyed: an environmental disaster.
However, in typical Icelandic fashion—a culture built around bathing in warm geothermal water wherever it is found—people began bathing in the lagoon. The community perceived this as water instead of waste. This prompted the landscape’s transformation from undesirable byproduct to an unexpected recreational oasis with an entirely new microbial ecosystem.

**Blue Lagoon Development – Discovering Waste As A Resource**

The newly formed lagoon quickly became a bathing venue around 1978, and by 1987 public access to the lagoon became regulated with the construction of a modest bathhouse [25]. In the early years, users suffering from psoriasis noticed drastic improvements to their skin, triggering the establishment of Blue Lagoon Ltd. in 1992 and scientific research in 1992-1996 to understand the unique microbial and geochemical conditions of the geothermal effluent [26]. They discovered a distinctive microbial community, with 60% of the organisms considered novel species, including two strains of blue-green algae [27], one never seen before and the other only known to exist in one other location [28]. White silica mud, another material byproduct of the brine effluent resulting from the precipitation of dissolved rock from the Earth’s mantle, was also discovered lining the lava rock in the lagoon. What was perceived as an industrial landscape that produced waste (geothermal effluent) and a wasteland (the lagoon) evolved into a culturally rich, ecologically diverse destination. The discovery of these species paired with the increasing number of visitors caused perspectives to change, shifting reactions to the emergent condition from disastrous to opportunistic. Spatial and material waste was beginning to be seen as a resource.

In 1995, the Blue Lagoon launched its skin care line sourced from the material byproducts produced by the lagoon’s brine: blue-green algae, white silica mud, and other minerals [29]. The products evolved over 10-15 years during its development, prompted by the discovery of skin strengthening and anti-aging properties of the geothermal brine [30]. Its unique active elements
have led to the development of over 50 products [31] for a wide range of skin care purposes, giving the material wastes from the industrial process not only ecological and social importance, but also economic value.

Since 1999, the Blue Lagoon complex, designed by Sigridur Sighorsdottir of Basalt Architects, has experienced tremendous growth and development (Figure 2). The design strategy was to blend the complex into the landscape through the selection of materials and the architecture’s form. It consists of: the Blue Lagoon spa, the most visited destination in Iceland with over 400,000 local and international visitors a year; the Blue Lagoon Clinic focused on dermatology, treating psoriasis and other skin disorders; and the Blue Lagoon Research and Development (R&D) center with a biotech unit that extracts minerals and salts, and grows filamentous and coccoid blue-green algae sourced from the brine effluent to manufacture the skin product lines [32]. In 2012, the R&D center also began utilizing carbon dioxide (CO$_2$)-rich geothermal gas, a byproduct of the power plant, for algae cultivation [33]. The Blue Lagoon recently began an expansion project that doubles its size, which includes a 60-room luxury hotel, an underground spa, and a new restaurant that will be completed by the end of 2017 [34]. It was named one of National Geographic’s 25 Wonders of the World in 2012 [35].

The Blue Lagoon illustrates how a cultural shift in perceiving waste as a valuable resource can drive economically generative, ecologically diverse, culturally and socially rich destinations that spin-off from a single industry’s cascading waste, particularly within an isolated area outside of an urban center. However, the Blue Lagoon is not the only spin-off from the Svartsengi geothermal power plant: the emergence and creation of the Blue Lagoon led to the reactionary development of what is now known as the Resource Park.

Blue Lagoon Integration – The Creation Of The Resource Park Concept
The evolution of the Svartsengi Geothermal Power Plant as a CHP, coupled with the emergent
development of the Blue Lagoon, led to the establishment of the Resource Park in the Suðurnes region. Created by Albert Albertsson, VP of HS Orka, the Resource Park advocates for a ‘society without waste’ [36]. The Resource Park Concept (RPC) was defined and instituted in 1988-89, and consists of several key principles to guide development such as integrating multiple uses and evolving infinitely to meet the needs of the present and future [37]. It rejects the notion of waste, instead perceiving waste materials as valuable resources that flow in and out of the Park to be holistically utilized to the fullest extent possible for a wide range of uses. The Resource Park consists of Svartsengi, the Blue Lagoon, and a newer, nearby Geothermal Power Plant, Reykjanes [38].

A wide range of companies and programs utilize byproducts for multiple purposes in connection to both power plants. At Svartsengi (Figure 3), the Blue Lagoon complex employs approximately 300 people and cycles multiple byproducts between the spa, lagoon, clinic, and R&D center. Svartsengi’s other spin-off industries and byproducts include ORF Genetics, a biotech company, and Carbon Recycling International, which uses CO2 and hydrogen sulphide (H2S) from Svartsengi, producing methanol. Both companies each employ approximately 30 people. At Reykjanes, two fish drying companies, Haustak and Hateigur, use the power plant’s excess steam. Additionally, a fish farm producing turbot, plaice, sturgeon, and caviar uses remaining geothermal seawater from Reykjanes. These industries combined employ approximately 100 people [39].

The ever-evolving and developing Resource Park has had a tremendous impact on the region’s economy and culture, creating one out of every four new jobs on the southern peninsula [40]. Wages in the Resource Park also tend to be approximately 30% higher than average in Iceland. Tourism in the region, driven especially by the Blue Lagoon, continues to increase and drive revenues for both the Resource Park and Iceland as a whole. Overall, the Resource Park Concept encourages interdisciplinary
collaborations and promotes waste reuse as the link between diverse industries. Although it deeply engages with the region’s economy through the use and reuse of local resources and byproducts by multiple industries, and the Blue Lagoon has become a significant cultural and social destination, there lies potential within the Resource Park to more actively engage and interface with local ecologies and the experiential opportunities of geothermal energy as a landscape condition. For example, through the lens of landscape lifecycles, the waste effluent of the Reykjanes Power Plant has reuse potential for on-site ecological, economic, cultural and social spin-off programs [41] (Figure 4). Throughout Iceland, a wide array of ecological communities and anthropogenic systems utilize geothermal water at different temperatures. The fluctuating temperature gradient of Reykjanes’ geothermal effluent could be stretched, compressed, and manipulated with physical interventions. This could create thermal zones for a variety of experiences, ecologies, and uses, which would spatially intersect by sharing the same thermal gradient. Such thermal thresholds would create microclimates for multispecies users including plant communities for erosion control, human use through pools, saunas, and steam rooms, and various algal species whose windows of vitality are dependent on specific temperature ranges. Thermally associated communities are visible registers of the invisible thermal gradient. Byproducts of heat, water, and steam have the potential to be simultaneously performative and experiential. Waste has the ability to generate interactions between multiple species, creating a hybrid assemblage of economic, ecologic, and cultural programs that engage and interact across the geothermal landscape.

**Conclusion**
Waste is culturally constructed as the antithesis of value. The concepts of industrial ecology, urban metabolism, cradle-to-cradle, and lifecycle assessment each describe the sustainable management of a system vis-à-vis managing
resources and waste materials. However, these fields lack a clear articulation of how to manage the landscapes these systems rely on. Landscapes are also byproducts of these systemic processes. Landscape lifecycles advocates for a holistic multi-scalar viewpoint that considers the landscape as the thick surface on which these systems operate and materials flow, and as such, accommodate and invite constant change and exchange. These systems do not operate in the abstract or in isolation—they have territorial, spatial, aesthetic, and experiential impacts. Finding, understanding, calibrating, and designing the spatial interconnections of the system through the management of waste materials and landscapes are the opportunities sought through landscape lifecycles. The Blue Lagoon and Resource Park demonstrate how byproducts of the geothermal energy production industry have the potential to create meaningful jobs for local residents and develop new spin-off industries that relate to local culture, in turn, generating new cultural destinations for domestic and international visitors. A human ecology and economy has developed out of supposed waste materials. As a case study, the Blue Lagoon reconceptualizes and transforms undesirable materials and a waste landscape using diversified material recovery strategies and operative hybrid programming. It reveals the untapped opportunities of geothermal ‘waste’ in these emergent landscape conditions, which hybridize economies with recreation, research, and ecology, and shift the conventional relationship with waste from passive to productive. In reaction to the creation of these concepts, the lens of landscape lifecycles pushes these strategies further to actively engage with the landscape to create ecological habitats that intersect with human habitation. In this sense, waste incentivizes efficiency, augments value, and assimilates multispecies hybrid assemblages.
Endnotes

1 [] Di Palma, V. 2017. ‘In the Mood for Landscape’. In eds Girot, C. and Imhof, D., *Thinking the Contemporary Landscape*. New York: Princeton Architectural Press, p15. Di Palma lists other alternative terms to *wastelands* by several authors such as Ignasi de Sola-Morales Rubio’s ‘terrain vagues’; Antoine Picon’s ‘anxious landscapes’; Niall Kirkwood’s ‘manufactured landscapes’; Mira Engler’s ‘waste landscapes’; and Alan Berger’s ‘drosscapes’.

2 [] Nina-Marie Lister also provides additions to this list in her essay ‘Trashed Space’ in Trash ed. Knechtel, J. 2006., consisting of: James Howard Kunstler who describes these landscapes as ‘junkscape’; Pamela Robinson’s ‘crudscape’; and provides other terms such as ‘post-industrial’ and ‘waste space’.

3 [] Di Palma. p15.

4 [] Hawkins, G. and Muecke, S. 2003. *Culture and Waste: The Creation and Destruction of Value*. Oxford: Rowman & Littlefield Publishing Group, p.xi. In regards to cultural value and waste, Hawkins and Muecke write, ‘Values, common sense would tell us, can be either good or bad. Waste normally falls into the negative...redemption shows that negative value can be exchanged into positive value...’


7 [] Engler. 2004, p1. Engler describes how environmental systems have developed mechanisms for ‘all forms of waste is eventually consumed, used, and recycled in a chain of matter and energy flow.’

8 [] Waters, C. et. al. 2016. ‘The Anthropocene is functionally and stratigraphically distinct from the Holocene.’ *Science Magazine* 351:6269, p2622- 1-10, 3. Waters, et. al. describe technofossils as, ‘new materials commonly shaped into abundant artifacts with the capacity to be preserved in and to help date future geological deposits. Analogous to biotic fossil remains, these so-called technofossils provide annual to decadal
stratigraphic resolution far greater than what can be obtained from the first and last appearances of fossil taxa, which have traditionally been the most common means of correlating striatal sections.’ See also Jan Zalasiewicz, et. al. 2014. ‘The technofossil record of humans.’ Anthropocene Review, 1, p34-43.

9 [] The term ‘Anthropocene’ was coined by Paul Crutzen, a Dutch chemist, around the year 2000 during a scientific conference. Kolbert, E. ‘Enter the Anthropocene,’ National Geographic Magazine, March 2011.

10 [] Belanger, P. 2007. ‘Landscapes of Disassembly: Waste Economies and Emerging Industrial Ecologies,’ Topos 60: p83-91. Belanger describes how conventional and centralized modes of waste management are being replaced by more effective ‘multilateral strategies, including waste diversion, separation, recycling, composting, and remanufacturing.’


17 [] Ibid.

18 [] Blue Lagoon Ltd. 2016. Blue Lagoon Press Kit, p1-5.


24 [] Blue Lagoon Ltd. 2016, p1.
25 [] Ibid.
31 [] Ibid, p3.
32 [] Ibid. See also Albertsson, A. 2008, p5.
33 [] Ibid, p5.
35 [] Blue Lagoon Ltd. 2016, p1.

Figure 1: Geothermal Energy Network + Population on the Reykjanes Peninsula, Iceland.

Figure 2: The Blue Lagoon, Iceland; July 2010.
Figure 3: The Resource Park at Svartsengi, Iceland.
The perception of territory was made possible by the distance that separated the administrator or the professional in charge of its management and transformation and the various geographical places that it comprised. Landscape appeared also as the product of distance, but whereas territorial awareness presupposed a certain degree of interest or even greed, landscape sensitivity, at least according to Kantian aesthetics, was inseparable from disinterestedness.

A. Picon (2010, p.97)

They begin to overturn the supposed ‘givens’ of the visible so as to make visible the fact that the visual field hides and requires invisibilities, that it does not simply belong to the eye (of the prince) but to the (wandering) mind.


Introduction

Elizabeth Meyer’s credit is to have put aesthetic questions back on the landscape agenda in times when hegemonic debates in sustainable landscape and urban design shun any explicit reference to the notion of aesthetics.¹ Until recently, aesthetic values had not factored into the discourse of sustainability, except in negative asides conflating vision, visuality, and formalism with the aesthetic, and rendering all of that secondary to ecological function, performativity, quantitative metrics, or ecosystem services.² She argues that a designed landscape’s appearance can perform in the sense that it ‘can lead to attentiveness, empathy, love, respect, care, concern and action’ of the beholder.³ She therefore concludes that the ‘performance of a landscape’s appearance […] should have as much currency in debates about what a sustainable landscape might, and should, be as the performance of its ecological systems’ (ibid.). In her recent publication Beyond “Sustaining Beauty”. Musings on a Manifesto (hereafter referred to as Musings), she turns to theories of affect to refine her arguments.⁴ Sharing Meyer’s
original motivation to emphasize the aesthetic dimension of environmental design, we are, however, concerned about the political, or rather: we take issue with the a-political implications of the turn to affective theories and related notion of performance, which we believe to run counter to Meyer’s intention.

We will explore the thesis that a turn to the notion of affect, which is about the new continuity that is supposed to exist between object and subject, between the human and non-human, and which shifts from an aesthetics of incommensurability and individual contemplation to an aesthetics of reconciliation and collective participation, may jeopardize distance between (a) imagination and understanding in the experience of the design as well as between (b) analysis and project in the process of design. As an entry into the deliberation of the effects of affect, we turn to the discourse of Landscape and Ecological Urbanism. The design practice of these isms has recently been critiqued for the lack of ‘distinction between territory and landscape’, between the ‘eye of the prince’ and ‘wandering mind’, conflating the rational and sensitive, outside and inside, thus evacuating explicit critical reflection from the equation, or indeed excluding the mobilization and evaluation of political agendas in the experience of the landscape as well as in the design process. To conclude, we explore how to recover distance through alternative aesthetic theories and categories.

The performance of appearance and the role of affect

In the Sustaining beauty. The performance of appearance. A manifesto in three parts (hereafter referred to as Manifesto), Meyer makes a claim for ‘reinserting the aesthetic into discussions of sustainability’ to redress the bias within sustainable landscape design towards the ecological. Well aware that sustainability is generally considered to stand on three pillars, ecology, social equity and economy, Meyer primarily addresses the primacy of the ecological, since this dimension is most closely associated with sustainability within landscape design
discourse. She argues that for design to be truly sustainable, it will need to be more than merely ecologically regenerative. Insisting that landscape design is ‘a cultural act’\(^9\), she assigns a specific role to the aesthetic and to beauty in the widest sense: A designed landscape’s appearance can perform in the sense that it can ‘persuade’\(^10\) or educate the observer or user to, ultimately, behave more sustainably. Meyer expresses the belief that ‘the experience of certain kinds of beauty – granted new forms of strange beauty – is a necessary component of fostering a sustainable community, and that beauty is a key component in developing an environmental ethic.’\(^11\)

This conviction would be, first, grounded in her knowledge of designed landscapes by firms as disparate as Julie Bargmann’s DIRT Studio in the United States, Peter Latz and Partners in Germany, and Kongjian Yu’s Turenscape in China. Second, it would have been extended and enriched by the writings of eco-critic Lawrence Buell, geographer Denis Cosgrove, philosopher Elaine Scarry, and sociologist Ulrich Beck. From Buell she takes the argument that what would be needed to realize a ‘coherent vision of the common environmental good’ would be not more policies or technologies but more ‘attitudes, feelings, images and narratives’\(^12\). Meyer interprets the ideas proposed by Cosgrove in his seminal book *Social Formation and Symbolic Landscape* as underscoring her ideas of works of landscape architecture being ‘cultural products with distinct forms and experiences that evoke attitudes and feelings through space, sequence and form’\(^13\). She emphasizes, however, that she would ‘not believe that design can change society’, rather that ‘it can alter an individual’s consciousness and perhaps assist in restructuring her priorities and values’\(^14\). She therefore concludes her *Manifesto* by stating: The performance of a landscape’s appearance, and the experience of beauty, should have as much currency in debates about what a sustainable landscape might, and should, be as the performance of its ecological systems.\(^15\)

Seven years after the publication of her
Manifesto, Meyer has revised her ideas in her *Musings*, responding to numerous and varied responses that her *Manifesto* had evoked.\(^{16}\) Relevant with regard to the argument of our paper is a series of three partly closely interrelated points: (1) the emphasis on social aesthetics, (2) the move towards theories of affect, and (3) the clarification that ‘beauty’ is to be understood in a wide sense, including other aesthetic experiences and categories such as the sublime. These three aspects are not so much corrections to her *Manifesto* pointing in a different direction as refinements of her earlier arguments.

Meyer shifts emphasis from the individual’s aesthetic experience to ‘a new social aesthetics’\(^{17}\) in order to strengthen the role and weight of aesthetics in the sustainability discourse. She follows Ben Highmore in ‘recasting aesthetics as a social issue, not a personal experience’.\(^{18}\) While much writing in aesthetics would have been about individual experience, Meyer is interested in understanding how ‘numerous, simultaneous individual experiences in a public space comprise an aesthetic collectivity and create new ways of living in and thinking about the environment’.\(^{19}\) This new social aesthetics is, for her, synonymous with ‘a new ethos of sustainable perception and living’\(^{20}\). She further follows Highmore (who on his part builds upon Gregory Bateson’s ideas) in defining ethos as a ‘culturally standardized system of organization of the instincts and emotions of the individual’\(^{21}\). In this sense, ethos is for Meyer “the orchestration of perception, sensorial culture, affective intensities, and so on: more pertinently it will be the interlacing of these”\(^{22}\).

To explain the collective aesthetic impact of designed landscapes, Meyer turns to theories of affect, and introduces the concept of affect as follows:

Affects impress on the emotions; they touch us and move our hearts. According to Baruch Spinoza, the seventeenth-century philosopher, affects connect the mind and body; they can be actions or passions. But unlike the interest in the body in either feminist theory or phenomenology,
for instance, contemporary theories of affects entangle both bodies with the world of technologies and networks, from the ecological to the logistical to information. Meyer stresses that affects do not only refer to visual experiences, but address the full range of sensorial and bodily experience. For the aesthetic experience of (designed) landscape, this would mean that it ‘occurs within an affective world that implicates bodies, objects spaces, values, experiences, and networks’. How then do, according to Meyer, affects work on the individual and collective to prompt sustainable attitudes and actions? Roughly spoken, they make us understand on a deep level, in ‘a mode that combines feelings and knowledge’, how entangled we are in a network of and with other human and non-human beings. Two closely interrelated aspects are important to Meyer in this respect. Firstly, she emphasizes that such an understanding of aesthetic experience would be incompatible with a conceptualization that assumes that aesthetic judgments are disinterested. Meyer distances herself from this Kantian conception of aesthetics arguing that such disinterestedness only results in “self-absorbed reverie”. Since she wants to mobilize the aesthetic experience ‘to touch us and move our hearts’, leading to ‘recognition, empathy, love, respect and care for the environment’, she has little use for a conception of aesthetics that she assumes to imply ‘a separation from the world’. Secondly, the direction, as it were, into which Meyer hopes the aesthetic experience would move the many individuals of a society is a less anthropocentric one: The role she ascribes to aesthetic environmental experiences lies in ‘re-centering human consciousness from an egocentric to a more biocentric perspective’. Meyer argues that the experience of being part of, connected to, and depended on the world around us, which well-designed landscapes can provide, ‘break the barrier between subject and object’. This, in turn, ‘can lead to attentiveness, empathy, love, respect, care, concern and action on the part of those who visit and experience designed landscapes’.
As such Meyer’s writing is related to recent literature in STS, Social Theory and Geography focusing on the interconnectedness between human and non-human actors, advocating a more-than-human agenda where smooth transitions between ‘the social’ and ‘the natural’ lead to co-evolving socio-ecological systems (eg Latour, Haraway, Whatmore, and Braun). Within these systems, the environmental aesthetics of affect conflate with the environmental ethics of such spheres as Gaia or the Chthulucene, moving us to mind-sets and modes of caring and protecting. In the following, we take issue with this position, and more specifically with the collapsing distance between object and subject, between imagination understanding, between aesthetics and ethics. This reconciliation fundamentally de-politicizes the design as well as the experience of the landscape; not only excluding intentions and ideas about societal change and choice in design, but also foreclosing critical reflection and contestation residing in the experience of the landscape. The idea of entangled socio-ecological systems ruled by the laws of self-regulation and co-adaptation, with caring, protecting and respecting as collective ethos, replaces contested interests and political struggle with flattening consensus and participation. Putting it more polemically, the seemingly soft eco-sensitive attitude of thinking-with, living-with, and designing-with the non-human, is currently leading to statements like ‘Make Kin Not Babies’ by prominent social theorists such as, in this case, Donna Haraway. If we accept Meyer’s believe that landscape design cannot change society in combination with the idea that beauty emerges from a reconciliation between imagination and understanding, in the specific context of ecological design aligning with a more-than-human agenda, we might be in the danger of flirting with eco-fascism. This brings us to the central question of this paper, namely: ‘Can landscape architecture afford the de-politicizing effect of affect, and associated theories of emergence and performance?’ In an effort to inject the political into the design debate,
we will explore alternative aesthetic theories (experience) and sociospatial categories (design) predicated on distance and incommensurability. In Timothy Morton’s words:
We must deal with the idea of distance itself. If we try to get rid of distance too fast, in our rush to join the nonhuman, we will end up caught in our prejudice, our concept of distance, our concept of “them”. Hanging out in the distance may be the surest way of relating to the nonhuman. [...] A warning to deep ecology: if we aestheticize this acceptance (of evolution/extinction), we arrive at fascism, the cult of death. Instead, ecological criticism must politicize the aesthetic. We choose this poisoned ground.34

**Landscape experience: Revisiting disinterestedness**

*Frankenstein is an ecological novel precisely not because it compels us to care for a pre-existing notion of nature, but because it questions the very idea of nature.*

T. Morton (2009, p.194)

We would like to forward an alternative aesthetic theory or category that could help to recover the distance between reason and imagination in the experience of landscape design. More specifically, we will revisit the aesthetics of the sublime, as conceptualized by Kant and Lyotard, to foreground the essentialist position of disinterestedness.

From Kant we take the idea that the sublime refers to an essentialism that is politically liberating, verging on revolutionary republicanism.35 The experience is predicated on the incommensurability, or distance, between reason and imagination. Simply put, in the experience of the sublime the imagination crashes in trying to grasp the landscape, thus generating both an unsatisfactory feeling and promise or potency to comprehend the landscape in its (ideal) totality. According to Kant, the imagination produces, in its failing, a freedom to think the unpresentable.36 Central to this notion of the sublime is the conceptualization of the disinterested aesthetic experience. In contrast
to what is often considered as an indifference to the world (e.g., Meyer), disinterestedness refers to the freedom from any direct interests, be they material, sensory or moral, and argues that the true power of aesthetic experiences lies in such experiences of this freedom. Central to the Kantian sublime is showing the subject that even when faced with an overwhelming power, it cannot defeat our capacity to act freely and autonomously. Political theorist Mustafa Dikeç extends this unsettling effect of the sublime to politics, which is in its about forms of perceiving the world and how we relate to it. The disruptive effect of the sublime ‘invites reflexivity about the givens of our situation, a reflective withdrawal from the normalised spaces and practices by opening up new spaces’. Dikeç states that this disruption does not imply ‘a separation from the world’, as Meyer argues, but instead an ‘engagement with it in a reflexive way, exposing and questioning its constitution of the common and ordering principles’, thus opening up a space where the political can be played out. Instead of engaging with the world by means of normalised practices like care, empathy, and concern, in which we risk to get caught up uncritically, the sublime is about engaging with dissensus, disruption and indeed the political.

Although Dikeç is critical about the resistance to all possible representation in Lyotard’s sublime, Lyotard’s theorization could be useful in the context of ecological landscape design as it both avoids dystopian and utopian images of nature, and instead questions the very idea of nature. Similar to Kant, Lyotard’s ‘postmodern sublime’ sets up an incommensurability between reality and concept to confront us with the limits of our senses and in doing so, generate the freedom to unlock, or indeed deconstruct, systems of meaning (Lyotard, L’Inhumain; Leçons sur l’analytique du sublime). However, Lyotard differentiates between modern en postmodern: Modern aesthetics is an aesthetic of the sublime, though a nostalgic one. It allows the unpresentable to be put forward only as the missing content; but the form, because of its recognizable consistency, continues to offer to
the reader or the viewer matter for solace or pleasure ... the postmodern would be that which, in the modern, puts forward the unpresentable in presentation itself; that which denies itself the solace of good forms, the consensus of good taste which would make it possible to share collectively the nostalgia for the unattainable. 

Timothy Morton takes it one step further and states that in order to do ecocritique we need to include the aesthetic dimension, and to conceptualize of non-representable or postmodern sublime more specifically, illustrated by following quote which must be based on Lyotard’s differentiation between the modern and postmodern:

To do ecocritique, we must consider the aesthetic dimension, for the aesthetic has been posited as a nonconceptual realm, a place where our ideas about things drop away ... Art gives what is nonconceptual an illusive appearance of form... to encapsulate a utopian image of nature which does not really exist – we have destroyed it; which goes beyond our conceptual grasp. On the other hand, a nonconceptual image can be a compelling focus for an intensely conceptual system – an ideological system. The dense meaninglessness of nature writing can exert a gravitational push.

As an alternative to nostalgia or the evocation of care, Morton proposes Dark ecology as the politicized version of the sublime, or indeed deconstruction, referring to a melancholic ethics that refuses ideal form, thus creating an atmosphere of tension and anticipation; a thick space where something is about to happen confronting us with both the freedoms and constrains of critical choice (p.93, 186). Morton primarily draws on romantic literature and art to illustrate his argument. As an entry into relating dark ecology to landscape architecture, Robert Smithson’s Hotel Palenque could be a productive thinking experiment.

Landscape design: Revisiting interests

As a second entry into the deliberation of the effects of affect, we turn to the design discourse of Landscape Urbanism and Ecological
Urbanism. The design practice of these isms has been critiqued by Antoine Picon for their a-political tendencies. In his short text *What has happened to territory?*, he chronicles the fate of the concept of territory by weaving together the ideas of territory, landscape, and the notion of affect. Picon argues that until recently, ‘territory and landscape, in their traditional meanings, represented distinct and complementary perspectives’. In the 17th and 18th century, territory came to designate ‘space as a project and as a resource that mainly concerned corporations and institutions’, such as early modern European cities or the Dutch East India Company. Territory as project came to be synonymous with an ideal of the easy circulation of men and goods; as a resource, it opened up the possibility to exploit, in a new way, mines and fields as well as people and their skills. ‘Just like nature, space gradually lost part of its former vital dimension, with its somewhat feminine connotation of primeval fecundity, in order to become fully measurable, quantifiable and exploitable.’ Picon emphasizes that the perception of territory depended on a distance between the administrator or professional in charge of that space’s management and the various geographical places that it actually comprised. However, that distance was coloured by ‘a certain degree of interest or even greed’ with regard for the resources that the territory had to offer. For landscape a similar distance was constitutive. However, the ‘landscape sensitivity, at least according to Kantian aesthetics, was inseparable from disinterestedness’. Picon sees such disinterest at the core of the Romantic attitudes towards natural scenery. So, while both, territory and landscape, were ‘based on an estrangement from immediate experience’, they differed in the mental attitudes that lay at the core of their respective perception: ‘the territorial entrepreneur charted resources where the landscape amateur experienced disinterested emotions’.

However, in the past 15 years or so, the ‘conception of territory as based on a distance
that made efficient planning and design possible\textsuperscript{50}, has been challenged. As a reaction against the earlier top-down, reductionist and authoritarian practices in engineering and planning, design has indeed focused on internal systematic mapping aiming at un- and recovering the emergent relations with nature.\textsuperscript{51} In landscape and ecological urbanism, this ‘focus on the increasing complexity of interdependencies’ has led to a ‘collapse between territory and landscape, between outside and inside, between analysis and project’\textsuperscript{52}. With no outside from which to design, the fading or levelled distance between the designer and the environment, ‘forecloses the potential of the first causing the latter to change’\textsuperscript{53}. Picon argues furthermore that the same societal and cultural forces that have levelled the distance constitutive of territory also jeopardize the distance constitutive of landscape in the traditional sense. For

if there is no exterior from which things can be contemplated, there is no reason to separate spatial perception and understanding into various genres like the territorial and the landscaped.\textsuperscript{54}

This would account, in design practice, for projects that blur the distinction between architecture and its surroundings, architecture and territory, or architecture and landscape. In Landscape Urbanism and Ecological Urbanism, ‘socio-nature is generally stripped down to a biological perspective, assuming that a just and sustainable social structure will emerge from the enhancement of natural formation processes\textsuperscript{55}. Societal development is implicitly considered as ‘naturally guided by non-deterministic, co-evolutionary and co-adaptive interactions’\textsuperscript{56}. Within this organicist reasoning, the notion of territory as a political process is lost.

Picon argues that this ‘collapse of the distinction between territory and landscape’, which would force designer to ‘associate intimately the rational and the sensitive, the planning and the aesthetic dimensions\textsuperscript{57}, is intimately tied to ‘the current importance of the notion of “affect”’\textsuperscript{58}. For him, architectural affect is about the new continuity that is supposed to exist between object and
subject. The point we want to make in this paper is that the attack on the subject-object division in the wake of a turn to theories of affect runs the risk of also fostering the collapse between landscape and territory, between analysis and project, evacuating the political, or indeed interests to influence societal change, from the equation.

Conclusion
Fundamentally agreeing with Meyer to put aesthetics back on the landscape agenda, we argue for an environmental aesthetics that sets up a distance, instead of a continuity, between object and subject, understanding and imagination. Picon’s observation that the turn to theories of affect goes hand in hand with a ‘shift from an aesthetics of contemplation’, i.e. the disinterested contemplation of landscape in Kant’s sense, ‘to an aesthetic of active participation that lies at the core of the performatist turn within contemporary architecture’, holds true for Meyer’s deliberations. As much an attempt to inject the political as an attempts to remove eco-fascist and organicist tendencies from landscape theory and design, this article focuses on the effects of affect, foregrounding the risks of conflating landscape and territory in the design process as well as shuffling human/non-human aesthetics and ethics. While sustaining beauty, or better affect, is a way to ‘persuade’ the beholder to behave more sustainable, the sublime could offer ways to ‘free’ the beholder and create space to contemplate, or indeed critically reflect. Equally, revisiting the concept of territory could re-inject reflectivity again into design practice. Like the sublime, the category of territory is often related to authority. However, if we take the quality of distance as key to these concepts, we could avoid current authoritarian trends in social theory and design moving towards eco-fascist tendencies or organicist reasoning, with equally alarming Malthusian or Spencer-like associations respectively.
Endnotes


2 Meyer 2015, p31.


4 Meyer 2015.


8 Meyer 2008, p7.


16 Meyer 2015.

17 Meyer 2015, p37.

18 Meyer 2015, p38.

19 Meyer 2015, p38.

20 Meyer 2015, p37.

21 Ben Higmore, cited in Meyer 2015, p37.

22 Ben Highmore, cited in Meyer 2015, p38.

23 Meyer 2015, p38.

24 Meyer 2015, p35.

25 Meyer 2015, p37.

26 Meyer 2015, p37.


28 Meyer 2015, p32 f.

29 Meyer 2015, p32.
33 Haraway 2016, p164
35 Morton 2009, p16.
38 Meyer 2015, p32 f.
39 Dikeç 2016, p107
42 Morton 2009, p24
43 Picon 2010, p97.
44 Picon 2010, p95.
47 Picon 2010, p97.
48 Picon 2010, p97.
49 Picon 2010, p97.
50 Picon 2010, p98.
Books, pp225-228.
52 De Block 2016, p13.
54 Picon 2010, p98.
55 De Block 2016, pp1f.
57 Picon 2010, p98.
60 Picon 2010, p99.
Abstract
The appreciation of green infrastructures as ‘nature’ by urban communities presents a critical challenge for the green infrastructure concept. While many green infrastructures focus on functional considerations, their refinement as places where nature can be experienced and understood, has received little attention in research and praxis. Contemporary urban societies entertain varied and distinctive ideas on nature and their relationship to it, themes explored in contemporary urban park and garden design.

Ignoring this may lead to a process which many urban parks underwent in the course of the twentieth century. The rise of standardisation and normative thinking made its way into the design process and led to a standardisation of design solutions. Urban parks were reduced to either a technocratic element for mass recreation, or a ‘bio-cratic’ element where nature was left to its own devices and human intervention was taboo [1]. As a result, the attractiveness of the park declined; the appeal of a ubiquitous ‘green’ alone proved not enough to sustain its popularity.

Contemporary interpretations of green infrastructures
Recent research on green infrastructures has led to a breadth of interpretations of the concept: as greenways—corridors of various widths, linked together in a network—urban-riparian corridors, recreational greenways, ecological corridors, scenic and historic routes and comprehensive networks, physically interconnected ‘green’ space ranging from nature reserves and urban woodlands to designated cycle routes, channelled rivers and parkland, networks for the provision and management of water resources, storm water and flood prevention, or to locate alternative infrastructures for commuting, spines or frameworks of recreational facilities with a focus on their accessibility and connectivity for urban populations [2]. Despite this broadening of interpretations, there is a common ground between the various understandings of green
infrastructure, which can be summarised as a set of technical principles; in the field of conservation and ecology, the emphasis is on safeguarding or developing ecological networks and biodiversity, while in terms of social benefit to urban communities, the focus is on functional aspects such as sport and recreational amenity and routing for connectivity, accessibility and health.

However, green infrastructures are more than just preserved natural areas within urban regions, they are also invariably built—and cultivated. With a few exceptions, green infrastructures are thus not necessarily or exclusively natural areas but rather an interrelationship between ‘nature’ and ‘culture’. This interrelationship resides principally in design and management regimes, and thereby embodies and expresses concepts of nature and landscape held by communities and society. The focus on technical or planning aspects in green infrastructures overlooks design and thus the importance of this cultural component. The perception of landscape and green spaces by individuals and groups and the degree to which green infrastructures offer urban communities spaces that generate and reflect personal and collective notions of nature, have to date received little attention.

Representation and elaboration of nature in contemporary Parisian urban parks and gardens

This paper expands on contemporary conceptions of nature in urban parks and urban gardens such as those realised in Paris between 1980 and 2000. These developments, together with parallel events in Barcelona and the Netherlands, are considered the beginning of a new period of landscape design innovation embodying emerging societal visions of nature and landscape [3]. The projects all display articulated expressions of conceptions of nature, reflecting both a return to the classical garden tradition, as well as elaborations of nature via the sensorial, ‘abundant nature’ and nature as process. But not only do these parks and gardens give different expressions of nature, they also form part of a
green infrastructure network in their own right. As a series of precise moments connected by rivers and canals, this network differs markedly from prevailing green infrastructure models.

The dissolution of expressions of nature in the functionalist period was contributory to the condition urban parks had reached in the lead-up to the period of construction in Paris between 1980 and 2000. The brief for Parc de la Villette for instance, went to lengths to lament this condition. ‘[…] it can be argued that the ‘green’ of the city has been transformed into a mere accompaniment to the buildings: a planted décor, often without any imaginative power, which evokes not the slightest emotion nor stimulates any activities, in short, provides not the slightest pleasure’ [4]. The briefing documents thus actively promoted a return to the imaginative conceptions of nature embodied in historical examples. The reversal of this pattern in Parisian parks indicates an important shift in the envisioning of nature by contemporary designers, reflecting in turn shifts in conceptions of nature held by urban communities. A study of Parc de la Villette (Bernard Tschumi, 1986), Parc André-Citroën (Gilles Clément and Alain Provost, 1992), Jardin de la Bibliothèque nationale (Dominique Perrault, 1996) and Rue de Meaux (Michel Desvigne, 1989-1992) exposes a range of different representations of nature.

Classical interpretations of nature

The two parks use representations of nature from the classical garden traditions. At Parc André-Citroën a matrix of rectilinear forms determines the geometry of the park and its spatial composition. Moreover, this park is carefully partitioned into different spaces or ‘rooms’ detailed in varying forms of naturalness, echoing the formal French classical gardens in which nature was dissected into formal categories such as the parterre, tapis vert and woodlands. At Parc de la Villette, the nodal geometry of the folie grid can be seen as a similar interpretation of nature from the classical garden tradition, in this case an abstraction of nature via numbers, dimensions
and ordering developed in renaissance thought and artistry. This conception of nature is also evident in the figures of the Prairie du Circle and the Prairie du Triangle, two fields of similar size, forming together with the rectangular footprint of the Cité des Sciences an enormous diagram of elementary geometric forms.

**Emblems of nature**
Metaphor and symbol used in the classical garden tradition also figure prominently in the representation of nature in these parks. The gardens in the Parc de la Villette evoke images of exotic or native landscapes, as for example the *bosco* of bamboo in the Jardin des bambous evoking a primeval forest, or the vines and climbing plants in the Jardin de la treille, referencing orchards or allotment gardens. Similarly, the gardens at Parc André-Citroën symbolise the rich tradition of horticulture in France through elaborate planting designs and symbolic references. This use of metaphor and symbols depicting nature had not been seen in urban parks for much of the twentieth century, which were rather characterised by an increasing absence of expressive form. Planting design in parks for instance, which in the nineteenth-century park had an independent role in the design, arising out of horticultural traditions and embodying pantheistic ideals about nature, became progressively marginalised in park design, serving only to demarcate and organise park functions, or sometimes to simulate botanic communities for ecological purposes [6].

**The material presence of nature**
Conceptions of nature in these parks however, go further than can be clarified through the lens of abstractions of nature from the classical design tradition. The Jardin de la Bibliothèque nationale [National Library garden] is located in a sequence of large urban voids along the river Seine including Place de la Concorde, Champs de Mars, Invalides, and Parc de Bercy. The library buildings are assembled around a large central garden, where everything is subordinate to the dominating image of a primordial forest, achieved
by transplanting a complete fragment of the Fôret de Bord in Normandy, Scots pines, birches, and oaks in a carpet of heather and ferns. The garden is sunken into a raised podium, from where escalators descend halfway into the garden. Here a platform, like a balcony overlooking the garden, accesses the library. From the lower level inside the building, the trees obscure the view to the facades, making the garden appear as part of an unbounded landscape space. The visitor, however, remains outside the garden, separated by the glass facade. The inaccessibility of the garden proper enhances the effect of wilderness, nature untouched by man.

A similar iteration of nature can be found in the Rue de Meaux, the central garden for a housing complex in the city centre. The form is entirely blurred for the benefit of the richness of its materials and texture. The birch forest represents an intensified version of nature, suggesting a primordial nature that has always existed on this location. It is a potent image: nature transposed to the urbanised context, with natural nature replaced by artificial nature, mimicking the natural processes. Nature is represented as a creative force for the city. It is the continuous change of natural growth that determines the design, not the design as a final product, as a fait accompli.

The sensorial perception of nature

While the emphasis used to be on visual experience, in contemporary parks and especially gardens, multi-sensory perception gets more relevance. At Parc André-Citroën, a large part of the park is taken up by a series of thematic gardens based on the sensorial aspects of nature, small, enclosed gardens, where colour, scent, sound and haptic stimuli are amply used, generating intense sensorial experiences. The individual relationship of the visitor to the gardens alters with each garden, one being viewed from a balcony, another from a route, and a third from a self-contained space seen from the inside. Different slopes and material underfoot
address the sense of body balance, and plants have various textures and scents. Similarly, at Parc de la Villette the gardens lining the garden walk represent the introduction of nature in the park via sensory qualities of nature. The most elaborate expression of a sensory garden in the Parc de la Villette is the Jardin des bambous. Its designer Alexander Chemetoff lowered the garden into the ground to literally escape Tschumi’s sequential imagery concept devised for the gardens [7], not only allowing it to escape from the fleeting experience of sequential (visual) images above, but also creating an enclosure in which sensorial perception can be developed. When descending, the sound of cascades that accompany the monumental staircase gradually drowns out that of the outside world. The stairs lead to a circular room with high stucco walls, a break in between the active world of the park and the relaxation of the garden, with artificial frog sounds aurally enlarging the distance between the urban sounds of the park and the natural sounds of the garden. A narrow path on a steel grid under which one can hear (but not see) the water flowing, leads the visitor through the dense bamboo foliage while ducking under the sewer pipes running through the garden. It is warmer and more humid than above ground and the sound of flowing and rippling water is everywhere. The garden presents itself as one of the visual images in the park: an abundance of bamboo, while the details remain hidden. Within the garden, however, there is no overview, and auditory and haptic stimuli complement the visual, with emphasis on the earthly aspects. Within the scope of this garden multisensory integration of nature is brought into play.

Nature as process
The elaboration of nature as process that was touched upon in the Rue de Meaux can also be seen in specific parts of Parc André-Citroën. Gilles Clément, one of the designers of the park, envisaged the park design chiefly as the ‘dynamic management of spontaneous vegetation’ rather than a ‘static visual order’ [8]. (This radical vision was somewhat compromised
in the realised park.) Alain Provost, stated that to merit its title of ‘park’ it was ‘[…] based on the strong and indispensable presence of water, the controlled dynamism of the earth and the rhythm of vegetation’ [9]. The realisation of Clément’s vision for the dynamism of nature was brought back to his design for the Jardin en Mouvement, a constantly changing landscape responding to abiotic, biotic and environmental processes, with a minimum of intervention or regulation. This garden lies at the edge of the park, next to the river, following the principle of a progression from natural (the river) to artificial (the city). In the garden the paths shift each year, adapting to a spontaneous spread of seeds, causing a continuous modification of circulation and vegetation.

The network of parks and gardens in Paris
From the sixteenth century onwards, castles had been built along the River Seine, which were then enlarged and reorganised, dominated by the creation of avenues as spatial axes, connecting the gardens into an all-embracing system. Thus incorporated in the urban fabric, the gardens were transformed into urban parks, organised around the river as a backbone. Thus, the basis was laid for the landscape identity of Paris in the seventeenth century, formalised in the system of avenues, gardens and parks. In the nineteenth century a new network was superimposed on this system, made up of urban avenues, promenades and boulevards, linked to a system of parks, public gardens, and green squares, and incorporating former hunting forests. The Seine—extended with the canals St.Martin, Bassin de l’Arsenal and Bassin de la Villette—remained the backbone of the system but the axial system faded away, to be replaced by a network of overlaps and confrontations between the seventeenth-century formal network and the contemporary urban network. The parks and gardens realised between 1980 and 2000 form part of this growing network of interconnected public open spaces [10]. The origins of Parc de la Villette and Parc André-Citroën, as brownfield parks projected onto derelict industrial sites,
was repeated on a larger scale. With the canals losing their industrial function in the twentieth century, they were transformed into the threads of this extended green infrastructure. These new facilities each express nature in different ways, which, when viewed as a collection, address the range of expressions of nature.

The parks and gardens in Paris are an example of an architectural interpretation of a network that permeates the whole city. They represent a green infrastructural network made up of a layering of historical and contemporary elements connected in compound ways, but not necessarily always physically connected. The new parks and gardens of the late twentieth century each had a different focus, which, when viewed as a collection, address a range of conceptions of nature, which not only determined the form of the parks, but also the way they are connected and interrelated within the urban system.

**Super-nature**
The value of the green network is not so much its interconnectedness, but the multiplicity of conceptions of nature it offers, as an array of interpretations and representations of nature, all derived from human perception and use, and thus can be appreciated in different ways. From the Parisian case study, we can see that the completeness of representations and elaborations of nature can be dissected and spread out over different constructed landscapes in the city, and it is the green infrastructure as a whole, which unites them.

The different conceptions of nature range from abstract geometry to nature brought close to man, the embodied experience of the dynamics of nature. The sensory qualities—the sound and spray of water or the sharpness of bamboo leaves touching the skin, the change in equilibrium and muscle tension when descending under the surface of the earth—add to the visual image. In her research on 20th-century landscape architecture *Supernatur*, Malene Hauxner introduced the notion of super-nature into the
landscape architecture debate. She used the notion as an intensified and superior version of nature, deeply embedded in history, culture and technology, and bringing together the architectural and the ecological view of the 20th century [12]. The abundance of nature and natural processes determines its own architectural language, not in the first place an artificial—artistic—reflection of nature, but an artificial reflection of nature, which in itself has become as much artificial as natural.

In the design of super-nature, the eye as the primary perceptive instrument seems to become, not so much replaced, but rather supplemented by the other senses, by the body’s immersion in the world, guided by emotions, interaction, performance, ‘things’, technology, experience, the feeling that a place can evoke. The articulation of sound, light, humidity, colour, texture, and height differences can create a multi-sensory experience, which emphasizes the image of nature and involves a ‘feeling of being surrounded by or infused with an enveloping, engaging tactility’ [13]. To be fully engaged with nature, means more than to look and listen: we come into more visceral and immediate contact with it. Addressing the proximate senses like smell and touch reduces the physical distance between us and nature to zero, and nature, as the object of appreciation, dissolves as a separate and distant thing, and becomes inextricably intermingled with the perceiver [14]. Translated in the design of gardens, parks and the green structures which might connect them, this then becomes a critical aspect of landscape architecture.

In conclusion, public green spaces are both dwelling places—architectural spaces—and representations of natural space, synthesizing architecture and nature. Rather than designing architectural spaces (gardens) on the one hand and spatially undefined landscapes on the other (green infrastructures), as an interrelated system they can be conceived as a means of returning nature to the scope of human perception.
Endnotes


Power And Accessibility In Landscape Areas

As we often hear in sociology, it is said that the most effective factor when it comes to generating power in communities is ‘knowledge’. For centuries, the freedom of ‘accessibility’ to information has been one of the most important contributors in determining the power balance between people. In public spaces, the situation is not very different. When use of a public space is assessed, information can be analysed primarily by accessing the place and then implementing effective program changes related to it.

Following the modernisation process, accessibility in multicultural metropolises has become a serious problem. Multiculturalism leads to a variety of changes in cities and impacts on public spaces, as can be seen when examined on a time space scale. According to Rotenberg, societies give different responses according to different variables [3]. To create equally accessible areas, firstly, we may need to understand these different responses to accessibility in landscape areas.

Accessibility in landscape areas can be observed in both physical and mental terms: physical limits imposed by the design may leave users unable to access the place, and various socio-economic obstacles cause limitations in terms of access to the area [4].

To expand on this further:
1. The landscape view can change through both programme and material exchange.
2. The landscape concept/programme schedule changes but the landscape view does not.
3. Landscape material/view changes but the programme schedule stays the same [4].

Rapidly increasing population in metropolitan areas brings the inevitable need for change in public spaces. In the process of such change, during the redesign of public landscapes, some problems may arise between the landscape perception and its actual use if the space and user analyses are not carefully considered, and decisions are not taken ethically. In other words, there may be some disconnections between the landscape of the user’s mind and the reality.
of the landscape. These disconnections can be presented as a good reason for restrictions on physical and mental accessibility.

**Urban Intervention Process And It’s Effects In Turkey**

In the post-industrial period we are in, some fields have lost their function following the modernisation process, and as a result of changing and developing technology. In this context, various urban transformation projects have begun in Turkey.

The Prime Minister of the period Recep Tayyip Erdoğan presented, ‘The Urban Transformation and Development Regulation Bill (UTDRB)’, in 2005, giving reasons such as; “The old urban texture of the central districts of the cities and their need to protect their cultural heritage lead to problems in the rapidly developing urbanisation process and threaten the security of the life and property of the society, due to the aging and neglect of the buildings, and lack of environmental controls.” [6].

Since the adoption of the UTDRB, municipalities have been given more effective powers than the normal expropriation process, so that the Bill can ensure rapid, effective progress. These powers were supported by the collaboration of various government units (the Board of Housing Administration, Council of Ministers) with the ‘UTDRB on the Transformation Fields’, just after the Bill’s implementation. On 16th May 2012, powers allocated to the administrative authorities were significantly increased, as a result of the ‘Draft Law on Transforming Areas under Disaster Relations’, and projects which focus on rent and gentrification are seen as contradictory to the “…materials to protect and preserve cultural heritage, by expanding the areas of social facilities” [7], which have become established as the most basic justification for the changes.

After these projects, especially in areas where neighbourhood experience has been
comprehensively observed, people have been subjected to very sharp changes and transformations in a short space of time. This situation, recognised by experts from local municipalities, chambers of commerce academics, etc., has been repeatedly objected to, in relation to the UTDRB. Despite all these objections, however, areas continue to be opened up to mass housing projects, through the division of conversion zones.

Another situation that is observed in the transformation areas is the use of identification methods. What is described here is the destruction of the cultural values referred to in the preservation order in the 2005 UTDRB, and the subsequent alienation of local users. The user is deprived of a number of items that have become part of everyday life, with the destruction of symbolic structures or open spaces in the conversion areas. The fact is that these projects appeal to new users more than to local users, and this can cause inter-community divisions and identity conflicts.

In Turkey, the Fikirtepe neighbourhood of the Kadıköy district and the İncirköy and Gümüşsuyu neighbourhoods in the district of Beykoz, which are to be transformed by UTDRB - the implementation process is still ongoing - are examples of these two different situations which restrict the use of public space.

**Case Study**

1. *Fikirtepe Urban Transformation Area (Futa)*

The Fikirtepe Neighbourhood is located in the Kadıköy district of Istanbul and has a 131 hectare area designated by the Istanbul Metropolitan Municipality (IMM) as an ‘Earthquake-Focused Urban Transformation Area’, due to the fact that most of the residences have slum status and vandalism is a frequent issue in the neighbourhood. IMM and the Ministry of Environment and Urbanization (EUM) form the decision-making authority related to the project. Since the announcement, a number of lawsuits relating to the project have been filed by the Municipality of Kadıköy, experts, chambers of commerce and local people.
Almost all the FUTA is divided into parcels have been opened to the development of mass housing projects. The most common problem with the region is that after land has been swiftly removed from the citizens by the decision of the ‘Urgent Expropriation’ project for Fikirtepe by the EUM, projects take a long time to complete. In the project masterplan, approved in June 2016, there are 40 mass housing projects in total, of which 6 have been approved by the Ministry and construction has started, 27 are at the proposal stage, and 7 are at the planning stage (Figure I). In these mass housing projects, apartment prices can reach 1 million TL (approximately $US 280,000).

In this region, where a slum situation exists, a rationalisation along these lines is contradictory to the economic situation of the local people. A number of real estate offices were opened in the region for the sale of these projects, contrary to the identity of the neighbourhood, running slogans such as ‘One step to the life of your dreams’, ‘The heart of Istanbul is beating on your side’, ‘New favourite of the city: New Fikirtepe’ (Image 1). These mottos are examples of the gentrification intended for the area. It is almost impossible for the Fikirtepe people, who have been living at slum-level for years, to adapt to this identity change, socially and economically, in such a short period of time.

These projects, which do not have any identity integrity with Fikirtepe, have been filed against several times because of their rent-focused changes, completion times, disruptions to the local environment, and items that do not fit the needs programme. In an interview with Kadıköy Municipality President, Aykut Nuhoğlu, he stated that ‘The Kadıköy Municipality was ignored by the Ministry in Fikirtepe, and despite the objections made, the work was continued by the IMM and the EUM on the grounds that they could not do anything other than to try to control this situation as much as possible’ [2]. Prior to this, some of the landowners in Fikirtepe protested against the construction company they
had been awarded the contract, on the grounds that they did not rebuild their properties [Url4]. This demonstrates the dominant power of the government in FUTA, and how this administration contradicts the user-participatory design philosophy.

The real obstacle to addressing the landscaping challenges in the region is the physical limitations that are imposed on public spaces by the mass housing developments. It is envisaged that the streets, which were measured as being 40 km in length before the conversion and the increased intensive use of public space, will be decreased to about 23 km (i.e., a reduction of about 50%) by the end of the conversion process (Figure II). Despite the increase in the number of landscaped areas in conjunction with the existing mass housing projects, the fact that these landscapes are included in the site as private property is evidence of the extent to which public space is diminishing (Figure III). In addition, the walls and tall plants surrounding the mass housing projects, also affect the perception of public spaces, by the imposition of physical boundaries and vertical borders (Image II).

These limitations will inevitably lead to fragmentation of the neighbourhood and the community. The shanty houses located next to the mass housing projects, which are incompatible with the neighbourhood texture can be shown as a clear example of the distinctions in the area (Image 3). Floor heights, housing types, material selection, etc., are examples of the many design items included in the conversion area projects that are not compatible with their environment.

All these objections create the impression that FUTA is not intended for Fikirtepe people. Although the borders between the user and the space are psychological, the real problems in Fikirtepe are that landscape areas that appear to be growing in theory are only available to specific users in practice, and there has been a creation of anti-democratic landscapes by the disruption of the power balance between old and new users of
the area and the government.

2. Beykoz Transformation Area
Beykoz is one of the oldest settlements in Istanbul. There are 20 Bosphorus villages in the district, starting from ones at sea level on the western bank of the Bosphorus Strait and extending towards the upper levels. Beykoz Monopoly was founded in the 1920s and the Şişecam Factory was built in 1935, in addition to the Beykoz Leather and Shoe Factory, which remained in the region during the Ottoman period (1810s) under the influence of industry-oriented studies since the first years of the Republic.

Şişecam (Turkey Bottle and Glass Factories Inc.) is a factory which has operated in the Paşabahçe district of the İncirköy Quarter of Istanbul since 1935 (Image 4). With the establishment of the factory, the Paşabahçe district became known for its glass production [Url1]. The factory area was put up for sale by Paşabahçe Inc. in February 2008 after production was stopped in January 2002. In February 2011, the Beykoz Mayor, Yücel Çelikbilek, announced that the factory would be converted into a 7-star hotel by İŞ Investment. Demolition began in 2016 (Image 5) and the plan for the hotel is still in place [Url5].

With the closing of the other factories that contributed to the formation of the identity of the area, the residents’ attachment began to be shaken. Beykoz started to change rapidly with the development of luxury residential housing projects in the upper parts of the district, particularly at the beginning of the 2000’s, the area has taken its most recent blow with the passing of the Bosphorus Law, which instigated change towards rent-oriented use, such as the UTRB. This law, which was passed in 1983, is intended ‘To protect and improve the cultural and historical values and natural beauties of the Bosphorus by taking into consideration the public interest, and to determine and regulate the zoning legislation to be applied to limit structuring that will increase population density in this area’ [5]. The changes were made in January 2015, and the
first step was taken to increase the construction of the basins and floors of the structures on the banks of the Bosphorus, ‘for conversion’ [Url2]. According to the frequently changing legislation, it is inevitable that a distorted structure occurs in the Bosphorus Coastal Strip and Forecast Zone and, in the framework of the laws introduced to prevent such an outcome, there are no buildings registered as ‘houses that are suitable for the Constitutional Plan Decisions’, except the old buildings and residential buildings to be improved for the planned population [1]. Local people are being encouraged to move from the area, according to reports from the residents, citing the case of inability to make any exterior façade modifications in their houses and the prohibition of renovations by law, the rapid increase in title values, and changes in neighbourhood appearance. While this situation continues, luxurious settlement areas in the upper reaches of Beykoz are expanding rapidly, and there is a change of identity in terms of the upper elevations to the shore.

This change is undoubtedly reflected in the public landscapes as well. Improvements in the quality of landscaping has been made in Beykoz, and there has been a change in the user population. The Beykoz Marina Project is an example of such an improvement initiated with the motto of ‘Converting Beykoz to a Contemporary City Image’. The project, which was announced to the public by Beykoz Municipality in February 2014, was planned with the purpose of converting the approximately 44,630 m² coastline into a marina [Url3]. The buildings planned for the project, including a hotel and shopping mall, are remarkable. The cafés and restaurants developed around the marina area and are constructed in a design that is complementary to the existing appearance of the area (Image 6), and it is thought that this project intends to implement changes that focus on rent value and gentrification in Beykoz. It is also remarkable that the coastal arrangements were not made in the boundaries of the İncirköy neighbourhood, which is frequently used by the men of the
neighbourhood, and which is not perceived to be a safe area due to levels of alcohol consumption (Figure 4). When we examine Figure 4, we can see that the boundaries of the Gümüşsuyu Neighbourhood, where the numbers of luxury houses are increasing rapidly and where there are no construction permits, overlap with the marina project, involving the coastal landscaping. The İncirköy neighbourhood borders, where local users are being forced to move to, require construction permits by Bosphorus Law, along with the fishermen’s shelters area and the factory which is planned to be converted into a hotel. The cable car project, which is planned to pass through the middle of these two coastal areas, each with different design features, adds a new dimension to the borders of the region (Image 7, Image 8).

When all these components are taken into consideration, we can clearly see the change of identity intended for the Beykoz coast. An old Şişecam worker, asked about the idea of the Beykoz Marina Project, answered, ‘They do not do this for us anyway, we do not have enough money to live here anymore. They will not let us live here!’, exemplifying the psychological barriers between the coastal area development and local users. In other words, the main reason for the use of public space and the user change in the Beykoz region is the ‘othering’ of local people through the exercise of management and high stratum power. This sense of ‘otherness’ shakes the user’s sense of belonging, and subsequently affects the use of public landscaping.

**Conclusion And Recommendations**

Within the scope of the study, two different typology transformation projects which provide examples of urban interventions in Istanbul have been examined. Physical accessibility is restricted by the violation of public space by mass housing projects in the FUTA. With the development of these projects after conversion of the district, landscape view changes as a result of in-house material transformation, as well as through
programme change through the reduction in public space. Subsequently, the perception of the landscape by the local users shifts. The involvement of users in the planning and implementation phase of FUTA is crucial for the future use of the field. Furthermore, instead of planning domain plots independently of each other in such large scale transformation projects, it is necessary to start the project from the urban scale and be related to its surroundings and be considered as a whole within itself. Alternative to closing the streets in the public space situation, creating a common space which is appropriate to the area of the area and the user population, where the residents can spend time together, should be offered.

In the Beykoz region, this situation creates psychological borders in terms of the restriction in accessibility between users, and the development of public areas which serve to increase the power of high-income earners and management, as improvements to public spaces are implemented. In other words, while the landscape view is changing, and the programme scheme remains fixed, the actual use of the landscape on a daily basis is decreasing, because the place attachment of the users is impacted. The approach to the symbolic representations of space belonging as in Beykoz example is extremely important in the transformation process. Items such as the Şişecam factory which have a place in city memory should be gained to the design by evaluating the effects on the region's identity. In addition, a holistic coastal landscape should be planned in the coastal lane which can address both different user segments, taking into account the fish culture in the shelter zone. This will protect the integrity of the texture in the region by alleviating the “otherness” feeling of the local population residing in Beykoz on the landscape scale.

As we can see in the two examples above, nowadays, since landscape architecture has a serious voice in city planning, it is necessary to refer to it also as a cultivator factor. Landscape architecture, which concerns the transition from social space to physical space, can affect the
social environment via the changes that it brings to the physical space. Landscape architects must carefully analyse the other power elements in these spaces beforehand, as well as the elements that can trigger barriers and fragmentations in communities, with the aim of establishing a balance between forces. In the modern era, the task of designers must be to protect not only the physical and aesthetic qualities of the area, but also the social integrity. In sum, landscape architects can positively address the social life of communities by analysing the destructive and constructive effects of design power in the creation process.

References
Laws And Decisions.

Online References
[Url7] Image source: http://dostbeykoz.com/beykoz-sise-cam-fabrikasi-kimin-
Figure 1: Fikirtepe Urban Transformation Project Planned Mass Housing Projects Chart

Image 1: “A step left in your dream life” “Brooklyn Dream” advertising panels
Figure II – III: Fikirtepe Urban Transformation Project Street Texture Change
Image II: Boundaries between mass housing landscapes and public space

Image 3: Mass housing projects incompatible with neighborhood texture
Image 4: Paşabahçe Şişecam Factory 05/05/08 before its demolition [Link6]

Image 5: Paşabahçe Şişecam Factory 25/05/2017 after its demolition [Link7]
Figure 4: Beykoz Marine Project, Paşabahçe Factory Project and Cable Car Project Relationship Map

Image 6: Examples of newly opened cafes and boat restaurants in Beykoz region
Image 7: Fisherman's shelters and marine project

Image 8: Parking lot as a boundary between fisherman's shelters and marine project
Introduction
The descriptions of the gardens and the landscapes made by Italo Calvino are astonishing for the high level of interpretation. The Baron in the Trees can be considered a landscape poem, epic and far-reaching. Invisible cities and other novels represent his reflections on ecological issues. In The Road to San Giovanni and in the writings on Kyoto gardens, there are high-definition landscape readings made with a sensitivity which is close to some contemporary landscape languages.

The assumption of the research I conducted [1] is to consider the work of Calvino as particularly significant within landscape studies, especially for both the reading and descriptive forms and also for the creative process, where he has used many tools similar to those of a landscape architect.

Literature, like other arts, is often a source of reflection for the landscape architect and for his project design. On the other hand, surely every literature contains a historically defined landscape description, such as a story of places, as a social or historical framework, or as a psychological integration of the characters. Many have worked on this relationship, both from a literary vision and in the further investigation of landscape issues. From a literary perspective some have analysed the role and representation of the landscape, as James M. Mellard (1996) that has been questioning “a theory of how we use ‘landscape’ to make meaning in literary discourse”. Steven Siddall (2009) has worked on the importance of such categories as ‘pastoral’, the city-country contrast, the passage from neoclassical to picturesque in English-language literature. Robert MacFarlane (2012) has extended these arguments to the relationships with different forms of art. A more interior-minded approach to our discipline comes from Michael Jakob (2005) who, in an attempt to define literary landscape, rebuilds a history of forms and ideas through literature.
Calvino: An Involuntary Landscaper

If, habitually, in literature the landscape is a contextual element of the story, in Calvino there is an explicit will to construct and design landscapes, sometimes figurative, sometimes only mental. These landscape forms have the value of a conceptual, social and physical proposals. Sometimes they are landscapes of nostalgia. Other times, they are proposals for contemporaneity, in-between an answer to the problems of a society and the proposition of an aesthetic. ‘An involuntary landscape architect’, as Andrea Di Salvo said.

We must note that he almost chooses outdoor locations for narrations: the natural or urban spaces are the favourite places of the people and the communities within his stories. Such description of the landscape elements acquires profound scientific knowledge. In The Path to the Nest of Spiders (1947), he describes these ‘landscapes of war’ and the plants where the partisans were hidden hide in that ‘landscape of war’ using the scientific names. Similarly, the barks of the trees, the shadows and the foliage of the Baron’s woods are described with the precision of a botanist.

Landscape description is never a simple backdrop of the scene. Landscape becomes one of the protagonists of the novel, a kind of ‘media’ that communicates other layers of the story. Sometimes, in these landscapes, nature is consoling, sometimes is dramatic or malevolent, as in Marcovaldo (1963).

A Life Between Plants, Scientists And Gardeners

Calvino was born in an experimental botanical centre in Cuba and grew up in Liguria, in Sanremo, a city close to France, that is famous for its gardens (ex. Hanbury). Calvino’s parents, Mario Calvino and Eva Mameli, were the most important agronomists and botanists of the early XX century. They were ‘garden scientists’, travellers, investigators, communicators and promoters of the introduction of many exotic species for food and ornamental purposes. Mario devoted his existence to the development
of the countryside in Liguria. He created the basics of modern floriculture, working on the transformation of archaic agriculture into a modern one, impacting on both social and productive domains. After the war he worked for the newborn Republic of Italy for an Agrarian Reform that unfortunately never saw the light. Likewise, his mother Eva was the first female university professor in botanical studies. A pure scientist, whose DNA perhaps is at the base of Calvino’s scientific approach in writing. I think of Palomar, who is permeated by this analytic ability to analyse and recompose phenomena. Together, Mario and Eva were two protagonists of the landscape history of this region. They have written numerous treatises and articles and founded some journals, such as Giardino Fiorito. Furthermore, Libereso Guglielmi, who grew up with Italo in this family. He was firstly their gardener, then gardener around the world, a long-term head gardener at Myddleton Botanical Garden, researcher at the University of London. He was also a writer, botanical illustrator, hybridizer and acclimatizer.

**Three Short Essays**

There are some short essays where Calvino’s landscape reasoning becomes explicit. In 1964, he writes an a posteriori argument on the role of the landscape in the literature of Italian Neorealism [2]. He sustains that the greatest Italian authors expressed themselves and the historical phase through the specificities of their regional landscapes. So, the ‘global’ values of Resistance were blended with ‘local’ peculiarities.

In 1965 [3], he speaks about the landscape as a “composition of elements and relationships”. Calvino uses the term ‘composition’, which in Italian describes the highest level of design and artistic activities. He argues that the Baron in the trees contains “another sublime book, of a nostalgic evocation of a landscape, or rather: a pretty re-invention of a landscape through the composition, magnification and multiplication of scattered elements of memory”.

In Hypothesis of landscape description [4] he introduces the question of the different values
of the time in the description of the landscape as the impossibility to determine a static image, almost like in the landscape representations in Leonardo da Vinci: there is the time of landscape development, the time of reading and the time of description.

**Calvino In The Trees - A Landscape Poem For A New Society Based On Trees**

Inside my research The Baron in the Trees acquires certainly a prominent role. Aside from the ethical and philosophical contents, the life phases of the young Baron Cosimo are similar, in many elements, to the landscape architect’s experience and education. Landscape knowledge coincides with the adolescent phase, in which he explores the knowledge of the world of trees. Then, during youth and maturity, Cosimo works to transform the landscape, from above, creating his own habitat and collaborating with peasants and citizens.

He collaborates with the ‘neighbouring disciplines’, prefiguring large transformations of water resources, creating aqueducts and basins and increasing soil fertility. Finally, Cosimo predicts the construction of the Republic of Arborea, a ‘society among the trees’. A forest-city resembling an architectural structure, where trees assume structuring value.

Cosimo as Fourier (on which he wrote three essays) moves within a social utopia and describes the idea of a nature-based society for righteous men. A future society between the trees, not antagonistic, but parallel, sister and accomplice of that on Earth. The Baron is not an isolated bon sauvage. He lives in the society and is a part of it, but in a different position, with an alternative perspective and with the distance needed to better understand the world. How many treetop walkways and tree houses villages can we see in all landscape architecture websites?

This novel also describes one of the most significant steps in landscape history. It was 1767 Cosimo, twelve-year-old boy, climbs up a tree to spend the rest of his life inhabiting an arboreal kingdom. He grew up in a tipical Italian
formal garden, while his beloved Viola, daughter of disciple of Linneaus, lived in an innovative garden, clearly Romantic and exotic, which plants are unknown to Cosimo, for their shapes, colours and smells. Cosimo’s adhesion toward her garden represents his interest for a new and illuminated society, moving away from the more conservative ideals represented by his family. In this passage of the story we can understand also references to the history of colonialism and plant journeys, starting from The Plant Hunters by Michael T. Whittle (1970) to Flower Hunters by Mary and John Bribbin (2008) and passing through the project of Bernard Lassus at Rochefort-sur-Mer.

Ecological Metaphors
In Calvino is ever present a strong concern about the fate of modern society. The awareness of the coincidence between the prevalence of economic interests with the progressive deterioration of habitat is explicit, but, contrary to the most dramatic expressions of Pasolini, Calvino prefers the instrument of narrative metaphor. For example the geometries of insects, tightening and suffocating, in The Argentine Ant (1952), or the transformations of the toxic cloud’s in Smog (1958), which pervade places and thoughts. Ants and cloud have autonomous life as the human protagonists, and represent the interruption of the positive relationships between man and nature.

In the book of Building Speculation (1963), the garden is the tragic and comic counterweight of a common affair in Italy in the 1950s. The soil consumption and the devastation of the territory, which have been later denounced by Insolera, Cederna and others, previously and clearly appeared in this book: the bourgeoisie in financial need, the desire of speculating, the inefficiency of administration to manage the territory transformations. Similarly, Marcovaldo (1962), and the Invisible Cities (1972), represent a rising awareness regarding ecological issues.

INVISIBLE CITIES, VISIBLE LANDSCAPES
Calvino speaks about Invisible Cities as the text that best represents himself, he said “It gave
me the greatest chance to express the tension between geometric rationality and the tangle of human existences”. Apart from reflection regarding ecological issues, Cities are creative tools, “a network metaphor, crossable in different directions” (Belpoliti, 1996). Every city, beautiful or desperate, always contains its opposite. “You have to understand how the city is made and how it can be re-made”.

There are almost claustrophobic landscapes of ‘non-place’ cities, and Calvino uses the term terreno vago, terrain vague, and speaks of “abandoned areas”. For instance, Pentesilea represents the loss of orientation due to the infinite urban sprawl; or Leonia, with its continuous demolition and reconstruction. Others represent an ideal of urban utopia. Ottavia, the symbol of delicacy due to the equilibrium that sustains it; Andria, which perfectly combines tradition and innovation thanks to the advice of the stars; or Olinda, which always grows, reproducing the qualities of its original nucleus.

Cities are ‘invisible’ because they are pure abstract drawing, and are visible only through the imagination or mind. Cities are sometimes described almost with a deductive process, from general to particular, from broader to finer scale. Other times, on the contrary, landscape details give meaning to the cities, as inductive patterns that generate urban structures. They are palpable landscapes only with thought. As they are incongruous, it is impossible to draw them in their entirety; they are more descriptive in their parts or in the concepts that they express. In my opinion behind the Cities there are Mumford and Choay, Lynch and McHarg, maybe even Venturi. In the Cities, and in many of his works, we can find an explicit political position, which coincides with an ethical tension towards a ‘non-anthropocentric humanism’ (Milanini, 1990), aimed at improving the conditions of human life.
Calvino In Kyoto

The reading of the Japanese gardens is surprising, due to the deep and clear method that he used to reconstruct the main elements of the garden design process[5]. Apart from the beauty of the descriptions of plants and architectures, Calvino establishes a strong link between garden writing and poetic writing, which recalls the relationship between the landscape and its representation, or between paintings of landscape and real landscape:

There is one thing that seems to be understandable here in Kyoto: [...] The construction of a nature that can be mastered by the mind, so that the mind can in turn receive a sense of rhythm and proportion from nature [...] it occurs to me that poetry and gardens generate each other in turn: the gardens were created as illustrations for poems and the poems were composed as a commentary on the gardens.

Once he exceeded the reading of the meanings, he advances through the interpretation of moving into Katsura. Calvino had already highlighted the diversity of this garden in comparison with others in Kyoto. Here the system of path is the matrix idea, is the “phrase that gives meaning to every word”:

... the path splits into a straight branch and a twisted one; the former comes to a dead end, while the latter continues [...] Every interpretation leaves dissatisfied [...] The stones are embedded in moss, and are flat, separate from each other and set at the right distance so that the person walking always finds one under his foot at each step taken; [...] The garden has been so set out that at each step for one’s gaze meets different perspectives, a different harmony in the distances that separate the bush, the lantern, the maple tree, the hump-backed bridge, the stream.

So the path is a kind of device that allows you to get different perceptions of the same
elements and that works on times of perception. From a continuous reading, we proceeded to a sequence reading, fixed and more detailed, such as ‘discretization’, as we say in representation disciplines, which allows to represent complex organisms through a finite number of equidistant and close-up images.

[...] If there is a correspondence between the points of view and our footsteps, if every time our right or left foot advances on to the next slabs, a perspective opens up; that has been decided by the person who designed the garden, then the infinity of viewpoints is reduced to a finite number of views [...] each one of which corresponds to one necessity and one intention. So here is what the path is: of course it is a device for multiplying the garden, but also for removing it from the vertigo of the infinite. The smooth slabs that make up the path at the villa of Katsura are 1716 in number [...] so one can go through the garden in 1716 steps and contemplate it from 1716 perspectives.

Calvino’s Landscapes. Non-Euclidean Geometries
I conclude with another essential text in our discourse, From the Opaque [6], with which we can rebuild Calvino’s lexicon on the landscape project. A lexicon made of complex and never simplified figures and geometries. A choice that clearly marks a distance from any standardization and simplification processes of landscapes carried out by Modernism. A ‘democratic’ vision of sequences that together build a landscape and offer a ‘bird-like’ view, that is a different landscape.

If they had asked me then what shape the word is, I would have said it is a slope, with irregular shifts in height, with protrusion and hollows, so that somehow it’s as if I were always on a balcony, looking out over a balustrade [...] on other balconies or theatre boxes above or below, a theatre whose stage opens on the void, on the high strip of sea [...] the world is arranged on so many balconies irregularly deployed so as to look
out over on great balcony that opens on the void of the air, on the windowsill that is the short strip of the sea against the vast sky ...

He prefers to talk about anomaly elements rather than ordered ones. The only straight line is the horizon while the rest is a composition of broken and discontinuous, diagonal, horizontal and vertical elements. Also visual and prospective axes become complex, almost in search of new spatial dimensions, in an adaptive language, similar to deconstructivism. The language of a sensitive landscape.

I shall therefore start saying that the world is composed up of broken and oblique lines, with segments that tend to extend beyond the corners of each step in the manner of the agaves that often grow at the edge and climb in vertical lines like palms that provide shade to the gardens or terraces overlooking those where the roots of the plants are planted ...

Then, passing through a reflection about the dimensions of space, Calvino conceives a unique terraced landscape-world: from the top of the hill, through the terraces to the sea and to the broader gulfs. Through the reading of ‘landscape units’, he identifies the elements that can give a finite dimension, embraceable by eyes, to theoretically infinite systems. The lateral margins are the physical and perceptible ones, the background is the hill behind and the horizon is the audience, where this landscape becomes a theatre.

So if they had asked me how many dimensions space has [...] if I were to answer on the basis of what I really learnt by looking around me, about the three dimensions which with standing in the middle of them turn out to be six dimension, [but selecting them] or one can have it continues on the far side like a good isoheight following the series of inlets and bays and the hollows within these inlets and bays, until it encounters promontories that advance further into the sea than other promontories, defining larger bays which enclose the inner bays and other bays [...]
stretching out to enclose the whole sea in a single bay,

so that one may as well take the shape of the world to be that of the bay I have before my eyes, define by headland to the east of me and the headland to the west [...] whatever it is that limits my vision to one side and the other, ridge of a hill, trunk o fan olive tree, cylindrical surface of a cement tank, juniper hedge, araucaria, sunshade, or whatever happens to form the two curtains that define the stage upon which I find myself, a tall backdrop behind me, the footlights of a bright horizon in front.

Endnotes

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Abstract

Any strategy of thought about the complexity of the idea of the city forces us to establish diverse routes, retracing proposals from art and architecture that have been put forward in recent decades. We will pause to consider some of them, which, located on the imprecise limits of sculpture, architecture, landscaped and art, and maybe more easily to define by their negative state, end up seeming more evocative for use in the contemporary city project, and specially in their public spaces. Why public spaces are not considered as possible canvases where contemporary artistic expression can be carried out, instead of just the usual pieces of sculpture unconnected to the urban environments in which they are found, so ending up as little more than residual or chance elements? Nevertheless, there are occasions when the public spaces features artistic interventions that are reflective in nature or linked to artistic transference, and they provoke users or spectators a creative reaction, and action. Only with the start of its inhabitants’ activity and sensorial experience in the urban network can we verify the pulse and the latency of the city as an organism, or extensions of the lives lived in them and need to be considered as urban stages for collective life, ready to be filled with individual and communal experiences. Artistic performances would allow the public spaces to become closer to its inhabitants, bringing value to the recovery of public spaces from sensibilities, which don’t strictly derive from the architectural “discipline”, avoiding the character of decorative feature that they are currently given. Through the work of artists and architects like Mary Miss, Martha Schwartz, Christo and Jeanne – Claude, and Jaume Plensa, the text will visualize some experiences located in those diffuse limits.
As a starting point, we are going to work in the idea that every city is born depersonalized and, only with the start of its inhabitants’ activity in the urban network can we verify its pulse and its latency as an organism. Just as buildings justify their function with the habitability and comfort that they provide, so cities are extensions of the lives lived in them and need to be considered as urban stages for collective life, ready to be filled with individual and communal experiences. The origin of the comfort and the kindness of these cities is found in the correct interaction of certain factors, among which it is necessary to highlight the artistic component since it offers us a common denominator of the society that it hosts. Artistic performances would allow the city to become closer to its inhabitants, bringing value to the recovery of public spaces from sensibilities, which don’t strictly derive from the architectural or urbanism “disciplines”, avoiding the character of decorative feature that they are currently given. The work of Jaume Plensa, *The Crown Fountain*, located in Millennium Park, Chicago, is useful for helping us to visualise this coming together of art and architecture keeping it in mind when it comes to planning the city of the future. In the origins of this work, the artist asks himself, “*What is a fountain? How can it be relevant to the people that look at it?***[2] These questions are present in the work of the artist. Focused on human experience, not only from the sensory point of view, but also in its temporal relationship with history, of the past with the present, and of the present toward the future, the artist decided to maintain in the collective memory the historic fountain that was always in this place: a meeting place where you could get water, the main substance needed for life. Why not maintain this essential feature of the place and bring a new experience to it? Located in Millennium Park in Chicago, near the bustling Michigan Avenue, surrounded on one side by skyscrapers but also surrounded by trees that bring a certain serenity, two fifty-foot-high glass screens joined by a black granite pool that is scarcely an eighth of an
inch deep, it provides a new dialogue with the city. The two towers are the main elements that establish a duality, a commitment to constant but changing dialogue with the citizens, by means of thousand conversations with residents of Chicago. The artist only allows us to see their faces, transforming them into gargoyles, which shoot water from their lips, playing with the evocative idea that we are the creators of life. Plensa also allows the observer to become part of the work, as they are able to walk through the granite pool. The sound of the water and the footsteps of the people are also elements that make up the installation. The artist emphasises communication, conversation and interaction, understanding that these must be the preeminent actors in the public space.

Perhaps with the same curiosity, we should ask ourselves what public space is, this place that is so acclaimed in cities nowadays by their administrations, but largely put to the service of capital, with little value from an urban point of view and none for appropriation by citizens. As Antonio Miranda tells us in the prologue of Manuel Delgado’s book _The public space as ideology_ [3]: “As is already known, with buildings of “round form” - like isolated houses or isolated blocks – the civil space for meeting and synergy, the truly common and political space, the public space of quality remains definitively excluded. And all architecture that doesn’t build the city is false architecture or architecture without truth, that is to say, of very low quality (…) Only in this way will the public space be made into a true panhuman space-time continuum: a universal modernity of truth[4].

With the above in mind, we propose a search on the imprecise borders of arts and to translate the fruit of this conversation to what we have commonly named public spaces, thus giving them urbanity[5], an urban sense that has been lost in the modern society of consumption and globalization.
Retracing The Expanded Field: Translations From De Art Of The 70S To The Public Spaces Of Nowadays.

Architecture has been the field in which the majority of interdisciplinary debates have taken place, involving the visual arts with the development that has happened over the last three decades. In 1979, Rosalind Krauss wrote the essay “Sculpture in the Expanded Field”, published for the first time in the review *October, Vol. 8*, where the historian positioned herself against the irregular blindness of artistic practices, via a diagram in which she established structural oppositions between sculpture, architecture and “landscape art”.

“Expansion, adjacency, convergence, projection, rapport, fold: these are a few of the descriptive terms used to redraw the boundaries between the visual arts and contemporary architecture at the turn of the twenty-first century. If modernist invented the model of an ostensible “synthesis of the arts”, their postmodern progeny promoted the semblance of pluralist fusion”.[7]

These concepts, which are used to describe the works of these years, might be valid as much for describing artistic expression as architectural works. But if we could use them equally to describe our urban surroundings, it would make them richer, from which we could develop individual creativity, not only in artists and architects with their works and projects, but also via the inhabitants of the cities, making them actors in and shapers of the cities by means of their experiences, like in the previously mentioned work by Plensa, *The Crown Fountain*.

The works of artists like Gordon Matta-Clark, Robert Smithson, Robert Morris and Mary Miss explore the interconnections between architecture, sculpture, landscape art and photography in a complex and unpredictable way, still without architecture being their predominant subject. We can mention two of these works: *Partially Buried Woodshed*, by Smithson, 1970, and *Splitting*, by Matta-Clark, 1974. Taking architecture as a starting point, both attack
buildings physically, and take place in a space-time process, both are situated outside of art galleries or museums, becoming part of their surroundings, making the works overcome their physical limits. Partially Buried Woodshed was a work started with students of the School of Arts of Kent: he tipped 20 wheelbarrows of waste on an abandoned woodshed until the principal beam broke. Smithson’s basic idea was to show the principle of entropy: interested in showing the accumulation of history on artistic expression, he created one that would grow in meaning with the passing of time, at the same time that its physical reality diminished until the moment of its disappearance in 1984. With a logic tangential to this, the works of Gordon Matta-Clark suggest another possible way to intervene in cities, by generating new landscapes, and also by taking a physical attack on buildings as their starting point. In the case of Splitting, the work started on a building that was going to be demolished, so producing new interactions between what was built and the city, and generating new experiences in the viewers.

It would be very attractive to be able to introduce these new experiences into our urban landscapes, as proposed in works like Splitting: to break up spaces, to challenge seriousness, to blur the limits between the external and the internal. They would be enriching phenomena and experiences in our cities.

We can look at two works by Robert Morris from the beginning of the sixties: an installation in the Green Gallery in 1964, an almost entirely architectural piece, its status as sculpture is reduced almost to what is in the room, which is really not a room. The other, Untitled (Mirrored boxes), from 1965, is an outside installation made of glass boxes, shapes that are different from the place they are in; so they are visually a continuation of the landscape, though really (in their physical nature), they are not part of the landscape.

The first offers the possibility that this experience
could be translated to the city of today, with elements that invite us to enjoy a walk, simple forms that create spaces to be crossed or to serve as support, departing from the disposition of elements that with relatively simple forms call our attention due to their challenge to seriousness, and for their simple disposition, creating a beautiful dialogue between themselves, in the case of their creation, blurring the limits between sculpture, architecture and modern dance, considering that they were built to support dancers during a performance. The second example interests us precisely because it is located outside the museum space, and, from the extreme simplicity of its forms, enriches the landscape, and, with the use of the mirrored faces of the cubes, the seizing of the surrounding space is, if possible, more poetic and suggestive.

What happened with the trajectory of sculptors from the seventies on is that they started to focus on the exterior limits of terms of exclusion, and sculpture entered a condition of inverse logic. In the same way, with the same logic and with a simple mechanism of inversion, the same polarities can be expressed positively: the not-architecture is just another way of expressing the term landscape, and the not-landscape could be simply architecture. Artists as Christo and Jeanne-Claude, Mary Miss, James Turrell are still working with the same logic, showing as the validity of this position to “create” nowadays.

We can refer to the example of the work *The Gates* by Christo and Jeanne-Claude, an ephemeral work, an experience to be enjoyed by the users of Central Park, who, during the short time the installation was there, could see their everyday space reshaped. This project was dreamt up in 1979, but didn’t come to fruition until 2005, when it was financed from the sale of collages, plans and sketches of the project.\[^{[8]}\]

From the repetition of a simple element and the imposition of a new design on Central Park, the artists managed to transform the place without changing its use, bringing to it a new
sensory experience, both in the relationship that it established with the landscape of the park, as well as with the city, by means of the interaction provoked by the reflections as well as with the introduction of the colour saffron with such intensity.

**Sensing Spaces: Landscape City Reimagined**

(Image 2)

We borrow the title of the exhibition “Sensing spaces: Architecture Reimagined”[9] held at the Royal Academy of Arts in London in 2014 transforming it subtly but conveniently. Although it might seem paradoxical because it took place inside, we are going to use this exhibition as a reference point to deeper investigate deeper the experience that we are proposing for our cities, and also to help us to illustrate the validity of this breaking of the limits between art, architecture and landscape. Beyond the physical limits of where the exhibition took place, what matters to us is its concept, its result, and the possible translation of both to public spaces.

From a concern for the sensory and for the experience of the inhabitants of the architectural spaces, the result is difficult to categorize, meaning we have to return to the terms with which we started this text: expansion, proximity, convergence, understanding, submission and many others that centre themselves on the senses, forgetting use and liveability as the first reason for architecture. These qualities are what we think we can bring to the urban space with the intention of making these places more hospitable for the citizens. Perhaps we should redraw the city in these terms, becoming again to be a base to express the wishes of the citizens and their culture, and being understood as a collective work of art.

The exhibition “Sensing Spaces” plants questions in the minds of its visitors, not solutions: it is an approach to architecture that doesn’t highlight its functional aspects, but instead its experimental
ones, from the point of view of the sensory. Seven architects were invited to show seven works, with the purpose of waking and recalibrating our sensitivity to the space that surrounds us, experimenting with the boundaries between art and architecture. It was in part experiment and in part demonstration, requiring the involvement of the visitors for the result of the exhibition. The visitors were invited to interact, to observe, to move around and through, to occupy, and to feel the installations. During the time the exhibition was on, the historic space of the principal galleries of the Royal Academy was radically transformed and the perception of its space, proportion, light and material were altered in function of the degree of perception and commitment of its visitors, so building an experience as much personal as collective.

The installation by Li Xiaodong that we have chosen to illustrate this lecture, introduced the silence of the forest into the halls of the Royal Academy, by importing a piece of nature which was given to which he gave the architectural form of a maze. It introduced a reflection of nature made of small tree branches, trying to direct the spectators’ movements, while being aware of their desire to disobey. In perception, it involved the senses of touch, sight and smell, moving between those hard-to-define limits. In this case, we understand them as a negation of what they are not, not-architecture, not-sculpture and not-landscape (nature), letting it be the observer who gives the work sense through their experience of it.

We need to look into these interactions and to use concrete proposals to experiment on the contemporary city. These proposals won’t generate models, or even mechanisms, but rather a test of what the city would be like under their premises. In this way, projects like those cited in this article *The Crown Fountain* by Jaume Plensa, *The Gates* by Christo and Jeanne Claude or the installation by Li Xiaodong, would serve as examples of how to intervene in the contemporary city from the point of view of
greater interaction between the “expanded fields”, blurring the limits between them, exploring their boundaries, in which the perception of the citizens and the use of space are what really give them meaning.

We would like to refer to some works that in our perception had made under these premises; revealing the interaction between the expanded fields of art with imprecise and fuzzi limits: architecture, sculpture, land art, performance, theater, and their opposites. The Vietnam Veteran Memorial Monument by Maya Lin, 1982, Washington is a good example of what we are proposing. Fist of all, it is difficult to categorize. In its concept, it is not a monument; it is not a sculpture, due to the scale, the absence of centrality. It could be more defined as a land art work. If we describe it, we would say that they are two perfectly vertical granite black walls, that form a very open “V”, sunken in the earth, saving an artificial slope close to national commemorative monuments. With two simple traces, the work evolves and connects with its surroundings. Its materiality, the intensity of the dark and polished skin of the wall, creates a mirror effect, and over it, the names of the soldiers who died in the Vietnam war, giving a dramatic charge to the piece, and requiring the visitors to interact with it, reading and walking through the new path. (Image 3)

With the water as the main element, we can refer Greenwood Double Sites by Mary Miss, located in the park of the Museum Des Moines Art Center, Iowa. 1989- 1996. A series of paths, structures, pavilions, are evolving the visitor as essential part of the work, provoking an unusual way to relate with the water: a walkaway overhanging the edge of the pond makes it possible to move out over the water, leading you to a ramp, that disappear into the water after getting the visitor down the level of the pound. (Image 4)

In a closer work, in time and place, we can
mention Grand Canal Square, Dublin, Ireland, 2007 by Martha Schwartz. The author creates a new scenography extending a red carpet that connects the theatre with the river. The red pavement is like a canvas, where the strength of the colour and the lines crossing the space reinforced with lights during the night, establishes new relations with the environment, where again people and their movements are essential to complete the scene. “Extending out from the steps of the theatre, the red carpet rolls into the square, spilling the magic of the theatre into the public space and down to the water’s edge. The carpet is made from bright red resin-glass pavings that reflect and capture light during the day. The red pick-up sticks imbedded into the carpet provide dramatic light at night.”

As the authors describe it, they create new “paths of desire”, that are created by the reaction of citizens.

We want finish with the example of a small ephemeral exhibitor Pavilion designed by myself, for an exhibition hold by the Architectural Association of Seville, Spain, 2003. Located in La Plaza de la Encarnación a XIX Century garden, in the Historic Centre of Seville, its bizarre skin, metallic and transparent, together with its curved form, adapted to the garden paths creates new spaces to walk around, in an out of the pavilion, attracted local people to visit it and to know the urban history of the place. It is not a building, it is not architecture and maybe is closer to a piece of sculpture, that take into account the surrounding to take form, but being radical modern in its materiality.

**Conclusion: Sensing Urban Spaces**

In this tour of the arts and architecture from the seventies to the present day, we come to the idea of the city as an active support for and fundamental element of the interaction of the different fields, with the purpose of bringing an accumulation of experiences to the city which might allow us to understand public spaces as extensions of habitable spaces. Perhaps it
is not necessary for the city to represent us, or offer us an unique identity, given that multiple identities would fit, as well as individual ones, but perhaps it should offer us places where we can communicate, converse and interact, and establish new dialogues with the city, centre on human experience, not just from a sensory point of view, but also from its relationship with history, with the past and with the future. This would therefore be a proposal as much of looking at the city, our parallel city that is real as much as we can imagine it and dream about it.

We can say that the city and public space (just like sculpture in the seventies) have entered in the category of no-man’s land, in part because of the effects of globalisation, in part because we have simplified as much as possible sensory experiences in public spaces, but also because public spaces have increasingly been put to the service of capital. Artists and architects have, in urban spaces of cities, a field from which and because of which they can work to reverse this situation, by understanding that public space and the city itself are as much canvas as final work. For this reason, we understand that it is key to incorporate the citizens’ own experience, when proposing to translate “Sensing Spaces”, which we spoke about earlier, to the public space. These, can be incorporated into the city as urban stages where the citizens’ sensory experience will be what gives them meaning, as they are complex in their definition, due to working on the boundaries between not-architecture, not-sculpture and not-landscape, to be able to imagine cities more in accordance with the current complexity of the contemporary individual.

This demands, and with increasingly more force, the integration of nature as a substantial element in the urban environment, as its able to adopt multiple forms and be expressed in different ways, moving away from the conventional green spaces to which we have become accustomed in recent decades, and being able to locate itself equally in those diffuse and difficult-to-categorise limits between not-architecture, not-sculpture and not-landscape, and also in their opposites. Similarly, our vision of the city, our desire for a
parallel city would be the Sensing City, not by focusing on a concrete one, but by proposing it as with the interactive ground of the Expanded Fields.

Endnotes
1 Catalan sculptor, Jaume Plensa Born in 1955 in Barcelona, where he studied at the Llotja School of Art and Design and at the Sant Jordi School of Fine Art. He has received numerous national and international distinctions, including the Medaille de Chevalier des Arts et des Lettres, awarded by the French Ministry of Culture, in 1993, and the Government of Catalonia’s National Prize for Fine Art in 1997. In 2005, he was invested Doctor Honoris Causa by the School of the Art Institute of Chicago. In Spain, he received the National Prize for Fine Art in 2012 and the prestigious Velázquez Prize for the Arts in 2013. Plensa regularly shows his work at galleries and museums in Europe, the United States and Asia. Just to mention some one of them closer, I would refer in 2011, a large selection of Plensa’s sculptures, both interior – shown in the exhibition rooms – and large works – installed in the gardens – were exhibited at the Yorkshire Sculpture Park in West Bretton, England. Thanks to this exhibition, the site received national recognition as Most Magnificent Attraction in 2011. To date, this has been one of the most complete shows ever devoted to the work of Jaume Plensa.
4 Ibid., pp. 12, 13.
5 “Urbanity: the quality of being urbane; refined courtesy or politeness” Definition from Random House Dictionary of American English.
7 AAVV, Retracing the Expanded Field. Encounters between Art and Architecture. Cambridge, Massachusetts. London, England: The MIT Press, 2014. The debate and question posed remains open, and given the interest provoked by deep reading of this essay, in April 2007, the School of Architecture of the University of Princeton, in collaboration with the Department of Art and Archaeology, celebrated a symposium on Ro-
salind Krauss’s original essay, recognizing its influence on the decades that followed its publication, and its still possible projection towards the future. The symposium became a platform from which to reflect upon the possibilities for interaction between the different forms of artistic expression from post-modernity until today.


“The grid pattern of the city blocks surrounding Central Park was reflected in the rectangular structure of the commanding saffron coloured poles while the serpentine design of the walkways and the organic forms of the bare branches of the trees were mirrored in the continuously changing rounded and sensual movements of the free-flowing fabric panels in the wind.

The people of New York continued to use the park as usual. For those who walked through The Gates, the saffron colored fabric was a golden ceiling creating warm shadows. When seen from the buildings surrounding Central Park, The Gates seemed like a golden river appearing and disappearing through the bare branches of the trees and highlighting the shape of the meandering footpaths”.


10 Description from the author’s web site: http://www.marthaschwartz.com/grand-canalsquare-dublin-ireland/#
01. The Crown Fountain, 2004, Jaume Plensa
Image obtained from the artist’s web site. Unknown author.


Neoliberal Production Of Space And Its Impact On The Port And La Marina

Neoliberal ideas have coloured the development of planning process in the 1988’s Masterplan of Valencia due to the victory of the conservative party at municipal level in 1982. Henceforward has begun the era of Neoliberal Urbanism. The starting point of the neoliberal production of space are empty spaces –results of the space’s process of emptying– and, after that, come filling operations. This filling operations work, especially, as *imagos*, images and trough their sign-value (Baudrillard). The thematization, touristification and fragmentation are their principal characteristics. Neoliberal production of space also means that the city planning process has been launched by means of short and long-term projects. This is the logic that will guide our space of study: La Marina of Valencia.

Facing the image of the city of Valencia, the old riverbed of Turia and La Marina are featured as the main open public spaces. In fact, the 2005 survey of the The Strategies and Development Centre reveals factors that have a significant impact on the city image such as the City of Arts and Sciences (CAS), the garden of the former riverbed of Turia and La Marina. Although the survey was conducted in the period prior to the crisis whilst a real estate boom, the idea of great potential of these three spaces in the general image should be reserved. While CAS and La Marina are often considered as overpriced or obsolete mega construction projects created in a post-crisis period and therefore cause significant rejection, the former riverbed is perceived as a truly public space with free access, with no perception of exclusion of certain groups with different political backgrounds, as it happens in the other two spaces.

Appearance of these two new spaces –CAS and La Marina (as the river is an earlier project and for the most part it was developed within the budget of the previous administration of Humanist Urbanism, characterized by its rational logic in all of his levels and its socio-economical equity aim) – in the general image is also related to the paradigm of those that arise and of its landmark
nature.

The thesis of present research is that the spaces produced by Neoliberal Urbanism and particularly La Marina appear as spaces [1] in which the body is not contemplated; and where [2] the body is overshadowed by visual elements.

Regarding the first statement, the body is not contemplated apart from its Euclidean geometric character, in reference to its measures and metric. The body becomes a point of reference “in the metric space of techniques” (Serres in Castro Nogueira, 1997: 95) [2]. The analysis of the second question is based on the theoretical framework that conceives the body, not only as the sense of sight, but primarily as a space and a structuring element of the experience of the subject. In Neoliberal Urbanism and in architectures like that of La Marina, the body is buried by visibility. This visual effect is also a hierarchical practice: the verticality and protagonism of the Veles e Vents’ guides the observation and neglects other senses, at the same time it expresses and conducts following evaluation (visual processing, perception, social estimation): everything that is not ordinary is considered as a landmark.

In two editions of the America’s Cup yacht race La Marina North and some of its interior sites were used for the competition. The building of Veles e Vents (building Foredeck) was built in La Marina North in order to accommodate the participating teams and sponsors and to serve as a balcony for public to see the vela races. La Marina Sur has established itself as a residual material, but it was assigned as viewing area that has a dual function: [1] bleachers the public to watch the competition; and [2] create a ‘screen’ that hides the operating harbour, located further in the south. Initially the construction of La Marina responds to the pre-eminence of the imaginary –in front of the symbolic and the real dimensions of space– throughout construction of visual effects for special events (America’s Cup vela races and F1 races). Subject-spectator

1 Its most important building and sign, designed by Chipperfield.
function of the space in the context of races and regattas is no longer valid, which makes this spaces meaningless. Moreover, not only the visual focus does not exist anymore, it has also been challenged politically. The landmarks inherited by Neoliberal Urbanism contain various simmering conflicts.

The archaeology of these spaces consists of rebuilding the production process and re-establishing fragmented and segmentary scenarios for current use (Gironés, 2006) [5]. The question, at this point, addresses the possibilities of appropriating spaces disconnected from subject bodies.

**Uses And Practices Of La Marina’s Spaces**

In 2013, the Port Authority and the City Council of Valencia signed the definitive agreement to transfer 159,000m² of land currently occupied by La Marina to the municipality. Whereas the City assigned the land to the Consorcio Valencia 2007 (Boira, 2013) [1], an administrative tool that appeared as managing body of the 32d America’s Cup and is active till present time. After this transfer, Valencia was discarded from the position of sub venue for Madrid in the Olympic Games 2020. It caused a necessity to integrate La Marina into urban environment and to cease massive events aiming for social, economic and financial balance.

The change of municipal government opens a window of opportunity and contributes to launching of an effective citizenship’s (re) appropriation of La Marina. This appropriation and productive recovery of the spaces also responds to the economic unsustainability of the 447 million euros debt held by the ICO².

In relation to the history of the port, La Marina and the uses and practices of its spaces imply a paradox: when the land was owned by the Port Authority, the access to the port was open; but since the moment the soil was ceded and became public, the access became restricted. Decades

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² Instituto de Crédito Oficial (Institut of Official Credit) is the institution that controls the municipal debt in the spanish state. It is attached to the Economy’s ministry.
ago the port was physically closed, although there were multiple access points. For this reason and because of its practical nature it configures itself as a non-consumer leisure space with purpose of recreation and meeting point, and of solitude and tranquillity. It is a space occupied and appropriated for work and for daily leisure activities. At the present time public spaces of La Marina are theoretically public and offer free access, although it does not correspond to reality. This is partly due to [1] the elitism of spaces and a defined character of a class; [2] although spaces are being governed by the regular rules of public space, each building –Veles e Vents, La Lanzadera, EDEM, the bases of the America’s Cup, restaurants and bars– dictates its own rules of application of surrounding spaces. Some examples of this issue are placement of fences, privatization of public spaces between buildings, installation of private security that takes part in managing of some buildings and premises.

Currently the spaces of La Marina are visited by different groups of all kinds. They range from nostalgic individuals searching for the gaps of the daily history of the port, or food enthusiasts experiencing high-class restaurants, to families on Sunday get-away and skaters who meet in Tinglado 2.

Reference to the ‘spaces’ of La Marina was made because they do not form a unit, as it has been discovered in this research. Spaces are fragmented and separated by various aspects, and are divided between La Marina North (from the North pontoon to EDEM); La Marina Interior (from the crane to the Tinglado 5); and La Marina South (from the market, through the stands, to the end of the southern dock).

Moreover, the hypothesis of the co-constitution of space and individual is being developed; thereby by using, by practicing certain spaces of La Marina where the subjects-bodies create the space through the process of identity formation.
–which is seen as a relatively unstable, porous and contradictory entity, as well as one with consistency of varying degrees, in perpetual process of ‘coming-to-be’ (García Selgas, 2007) [4] – appropriation and transformation of the materiality of spaces.

The participant observation technique on the field work has led to the idea that spaces of La Marina North relate to a creation of the identity and the image throughout gastronomic consumption, leisure, sport and contemplation of the landscape. Uses and practices of La Marina Interior (with the buildings of Tinglado 2 and the historic building Edificio del Reloj) helps to create a meaningful construction and honours the historical past. It pursues a longing for historical roots and works to constitute a meaning besides great architectural events of the past, although secondarily it also seeks an entrenchment of everyday port image. Finally, La Marina South is considered as a space of poor consistency –it is formed by different types of borders (Lynch, 2008) [6]. Ultimately there is a need for analysis on contemplation of multiple interrelations between the body and space.

Proposal Of Body Strategies And Participatory Approach

“Under the cobblestones, the beach”

Deformed motto of the May 68

As a proposal, it is a question of opening different ways for the space appropriation of La Marina as of the body. Taking into account the results of the field work discussed above, at first our proposal will focus on the areas of La Marina Sur. This choice has derived from the reflection on the intensity of its application in comparison to the consumer-oriented nature of La Marina North and the historical character of La Marina Interior. While performing the research the choice of La Marina South is justified by its greater correspondence with the goals of the research, given the residual, fragmented and unconnected nature of the space. In fact, an appropriation of
La Marina Sur is compulsive in order an effective appropriation of La Marina North –the space of consumption– could follow.

This section contains following aspects: [1] the premises upon which a proposal could be built; [2] proposal of body tactics for space appropriation and [3] specific examples of its application in La Marina South.

1. Premises
From these considerations were developed key points of the proposed approach on the space appropriation of La Marina South.

The appropriation is understood as an occupation and material transformation of space, whereby a connection with space in different semiotic-material dimensions is established.

Existence of several material issues does not allow the body to appropriate the spaces.

There are empty spaces between the landmarks in La Marina. The empty spaces are also used in dispossesson process of some organisational forms, as it happened in La Punta case. This may not be the primary goal of landmark or empty spaces construction, but in the end it works as such –according to the development of Foucault’s idea of device.

In the empty spaces the body becomes decentralised. The empty spaces are not comprehensible, not legible, it is not clear how do the body appropriate the spaces.

A empty space no longer directs, it is a moment of disorientation and a matrix of possible actions: awareness of the materiality of space and at the same time unawareness. The empty space provokes the feeling of abandonment and disorientation as well as the reflection on where does it go. It stimulates the desire to flee

4 The primarily dispossesion of the agrarian territory located on the south of Valencia, which is linked with the seafaring territories’ dispossession.
from the same subversion of the city spaces in already written and comprehensive stories that direct the body. It provokes different issues and different types of actions. The empty space is an interrogation, a matrix of possible spatial practices endowed with action as long as they introduce difference. The empty space is a place of departure.

The circuit of observation the America's Cup regatta and the urban circuit of the F1 in their form resemble the serpent. They are introduced into clogged territory of the city and generate emptiness as a deployment of dispossession. It provokes devastation and elimination of the functional harbour and of all the elements related to everyday memory about this space. The clearest example is the destruction of the Royal Stairway during the first construction works of the 32nd America's Cup. This stairway provided access to water and was part of a series of daily practices such as bathing and transporting by boat. Another example is the destruction of the Fisherman's Market building, which was located on the same spot where now Veles and Vents is situated. The market was destroyed for the construction of the emblem of La Marina and the traditional fishermen were displaced to the southern ports. The emptying process erases memory, erases the meaning and finally erases spaces always built with some relation to the body. The process of filling always follows. In the case of La Marina it was performed by the means of different projects that try to implement the fulfilment according to the neoliberal concept: with great landmarks and, their counterpart, the empty spaces.

It is not a question to make spaces coherent, but to transform them into matrix-spaces to the possible extent, with degrees of autonomy.

Spaces that are appropriable are the empty spaces. These idea has risen from outside the subject-object dualism as space enters a process of co-constitution with the bodies.
On the relation between the empty spaces and the beach: the beach allows degrees of autonomy, acquires an ambiguous public status that intersects with the common. That is why our appropriation proposal revolves around these two axes. La Marina could have a metaphorical beach dimension because it multiplies its shore winning over the sea territory. The beach is a productive and reproductive space, where one can work, eat, etc.

2. Proposal Of Corporal Tactic Of Space Appropriation

On the concepts of tactics and strategy (De Certeau, 2000) [3]: the strategy has to do with representation; while tactics refer to non-representational, performative, and forthcoming knowledge (García Selgas, 2007) [4]. According to De Certeau, the concept of strategy is a “calculation of powers” of a subject that is capable of delimiting his own place or environment, and from there, from this gained position to establish relations with the external elements that are connected with the action of the subject, and that develops a strategy or deploys strategic model and hence a form of representation on the external space. The tactic is related to an accumulation of space that does not “have its own place” and in that sense there is no distance to observe the other as a “visible totality.” In De Certeau’s words: “Tactics have no other place than the other” (ibid., 2000: L) [3].

The logic of tactics is followed to capture the meaning of everyday actions. These are small and multiple processual situations that form, in some cases, everyday microresistances. Such moments have neither been thought through nor can they be considered spontaneous; they are a part of an implicit knowledge derived from the experience. They are integrated into the habitus (Bourdieu) as schemas of perception, valuation and action that are at the same time rational and irrational, spontaneous and thoughtful; concurrently, Bourdieu’s concept of habitus allows us to subvert these dualities. In this sense, tactics have more
to do with the attitudes and the actions affected by certain structures, rather than with scheduled behaviour. The *habitus* is the meeting point between the body and the space. Therefore, it is a question of knowing how these actions are given as tactics, in order to be able to draw a corporal strategy of appropriation.

The starting point of the neoliberal construction of space are empty spaces; after that come filling operations. For instance, operations to fill landscape: the hill in La Marina Sur that functions as a port screen is an example of such operation and acts as a boundary between the leisure sector and industry sector. There is no better observation point of industrial area of the port, but as an unintended consequence of this ‘hill-screen’ no one directs his view towards water while climbing it. This is how the neoliberal construction of space ends in paradox. The hill, in fact, was not designed to be inhabited, but as background for contemplation of an image (regattas of the America’s Cup).

La Marina is a social trauma. The motto of May 68 “Under the cobblestones, the beach” perhaps should be subverted towards “On the cobblestones, the beach” in the sense that it would not deny La Marina and a part of the collective memory, but would incorporate this trauma into a collective knowledge that allows future to link with its history: the operational port, the port as a space for daily activities, refusal of daily life in favour of neoliberal landmarks, etc. Our proposal would not then have dealt with a new emptying process –but a ‘good’ one, in this case, due that it would be for a citizenship’s (re) appropriation of space– but with incorporation of the trauma into the collective memory of space.

In this manner, it is a question of generating a matrix of possible actions, so that each body appropriates the space as it could.

### 3. Specific Examples

The tactical actions in the space are addressed
from a perspective of recognition and transformation. It consists not of a procedure, but of different non-consecutive moments of a process. Each tactic is a simultaneous dispute over space, landscape and bodies. Each tactic has repercussions in the others, following the logic of a fluid dynamics.

[3.1] TACTICS OF RECOGNITION

Provide recognition instruments that would involve the whole body. From cartographic methodologies, drawings, various types of inscriptions and representational elements that would create an awareness with greater degree of depth.

[3.2] TRANSFORMING TACTICS

With help of the instruments that articulate physical and material question of the barren create the actions of common and urban character: performances, installations, games, social events, theatrical plays, summer films and ceremonies.

Generate other possibilities as some unexpected space activities or ones that affect the concept of consumption process. Like, for example, the activity of eating in a public space next to a high-class restaurant stimulating the falter of potential meaning of the other act.

Transfer of indoor activities into the public spaces, shaking the concept of in-and-out private-public duality. This has particular interest in relation to La Marina South, which is better suited for activities that involve a greater degree of daily life than, for exam-
ple, La Marina North.

Collectively uncover the Tinglado 4 and Tinglado 5 as a symbolic ritual act⁵.

Conclusions
The emptying process is the logic that articulates the neoliberal concept of space production. With the empty spaces starts the process of loss of meaning, of a memory removal; then appears question of the filling and its counterpart, letting stay vacant. On the one hand, these filling operations work by the means of landmarks, fragmentation and interruptions. On the other hand, the empty space acts as a paradox and as a matrix of corporal strategies of space appropriation. The empty, the vacuum allows to break this neoliberal logic and to initiate new semiotic-material spaces; the empty is understood as a matrix of actions. In fact, the empty space is not a vacant space but a fracture, a breach of the neoliberal space concept.

La Marina in Valencia is considered as a strategic point and a controversial space, in the sense that diverse and relevant types of social dispossession, of material and memory, of many collectives of Valencia and its territory are concentrated within. It is one paradigmatic condensation, since it is a neoliberal space and, therefore, a space of flows, extra-national and global relations, and, at the same time, of singular and local resistances. It appears as a space of “hybrid identities, flexible hierarchies and multiple exchanges” (Negri, 2002: 5) [7], where despite an advance position of a devastated neoliberal city, it is employed with great capacity and power within the spaces of resistance. Spaces that are able to articulate as individual and collective body.

References

⁵ This was covered in order to shelter F1’s race cars.

Introduction
This paper looks at two examples in the UK of a transition from landscape conflict to landscape creation; one of which is historical – the fight for and creation of the first National Park in the UK, and the second one is propositional – a consideration of the current conflict over Green Belt and the potential that this offers for the creation of a new type of National Park. It is written from the perspective of a landscape practitioner who is dealing on a regular basis with Green Belt issues on behalf of both developers and local authorities. It proposes a possible way forward for the current Green Belt crisis.

Conflict on Kinder Scout
During the 1900s there was growing unrest in the UK at the lack of access to the countryside. Rambling was an increasingly popular activity, particularly amongst the unemployed and industrial workers, providing a cheap opportunity to leave the crowded and dirty city and enjoy the space and fresh air of the countryside. However, much of the land which had previously been common land (particularly the open moorlands) had been enclosed under the enclosure acts of the 18th and 19th century and public access denied by the private landowners. The Peak District was at the centre of this conflict with huge number of workers from both Manchester and Sheffield wanting to walk across the moors. (In the 1930s only about 1% of the 150,000 acres of mountains and moorland were accessible to the public). Regional and national rambling groups were established including the National Council of Ramblers Federations (which later became the Ramblers Association) which campaigned for walker’s rights and improved access to the countryside. However, many were frustrated at the slow rate of progress of this and in 1932 a small group of workers from the British Workers’ Sports Federation (BWSF) arranged a mass trespass onto Kinder Scout in the Peak District. On Sunday April 24th 1932 around 400 ramblers from both Manchester and Sheffield took part in this trespass on Kinder Scout in the Peak District. The ramblers crossed privately-
owned land to reach the Kinder Plateau (the highest point in the Peak District) but in doing so a fight broke out between the trespassers and the land-owner’s gamekeepers. On their return, six people were arrested.

At the trial of Benny Rothman one of the leaders of the trespass, Benny’s defence of the trespass was: ‘We ramblers, after a hard week’s work in smoky towns and cities, go out rambling for relaxation, a breath of fresh air, a little sunshine. But we find when we go out that the finest rambling country is closed to us...’³ (Notably similar to what motivates many city dwellers today to access the countryside.) Five of the arrested men received jail sentences of up to six months. This was a harsh sentence and felt by many to be severely disproportionate to the ‘crime’. However, in fact it served to fuel the campaign and a few weeks later a massive 10,000 walkers met at the annual access rally at Winnatts Pass near Castleton demanding action for improved access to the countryside.

**National Parks and Access to the Countryside Act**

The conflict between land owners and walkers in the 1930s (with the iconic mass trespass of Kinder Scout) resulted in a huge step forward. It was followed by more campaigning and lobbying, particularly by the newly formed Ramblers Association who campaigned hard for access improvements and rights of way. In 1936 a Standing Committee on National Parks was formed to campaign for the establishment of National Parks. Finally, in 1949, seventeen years after the mass trespass on Kinder Scout, the National Parks and Access to the Countryside Act was passed with the purpose ‘of conserving and enhancing the natural beauty, wildlife and cultural heritage of the areas’...and ‘of promoting opportunities for the understanding and enjoyment of the special qualities of those areas by the public’⁴.

Ten National Parks were originally designated, the first of which in England was the Peak
District in 1951. Lewis Silkin, Minister for Town and Country Planning at the time, described it as “... the most exciting Act of the post-war Parliament.”

Today there are fifteen National Parks providing a hugely important resource for the UK and attracting an estimated 172 million visitor days/year. Each National Park is a protected area with defined special qualities and its own National Park Authority which is made up of members, staff and volunteers. Development within the National Parks is strictly controlled to ensure the special qualities of each park area are preserved. The Park Authority is responsible for looking after the landscape, wildlife and cultural heritage within it and for producing a management plan for the area which guides its future use, development and management. Funding for each National Park is provided by central government.

The conflict on Kinder Scout arising from the mass trespass is widely credited as being the catalyst which led to the creation of the National Parks. At the 75th anniversary of the mass trespass on Kinder Scout, David Miliband (Secretary of State for Environment, Food and Rural Affairs at that time) said that ‘without the action of the trespassers, the nation would not have the National Parks nor freedom to roam on mountain and moorland which the 22 million annual visitors to the Peak enjoy today’ and went on to say ...

‘We sometimes like to think that the thinking of politics is ahead of that of the people. There can be no doubt that in the 1930s, the politics were way behind the people, and the trespassers showed the way forward on access to moorland which is now enshrined in the Countryside and Rights of Way Act.’
**Landscape Conflict in the Twenty-first Century**

Today, the National Parks are well-established but the UK countryside remains an area of great conflict, facing huge pressure from many for its protection and conservation and from others for its development as a solution to our housing crisis. One of the fiercest battlegrounds where this conflict is played out is in the Green Belt.

**Green Belt and its Historical Context**

The term ‘Green Belt’ refers to the land around our major towns and cities which has been designated by local authorities to be protected and retained as permanently open. In England there are 14 urban areas with land designated as Green Belt. These include: London, Birmingham, Bristol, Cambridge, Lancaster, York and Merseyside and Greater Manchester. On 31 March 2016 approximately 1,635,480ha of land was designated as Green belt (c. 13% of the land area of England). Further areas exist in Wales, Northern Ireland and Scotland.

The Green Belt concept was originally established in Ebeneezer Howard’s vision for Garden Cities in the 1890s in which he proposed a principle of “always preserving a belt of country around our cities”. Originally these Green Belt areas were seen primarily as a recreational resource providing accessible open space and clean air for the city dwellers and incorporating parklands, allotments, farms, and smallholdings. It was first formally introduced as a planning designation around London in 1938 when The Green Belt (London and Home Counties) Act gave permanent protection to London’s Green Belt land and this was subsequently included in Patrick Abercrombie’s County of London Plan in 1953.

By 1955 the emphasis had changed away from preserving the countryside as a recreational resource and more towards preventing urban sprawl. In a Government circular 42/55 the Minister of Housing and Local Government drew attention to “the importance of checking the unrestricted sprawl of the built-up areas, and of safeguarding the surrounding countryside..."
against further encroachment”. Since then, the fundamental aim of Green Belt has been to prevent urban sprawl by keeping it permanently open. Five purposes of the Green Belt were defined in Planning Policy Guidance note 2 (PPG2) and these became enshrined in the National Planning Policy Framework as:

- to check the unrestricted sprawl of large built-up areas;
- to prevent neighbouring towns merging into one another;
- to assist in safeguarding the countryside from encroachment;
- to preserve the setting and special character of historic towns; and
- to assist in urban regeneration, by encouraging the recycling of derelict and other urban land.

It is noticeable that today, the designation and protection of land as Green Belt has no relationship to the quality or character of the landscape or the opportunities it offers for recreation. As such, it is very different to National Parks although both have similar strict restrictions on development.

The Green Belt Crisis

Today the Green Belt is in crisis; it has become a battleground. This crisis comprises three key aspects. Firstly, the urban population is increasing and there is a national housing crisis. There is a shortage of land to deliver affordable housing which is prompting calls for development land in the Green Belt. Secondly, the quality of Green Belt land is steadily declining as farming ceases and alternative urban fringe land uses become the norm or land just sits ‘in waiting’ for its release as development land. And finally, thirdly, the Green Belt is failing to provide the recreational resource which is needed by the urban population for the simple, but essential, provision of fresh air and access to the countryside.
There are loud calls from the national housebuilders that the development restrictions on Green Belt land are restricting the delivery of new housing and pushing up house prices. In Sefton for example, The Housebuilders Federation made a representation to the Local Plan Inquiry stating that ‘there is compelling evidence to indicate that Green Belt release is essential’¹³. In places these calls are being heard and between 2011/12 and 2015/16, changes to Green Belt boundaries by local authorities have resulted in a loss of over 4000ha of Green Belt land.¹⁴ Recent research by CPRE¹⁵ identified that the number of houses planned for the Green Belt now stands at 275,000 homes.

Local and national pressure groups are fiercely resisting this Green Belt loss with high pressure campaigns to ensure the protection of land as countryside: ‘#Our Green Belt Campaign’ - CPRE¹⁶, ‘Hands off Bury’s Green Belt’¹⁷, ‘Save Stockport’s Greenbelt’¹⁸, ‘Canvey Green Belt Campaign’¹⁹, ‘Save the Cambridge Green Belt’²⁰, ‘Newcastle West Green Belt protection Campaign’²¹ to name but a few. Headlines such as ‘Green belt campaign group warns Surrey faces ‘tidal wave’ of development’²² and ‘Thousands Join in Green Belt Development Protest’²³ frequently appear and ‘save our Green Belt’ protest marches are a regular occurrence.

The Quality of Green Belt Today

One of the reasons why Green Belt land is so fiercely fought over is that it is the area closest and most accessible to our large urban areas and millions of urban dwellers. As such, it represents the area of countryside which is most accessible and known to the largest numbers of people. (CPRE estimate that Green Belts provide countryside which is close to 30 million people²⁴; this represents about half the UK population.) In theory, it offers clean air, space, nature and opportunities for informal recreation and provides a setting for the urban areas which contributes to their sense of place. As such, Ebeneezer Howard’s original vision for the Green Belt (the circle of countryside around each town) remain just as valid today as it did in the 1890s despite
not being mentioned in the five purposes of the Green Belt.

However, the reality of Green Belt landscapes today is very different to that of Howard’s vision. As a landscape practitioner I have carried out a number of Green Belt reviews, Green Belt appraisals and landscape appraisals for Green Belt land. The common theme emerging from these is that large areas of Green Belt are in fact low quality landscapes. Despite being ‘protected’ by a Green Belt designation, they are often degraded landscapes, poorly managed, and used for urban fringe activities. In some places, land is left unused and allowed to appear un-needed - landowners hopeful that this will speed up its release from Green Belt and allocation for new housing. Access to and through the Green Belt on the public rights of way is often poor. Without a car, it is often difficult to reach the countryside. Once there, footpaths are often unmarked and/or overgrown, there are few off-road cycle routes and routes are often unconnected segments of historic rights of way rather than co-ordinated and connected recreational routes.

There are of course exceptions. In Green Belt land on the south side of Cambridge for example, historic public rights of way have been combined with newly created permissive paths to provide circular recreational routes between the city centre and the outlying village of Grantchester. The landscape is managed positively by grazing cattle and hundreds (and at times, thousands) of people use the routes every week to access the countryside for walking, running, cycling and informal recreation.

Although the NPPF (para 81) encourages local authorities to ‘plan positively to enhance the beneficial use of the Green Belt’ there are few places where this is evident. But also, the NPPF is silent on how to facilitate this positive planning. Lack of resources, complex land ownership and an absence of an overarching framework for positive land management in the Green Belt, are probably at the root of it.
A New Type of Green Belt

In theory the Green Belt should be some of the UKs’s landscapes which are most used and most invested in. Green Belt should be a multi-functional landscape which is high quality, well managed and accessible. It should contain a dense network of footpaths, cycle routes and bridleways which connect in to the city and which offer quick and easy routes for enjoyment of the countryside. It should be a productive landscape providing food for our urban areas with low food-miles and incorporating space for individuals to grow their own food in allotments, small holdings and community orchards. It should be some of our most well-managed landscape, providing high levels of biodiversity and a range of good quality habitats for wildlife. It should be an area which we are proud of. In short, Green Belt land is a huge landscape opportunity.

I believe that now, 60 years on from the establishment of the Green Belt, it is time to review our approach to Green Belt landscapes. There is clearly a great public affection for the Green Belt, and a fierce desire to protect it as countryside despite its often poor quality. At the same time there is a very real need to provide a positive response to the current housing crisis.

The current conflict in the Green Belt is an opportunity to re-think it and create a new type of Green Belt. I believe that this means a balanced response combining both development and protection of the Green Belt. In my opinion, the protection and management of the Green Belt should come closer to that afforded to National Parks. Green Belt land comprises potentially the most accessible areas of countryside in the UK for the largest number of people. I consider that the simple need for clean air, contact with nature and access for walking by the residents of our cities is as important today as it was in the 1930s (perhaps more so, in this technological age). Thus the factors which triggered the mass trespass on Kinder in 1932 and the consequent establishment of the National Parks are equally relevant today and justify a new approach to our Green Belt.
In my opinion, it is now timely to review and update the purposes and management of the Green Belt. I believe this should include a number of key changes:

- a return to Ebeneezer Howard’s and the 1938 Act’s original vision of Green Belt to include the purpose of providing accessible countryside which can be used for recreational purposes as one of the core purposes of the Green Belt;
- establishment of Green Belt authorities, similar to the National Park authorities, to oversee the protection and enhancement of the Green Belt landscapes and the promotion and development of recreational activities within them;
- promotion and development of green fingers and sustainable transport corridors which provide direct connections between the residential districts of urban areas with the Green Belt making the Green Belt countryside a landscape which is truly accessible; and,
- development of management plans to preserve and enhance the landscape quality of the Green Belt and balance the competing needs of those who live, own and use the Green Belt (similar to those prepared for National Parks). This needs to put an end to the sequence of abandonment of Green Belt land resulting in landscape degradation and ending with pressure to develop Green Belt land because of its poor quality; and,
- a contribution of Green Belt land to easing the current housing crisis. A comprehensive review of Green Belt land is needed with the purpose of releasing c. 1% of the lowest quality Green Belt in locations closest to major public transport nodes and the allocation of this for c. 500,000 new homes over the next 10 years with an associated financial contribution to the establishment and running of the new Green Belt authorities.

The above approach aims to provide a balanced response to the current Green Belt conflict. It suggests a positive way forward which
provides an improved landscape quality, a stronger recreational resource and a significant contribution to the housing crisis. The solution is reminiscent of that which evolved into the creation of the National Parks sixty years ago. This feels appropriate to me – the current conflicts over the Green Belt represent a 21st century battle for the countryside and one which I hope will be a similar game-changer as the mass trespass was on Kinder Scout in 1932.

Finally, the current Green Belt conflict is all about landscape – landscape character, quality, use, value and management. There is a real opportunity for major positive change to the Green Belt landscape. It is a key challenge which the landscape profession should engage with. Landscape academics and landscape practitioners need to be pro-active in this conflict, take a lead role and provide guidance and leadership in managing this landscape change.

Endnotes
1 (Friends of Kinder Trespass, n.d.)
2 (Guardian Newspaper, 1932)
3 (Bibby, n.d.)
4 (Government, UK, 1945)
5 (National Parks England, n.d.)
6 (National Parks England, n.d.)
7 (Friends of Kinder Trespass, n.d.)
8 (Department for Communities and Local Government, 2016)
9 (Howard, 1902)
10 (Ministry of Housing and Local Government, 1955)
11 (Department for Communities and Local Government, 1995)
12 (Department for Communities and Local Government, 2012)
13 (Housebuilders Federation, 2015)
14 (Department for Communities and Local Government, 2016)
15 (CPRE, 2015 (revised 2016))
16 http://www.cpre.org.uk/what-we-do/housing-and-planning/green-belts
17 https://you.38degrees.org.uk/petitions/hands-off-bury-s-green-belt
18 http://www.savestockportsgreenbelt.org.uk/2016/12/about-save-stockports-greenbelt.html
19 http://www.canveygb.co.uk/
1% of England’s Green Belt developed at a density of c. 30 dwellings/ha would deliver around 490,600 homes.

A proposal for the release of 1% of the London Metropolitan Green Belt was put forward in 2015 by London First in (London First, 2015)

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alparks.gov.uk/students/whatisanationalpark/factsandfigures. [Online] [Accessed 14 June 2017].
UK National Parks (Source: www.nationalparks.gov.uk)

Extent of Green Belt as at 31st March 2016 (Source: DCLG)
Poster for Saver Stockports Green Belt campaign (Source: http://www.savestockportsgreenbelt.org.uk/)
Abstract
The paper focuses on the Novarese still-fragmented society affected by the new immigration coming from countries outside the EU area. In this context, the quarter Sant’Agabio has become the most ethnically and religiously-diverse neighbourhood in the city, with problems arising in within the community. Thanks to the collaboration of local Associations, City of Novara, and Politecnico di Milano a programme funded by a Charity Foundation aims to find in the reclamation of a 6.000 sq. m. derelict area in Sant’Agabio to use as a common horticultural garden, a way to permit people to better understand each other and increase tolerance and respect, starting with activities dedicated to schools, parents and grandparents of the diverse communities.

Introduction
The paper focuses on an 18-month programme funded by Cariplo Foundation in the Piedmont town of Novara – a historical city surrounded by its famous rice fields – that in the last century has become one of the industrial nodes of the region bringing to the area immigrants from all over Italy. In the past two decades, the Novarese still-fragmented society has been affected by the new immigration coming from countries outside the EU area. In this context, the quarter Sant’Agabio has become the most ethnically and religiously-diverse neighbourhood in the city, with problems arising in within the community. The programme, thanks to the collaboration of the City of Novara, aims to find in the reclamation of a 6.000 sq. m. derelict area in Sant’Agabio to use as a common horticultural garden, a way to permit people to better understand each other and increase tolerance and respect, starting with activities dedicated to schools, parents and grandparents of the diverse communities.

Local Background
Sant’Agabio is a populous neighbourhood of Novara (13,000 inhabitants) with a large industrial chemical zone, bordered by freight railways (Southwest to Northeast), the
railway line to Milan (East-Southeast) and by the Terdoppio torrent (North to South). The neighbourhood has a strong presence of immigrants (27%). Given the progressive urban degradation due to large abandoned areas characterized by the risk of flooding, it has pushed the municipal administration to re-qualify the district as one of the priorities of its program. A group of associations, in collaboration with the City of Novara, the public schools in the district and the Department of Architecture and Urban Studies of the Politecnico di Milano, have decided to realize a project by taking the opportunities offered by the “Resilient Communities” Call for Proposals of the Foundation Cariplo involving all resident population.

The project develops on three axes of intervention: 1) to develop the ability of self-production of quality foods using common goods, 2) to improve the quality of the urban environment, 3) to intervene to mitigate the risks associated with possible flooding of the Terdoppio stream. Practical actions are complemented by information sessions in schools and the resident population (parties, meetings).

**Goals and Objectives**

The programme wants to improve the neighbourhood resilience through the development of an aware and participatory community, activating the common cultivation of two communal lands in which there will be space for a large common garden and a nursery for plants to be distributed in the neighbourhood. Other goals are a lawn with herbs intended for breeding (according to a zero km farm); a litter box for the production of humus by means of wastes (using the wet fraction of urban waste); the construction of two small educational gardens at the community’s primary schools (with humus litter); the diffusion in the families of elementary techniques to produce natural bread; the self-retraining of the district through a correct management of the green; the reduction of energy consumption and waste production; the care of the Terdoppio Park and the creek that runs along it; providing common
working moments and multicultural events for the development of an integrated multi-ethnic community.

All this can be translated in the measurable area as the following expected results: more than 1,000 Kgs of fruit and vegetables products; more than 1,000 Kgs of bread and bakery products; more than 2,000 of humus litres; more than 400 individuals “graduated” in cultivation of gardens and laboratories; more than 400 individuals “graduated” as teachers and students in the many school initiatives envisaged by the programme; more than 10,000 sq. metres of urban territory for organic farming. The action aims also to reach a waste reduction (target less 50%) and a reduction of the fraction of the undifferentiated waste (from the current 50% to 40%) as well as a reduction in energy consumption and investment in energy retrenchment.

In the area of ‘intangible’ goods, the programme aims to improve the knowledge, the awareness and, above all, the reduction of the risks of the territory of Sant’Agabio; the satisfaction linked to the results coming from activities carried out with unknown individuals, with the objective to reduce the risks of ethnic conflicts and the direct improvement of the quality of life of the inhabitants of Sant’Agabio.

**Common focus about risk assessment**

An in-depth discussion among the members of the various associations involved in the project led to the identification of certain risks, divided into three categories. Neighbourhood Risks: chemical risk for contiguity with potentially hazardous productive devices; hydrogeological risk for the possibility of flooding the Terdoppio stream: over the past 20 years there have been eight blast episodes that affected the buildings on its banks near Sant’Agabio and at least as much less severe floods; landscaping and health risks related to the poor quality of urban furnishings, often vandalized, and waste collection (-20% compared to the town average, which is combined with the low quality of differentiated fractions) in 2016 averaged over one hundred episodes of abandonment of waste
outside the regular modes. Risks related to the type of settlement: Environmental degradation of post-industrial areas (over 50% of industrial areas have been abandoned and constitute a large cemented area close to the inhabited centre). As in many post-industrial areas, this has created a series of degradation phenomena mainly related to the abandonment of agricultural areas (for example, farming buildings reduced to deterring ruins); abandoned industrial areas form a large cemented area close to the inhabited centre. Consequently there is an aggravation of heat-islands and heat waves typical of high-density construction districts (particularly in the western district); loss of contact between population and primary (agricultural) productions and consequent vulnerability to economic and food crises: among the inhabitants, the presence of former farmers was practically abolished, keeping the memory of cultivation and farming; vulnerability to all kinds of unforeseen and change related to the weakness of the social fabric: the threats of the future are largely unpredictable, in order to face them it is necessary for the community to share the widest possible wealth of values (value = what is important to our well-being); at present there are no particular phenomena of contrast, but the different communities present tend to ignore each other; risk of criminality and social conflicts related to ghettoization (isolation, closure, non-integration ...) of the present ethnic groups and the resulting competition for the control of the territory.

A Spanish Case Study
The Platform for Urban Social Agriculture in Alcalá de Henares (PAUSAH) was established in 2012 among various local associations. Its objective is to obtain the temporary assignment of publicly owned land. The aim is to implement different ecological agriculture initiatives that allow the population’s access to agricultural production. In this way, it’s possible, among other things, to mitigate the serious economic situation that many families suffer, to facilitate self-consumption and to stimulate healthy eating
habits, to improve the environment, to foster interpersonal relationships, to expand social networks and to bet on positive solutions and transitional situations facing a profound social, economic, labour and environmental crisis. It corresponds to PAUSAH the management of the properties attached to the Agreement signed with the City Council for the development of urban ecological agriculture. The Collaboration Agreement is the instrument to establish the legal and management framework, as well as to channel, where appropriate, possible subsidies related to the maintenance, conservation, cleaning and technical assistance of the ecological orchards. The farm to be managed is distributed in equal parts among PAUSAH member associations requesting their participation in the development of the project. From the initial surface available in each orchard farm, at least 20% is reserved for a period of 3 months to accommodate associations that request to join after the start of the project. Those groups that are not part of PAUSAH and request the allocation of plots are so located in the parcel awarded to any of the member associations of PAUSAH by way of sponsorship, the leading association being ultimately responsible to PAUSAH. An initial fee of € 1/m²/year is established to cover part of the maintenance, and necessary improvements or the acquisition of the necessary material or tools to undertake them. This fee can be revisable based on needs. These revenues must be justified before the City of Alcalá de Henares, in such a way that they correspond to the expenses derived from the adequacy and maintenance of the property. The duration of the concession is 4 years, being the first 6 months of proof and the concession to the user depends on the extension of the Agreement signed with the City.

In order to participate in the project, it’s necessary to abide by the rules of Organic Farming, especially with regard to saving water, by installing drip irrigation, using organic fertilizers and using products that are respectful to the environment on the basis of Council Regulation (EC) 834/2007 on the production and labelling of
organic products and repealing Regulation (EEC) 2012/91. The activity of PAUSAH respects the affected legislation. In this regard, it undertakes that the promotion and development of urban and peri-urban agriculture must be respectful of the natural environment and especially with the 100-meter strip on each side of rivers protected by the Natura 2000 Network, and thus assists in its ecological recovery, if this is possible. The authorization holder must ensure at all times, for a proper use, the maintenance of the facilities. Given the typology of the orchards, users can only grow vegetables, flowers, and aromatic plants. It is also possible to reproduce native trees, up to two years, for later planting in other parts of the municipality. PAUSAH has been possible thanks to the collaborations of these associations: Ecologistas en Acción, Federación Comarcal de Asociaciones de Vecinos de Alcalá de Henares (FCAVAH), Colectivo de Acción para el Juego y la Educación (CAJE), Foro del Henares Asociación Salud Mental Madrid Este (ASME), Agua de Mayo, La Ínsula Colaboractiva, Mujeres Unidas del Mundo, Red de Solidaridad Popular de Alcalá de Henares, Asociación La Mancha Verde.

**Transition town – Urban Resilience as a Method**

One of the characteristics of a resilient population is the ability to choose how to feed properly. The ability to choose develops from the practical knowledge of the production and / or direct conversion of some of the food needed to your life. First for the benefits that could arise in the unlikely total collapse of the production system based on the division of labour, but above all to increase the ability to judge and recognize quality products and the result of sustainable (socially and economically) processes. The programme in Sant’Agabio is designing an action that involves several collective self-productions (consistent with the “together” approach of the whole project).

The quality and the amount of greenery available in the urban areas also influences many other critical aspects of the environment: heat islands, waves of heat, poor soil drainage capacity, pollution of land and groundwater. The spread
of crops without chemical contamination (both herbicides, pesticides and fertilizers) and green areas removed from urban degradation contributes to making a neighbourhood more able to cope with the risks associated with these phenomena.

Triggering a virtuous emulation circle, it’s possible to define the transition of the agricultural system by enhancing the sense of common goods and also to recapture some basic nutrition techniques: the vegetable garden and other small-scale basic food-cultures as the natural baking (using “pasta madre”, the natural yeast).

Concretely, in a municipality-owned area of 7,000 square meters in Poletti Street (between Calvari Street and Bonzanini Street, in front of the Park of the Terdoppio), that is enclosed by numerous large condominiums, currently covered by grass, but in a state of progressive degradation the funded programme will provide a common garden (of two thousand square meters); a nursery area (two thousand square meters more) for various kinds of ornamental plants to be distributed in the neighbourhood; humus (natural fertilizer) produced by earthworms; a large green area in the rest of the patch so as to avoid degradation. The grass from this area will feed some animals (at a farm close to the area) with herbs grown without using chemical agents; two school gardens in two of the schools in the district (the other three schools will be request to manage an area of the garden designed in Poletti Street); homemade self-production in an experimental food laboratory, in which to activate practical baking courses using the tools normally available in a family (as a refrigerator, a gas or electric cooking oven, cookware pots and easy-to-find, low-cost cooking utensils) - on the premises adjacent to the garden area of Poletti Street in a building owned by the ATC (Public Company for Housing Development).

The idea is to manage this 4,000 - 6,000 sq. metres area as a vegetable garden also to create synergies between people of the neighbourhood, involving them to recollect water from the roofs of the building surrounding the area, and
asking them to collect organic garbage and to feed the worms producing humus. In practice the programme will organize the delimitation and dissolution of the soils of Poletti Street to transform them in cultivation areas and create a litter box for the production of humus and the activation of the two school horticultural gardens (preceded by a general information campaign on the project) including the delimitation of cultivation areas and the litter box for humus production. The horticulture develops on small flowerbeds pertaining to the school building or in specially designed mobile containers, in recycled material, where students can experience and learn the phases of nature and the environmental respect. The demonstrations of the good performance of the teaching laboratories will be held at the end of the school year.

Another aspect of intervention is increasing separate waste collection: using the wet fraction through the action consisting both of the normal aging of the fraction and of the unremitting activity of the worm, producing excellent humus (the only modification permitted in organic farming).

Process for the identification and selection of volunteers for the management of the common garden and the nursery of Poletti Street (from the residents of Sant’Agabio who submitted to the municipality a question for the realization of a garden in the city, from the invitation to the families of buildings facing the garden, widening the information and the proposal to the buildings and schools progressively farther to reach the availability of fifty volunteers for the vegetable garden and about twenty for the nursery).

Common management of the vegetable gardens
From Spring 2017 to the end of the year the vegetable garden will be managed as a common. The humus litter will serve all the gardens. Volunteers will not have each their own mini plots, but will collaborate on the management of numbered sectors, broken down by types of crops sown. For the nursery part, management will be common without distinction of sectors,
as the plants grown in nurseries are destined to the community. Produced plants will be distributed in the neighbourhood. The harvest of the garden will be divided among the participants who will contribute proportionally to the quantity and quality withdrawn. Indicatively at a quarter of the market price (from 20 to 50 eurocents per kilogram). Cultivations in the school gardens, both at schools and in Poletti Street will be realized according to the methodology of the synergic garden (a single section with so many species appropriately disseminated so as to protect and strengthen each other). Associations in Sant’Agabio will ensure irrigation during summer school closure. Weekly baking workshops have been organized with sessions beginning on the first week of each month starting from February 2017 (about 10 participants) for a duration of 8 weeks - each participant pays a contribution fee of € 20 for the cost of the action and brings its own flour. Since autumn the two other activities have started: dissemination of greenery in Sant’Agabio and the distribution of cultivated plants in the nursery. All this means to define an integration between production in the countryside, the one coming from the urban gardens and the one done in the families, creating an urban lifestyle that internalizes the culture of organic farming, that is healthy, respectful of the environment and therefore geared towards the short chain and to the permaculture.

Conclusions
The city of Novara is facing a new challenge. The community sees the transformation of this district beyond the railroad as a new opportunity. The creation of a resilient neighbourhood starts from a new urban settlement. The task is based on a duality between agricultural production and responsible consumption. People that come from different cultural and social contexts can find a common point in the collective management of urban space. The Sant’Agabio Resilient project starts from the schools. Involving pupils’ conscience, it seeks to involve families and citizens all in a virtuous process. Food,
liveability, and economic and social growth can be the driving force behind the growth of an area often forgotten by the rest of the city. The project is taking little steps to bring the world of industry, small production, and food choices together with a clever and shared management of public space and land. Rural does not mean past. New generations, in nowadays depressed and declining cities, can activate a new reflexive approach to their own community trying to renovate and re-qualify at local scale the role of agriculture and food production. The resilience of a community passes first from the ability of individuals to react in a balanced and creative way to the problems of the post-industrial society, and this is what attempts to generate with the Sant’Agabio Resilient project.

References
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What do huge flocks of sheep, hundreds of rabbits, business parks, metropolitan parks, leisure parks, high-tech parks have in common with airports? These are the most frequent visitors to airports recently constructed in Europe. These are the new ways of inhabiting an airport and connecting it to its context. Having so many airport infrastructures has caused a premature obsolescence of many of them. Many airports were abandoned becoming a problem for cities in terms of space and cost. However, airports are challenging case studies because they are very difficult to try to put back into the old structure of the city. The combination of centrality, emptiness, environmental contamination and economic capability makes a good case for study from a landscape perspective. What to do with these flat, concrete, highly complex sites, often urban spaces, once they are no longer needed for air travel?

View From Above
Airports and the view from above have fascinated and influenced landscape architects as well as urban designers since the beginning of aviation. Modern imagery has been significantly affected by looking at places and territories from above. The aesthetic of distance has always been predominant. Le Corbusier enthusiastically praised the bird’s eye view that the airplane has endowed us with. However, that eye looks with alarm at places where we live because the spectacle is frightening, overwhelming. If, as for Le Corbusier, the airplane eye reveals a spectacle of collapse, today, according to Augé, the images transmitted by geostationary satellites and aerial photos have accustomed us to a global vision of things. However, airports and infrastructures in general have also had significant effects on the transformation of urban and natural landscapes. If it is acknowledged that until the 1990s, the development of the infrastructure networks in Europe caused an unexpected acceleration of change in urban development, than during the last decade this statement has become invalid. The idea that infrastructure produces
economic development in peripheral areas and the belief that there cannot be economic development without the creation of new infrastructures are not univocally valid anymore. Although the role of accessibility in economic development is important, it can’t guarantee economic development by itself and its role has been overestimated.

European landscapes are full of “infrastructure ruins” that represent a widespread situation of on-hold infrastructure. At the same time, throughout the world, there are hundreds of inner-city airports that will cease to exist in the next decade. However, non-material infrastructures are able to establish the immediate artificial proximity to remote places, with the possibility of reconstructing places in the network that emulate real physical spaces, with the design of the new vectors: this technological evolution will have dramatic effects, though still undefined, that will influence the airport infrastructural system. The scenario is set to change in unexpected ways.

Meanwhile, a new urbanity has been gradually defined by new environmental and landscape qualities with a higher respect and consideration of local territories and identities. New temporal regimes have been identified by new work life and social attitudes. The scarcity of non-renewable energy, economic change and new lifestyles enhanced a more conscientious ecological awareness. This generated a complex change in the way of thinking and living in the territory, the landscape and the city. Governments and municipalities increasingly reduce budgets for the building of public space, but still they are moving important resources for the improvement and development of infrastructures. This constitutes a precious opportunity that cannot be left to engineers alone, nor can it respond to transport needs only. Recovering places and ideas, overlaying the transport system with other systems and public spaces constitutes a realistic opportunity to improve the environmental and social performance of the city in a more sustainable way.
Planning Obsolescence
Specific objects may become functionally obsolete when they do not function in the manner that they did when they were created. Obsolescence occurs frequently because repurchasing has more advantages than the inconvenience related to the replacement of parts; or when the cost of repairs is higher than the cost of buying a new one and it is typically preceded by a gradual decline in popularity. Defined as “planned obsolescence” it is a compulsory business practice that involved the deliberate reduction of product life to increase consumer consumption. In contrast to this, Serge Latouche calls for a change in thinking: a cultural shift in which reuse, recycling and reinvention could bring new uses and second life for many objects. The same thing can happen to airports infrastructures, when they become inadequate to still be airports due to physical, technical or environmental problems. It can refer to multiple aspects: technological, economic and aesthetic and it becomes interesting to shift the perspective from “planned obsolescence” to “planning for obsolescence” as a societal change of culture.

Tendencies
Airfields can be classified through categories of centrality, which imply system of flows and land use as well as physical and geographical proximity to the city. Airports can be engulfed, insulated or marginal according to a system of centrality, flows and attractors that determine the territorial value. Many abandoned airports have already become part of by the urban fabric: they have been engulfed by the growth of the city. Others airports are insulated from the city. Others airports are more marginal in the urban context. Worldwide case studies and research experiments show different ways to activate airports’ second life, starting the process that Dümpelmann has defined as Airport Afterlives. After decommissioning, many former military airports were not re-used and they have remained in an abandoned state for years. But due to
growing populations and the high demand for new housing, many of these airports have been re-developed as a new part of the city. Starting with the transformation of the air connection infrastructure (runway, technical street) into roads and streets and continuing this new urban development with houses, public services, commercial and business areas. The addition of public urban parks will add value to the gradual renovation of existing structures and the new urban development area. This development is extremely well connected to the nearby cities, but the memory of the airport is almost completely removed. This is the case of Stapleton City in Colorado or München Riem in Germany. In other cases, many problematic airports no longer present themselves in the potential range for urban expansion. These airports, which were once peripheral, have now been engulfed in the urban context, becoming physically central in the city. This simplifies their re-conversion into park and recreational places. These cases can make the transformation into public urban parks as clearly shown by Tempelhofer Park in Berlin or Downsview Park in Canada.

In addition, the proliferation of low-cost companies started to promote the revitalization of secondary airports. After the post war decommission of many small and medium airports they remained unused for years until local municipalities focused their attention on these airfields to find alternative use solutions. The fundamental role of these airports as strategic hubs in the new low-cost air model and their moderate but well connected dimensions make them crucial airport infrastructures on the local and European scale. They generate a rapid transformation of land use and of the infrastructure network relating to land transportation. Stockholm-Skavsta Airport in Sweden and Liege Airport in Belgium clearly show how the integration of new economic, cultural and leisure activities at these airports contributed to a dynamic renewal of the surrounding territories and improved local businesses. In this way, the secondary low-cost
airports became landmarks in the territory and important elements for the local economies.

Within this framework, it is possible to highlight some paradigms that have increasingly gained attention with recent design projects: landscape that reclaim and compensate for what has been destroyed, re-cycle as paradigm to renew abandoned places looking for new meaning.

1. Landscape Reaction
Nowadays, the trend is moving away from the modern attitude of domination and submission that characterized previous decades towards a mechanism of atonement for the excesses of the past, towards an attitude of understanding and balance with the legacy that has been inherited. Thus, people have felt obliged to repair the damage caused by several generations of their forefathers. This moral recovery, beyond that of a simple physical recovery, implies atonement for actions committed, by reinstating existing values in the case of the natural environments or by recovering uses within the urban environments.

Even if the slow rhythms of the landscape inevitably collide with the incoming mass of passengers, landscape becomes a medium that generates processes of recovery also for airport infrastructures. The economic centrality, environmental impacts and cultural relevance of airports, as well as their abandonment, has provided landscape architecture with new territories and opportunities to be explored. The airport is claimed as a site of and for landscape. Airports can have a new meaning, by conceiving airport transformation through Landscape. According to Charles Waldheim, describing an airport as a landscape is already an important conceptual break through: just claiming the airport as an ecological or environmental field to be managed.8

Landscape architects have recently reasserted their historic interest in the airfield as a site of design through a range of practices that most
often involve biological and ecological strategies for dealing with the management of the airport. In fact, it is not just a matter of simple engineering or a solely architectural project. «Planning, design, development and re-use of airport sites is accomplished by focusing on the relationship between the human and the non-human, as well as on the flows of people, wildlife, machines, energy, water and waste». The aim is to design within a more coherent and interdisciplinary framework. And most often it is a mechanism that also allows one to plan for the ecological function of the site over time. This allows one to think about what is outside the airport and what is on the airport, in relationship to each other. In fact, thinking in a “landscape way” supposes thinking about buildings, land use and ownership. The landscape approach allows one to plan a new airport, thinking about the entire life of the airport, including its decommissioning as one long life cycle. And it is an international process. Many projects show a variety of landscape forms that can be the outcome in the remediation of an airport, like public urban parks, residential neighborhoods, nature reserves and solar parks. But it must be approached on a site-by-site and project-by-project basis.

Airports are not just engineering projects and architectural objects but more complex urban ecologies with significant environmental implications. Operating and abandoned airports comprise complex urban ecologies. Landscape is an opportunity to address airport’s critical environmental issues and public health hazards. Furthermore, landscape systems typically cost less to build and maintain than conventional infrastructure, creating an economic benefit. Architects and planners have engaged in the design of airports, mitigating and remediating the adverse environmental impacts of aviation. Airport planning, design and development have led to the creation of new landscapes, event programs and synthetic ecologies.
2. Re-cycle creation

Recycling helps to reduce waste, to limit its presence, to reduce disposal costs and to limit production of new waste. It is an experimental idea that stresses the interpretation of design as an adaptive practice carried out by specific tactics. Accordingly, the recycling of airports could become an operative strategy for other urban transformations. The conversion of airport infrastructure, in fact, increases quality and development of the surrounding urban and social condition, transforming airfields into catalytic processes. These new infrastructures generate trade with landscapes but also allow us to see new landscapes. Therefore, the airport infrastructure can be considered as a place of permanence and not just a transition, as a biological material originating from the surrounding area and as an integral part of the new territorial condition. The airport becomes a place to live in, not just a doorway to another destination. The airport infrastructure could be organized to satisfy not only one specific sector (flight operation) but it adapts itself and its efficiency in relation to the surrounding context, it can exchange flows (physical and immaterial) with the surrounding territory and accommodate multiple functions. Valuing and anticipating the correct strategy of re-cycling for airports is an increasingly urgent necessity, in order to anticipate the inevitable decline of these structures and to activate recovery processes in synergy with the different urban realities.

The recycling process of an airport is not exhausted with the total assimilation of the infrastructure into the city. After a recycle transformation and re-activation, the airport leaves physical traces of its memory and of the presence of the previous life or of the former activity. Like Ypenburg project in which the former runway has been converted into an ecological landmark and urban promenade, called “Landingslaan”. Or Maurice Rose Airfield project that leave the signs of airport activities through the re-elaboration and re-interpretation of the concrete and asphalt into urban parks
and ecological environment. In many cases, these design opportunities seem to show the airport in terms of archaeology, as a place to be rethought rather than as a place of innovation and progress. However, the re-significance and renewal of this infrastructure could activate processes of growth, develop transport and communication networks, and increase the availability of landscape and places in which to live. The recycling of airports could also become an operative strategy for other urban transformations. Furthermore, with the dispersion of the contemporary city and the privatization of buildings and activities, open space increasingly gains importance as the place of relationship in the city; pursuing environmental sustainability objectives is a necessity. In that sense, recycled obsolete and underused airports are imagining as latent public spaces, with relational engines and ecological devices.

**Resilient Landscape Reserves**
The theme of new life cycle for infrastructure could bring interesting possibilities for landscape and urban design: faced with the uncertainty of the market and of the future, hybrid infrastructures could define changeable scenarios of resilience. Many airport facilities will become obsolete, many will serve other functions and many will begin new life cycles generating new trade within the cities, landscapes and territories they serve. It seems that the destiny for many airports will be adaptation as points of territorial aggregation with multiple functions: environmental, touristic, and leisure. The projects above mentioned show the transformation of airport sites for a variety of new uses—from public parks to ecological corridors, from energy farms to new urban districts. These re-interpretations of the airfields allow to understand the crucial step that many small and medium airports are currently facing: they conceive the airport not only as transport infrastructure but also as a key element for the development of territories. They may become the new backbone of the city, improving the
quality of urban life and becoming “a place to live instead of a place to leave.” But, when neither the landscape nor the city has the chance to expand towards the airport, how can the relationship between the cities and the airport be changed? Among all the possibilities and trends, the option of destroying the infrastructure does not seem to be the most convenient. Resilient and ecological airport infrastructures could generate a reserve for cities in which the function of aviation could remain active as possibility, overlapping with other ecological and urban systems. Similar to cities, resilience should be the ability of an infrastructure exposed to hazards to resist, absorb, accommodate and recover promptly the efficiency from the effects of the hazard. In this scenario, the hazard exists as fact.

Transposing the concept of resilience to infrastructures refers to the capacity of a structure to express diverse meanings over time, beyond its original function or use. In that sense, the exploration of fostering new life cycles is a particularly significant issue for the airport but it can be transferred to other types of infrastructure. If an infrastructure is no longer used (or needed), it is possible to be rethought through its resilience, in order to activate a process of renewal of its own physical and functional condition. Resilience is therefore a function of sustainability, which requires a thorough review of the organizational and management models upon which urban coexistence relies. All ecosystems are constantly evolving, often in ways that are discontinuous and uneven. While some ecosystems are perceived to be stable, this is not strict stability in a mathematical sense; this is simply our human, time-limited perception of stasis. But resilient infrastructure is also something that we can plan to produce a long term strategy that ensures social homeostasis through a shared governance, in order to generate the conditions for better efficiency as we move in the direction of creating a low carbon civilization - through new technologies
for a collaborative management of land, energy resources and mobility. Resilient infrastructure represents a system capable of renewing its balance within the changing surroundings, able to adapt to the stresses arising from climate change and tasked with finding solutions for some of the social, economic and environmental crisis that characterizes our era.

Airport’s resilience value consists of two factors: the large amount of available space that could become an agricultural field, a park, a public space or a square and in being an infrastructure that is limited and used in a specialized way. Additionally, airports, thought temporarily unused, can still be returned to usefulness. In the end, infrastructural resilience is the capability of structures to regain value. It may come back in value as infrastructure, or as open space, or as a combination of both. According to this, the reconversion of airport infrastructure could become an operative strategy for other urban transformations. Their re-significance could increase quality and development of the surrounding urban and social conditions. The urban design approach aims to rethink airfields, imagining them as latent public spaces, in synergy with engines of change and ecological devices.

Endnotes
3  Outcome from ESPON Seminar in Paphos, Cyprus, December 5-6, 2013.
4  The reflection comes from Paul N. Edwards quotation: «Mature technological system – cars, roads, municipal water supplies, sewers, telephones, railroads, weather forecasting, buildings and even computers in the majority of their uses – reside in a naturalized background, as ordinary and unremarkable to us as trees, daylight and dirt. Our civilizations fundamentally depend on them, yet we notice them mainly

5 The concept was identified in the 1930s when the entrepreneur Bernard London argued that the only way to revitalize the economy from the economic collapse of 1929 was to stimulate consumption.


7 Airport Landscape Exhibition, curated by Charles Waldheim and Sonja Dümpelmann, assembles canonical cases, projects and practices, as well as specific species and selected sites in support of this claim. The exhibition was organized within two broad thematic categories - Operations and Afterlives - and it has been held in at Harvard University, Graduate School of Design on October 30 - December 19, 2013. The projects exhibited are collected in the volume: Dümpelmann S., Waldheim C. (eds.), Airport Landscape: Urban Ecologies in the Aerial Age, Harvard Design Studies, Cambridge, 2016.

8 Referred to the “Interview with Charles Waldheim”, carried out at Graduate School of Design, Cambridge, on December 12, 2013.

9 Referred to the Conference Airport Landscape: Urban Ecologies in the Aerial Age Exhibition, Panphlets, October 30 - December 19, 2013, Harvard University, Graduate School of Design, Cambridge.

10 The best case studies are from Germany or Scandinavia. However the operating airports Schipol Airport, Oslo Airport and Munich Airport are good examples. In America there are many examples of decommissioned airports being converted. Furthermore, there are many others interesting international examples such as in
Morocco, Island, or Taiwan.

11 The infrastructure is considered as a place of permanence and not just a transition, a biological material originating from the surrounding area and an integral part of the new housing situation. It is an Osmotic Infrastructure: an infrastructure in osmosis with the surrounding area. Referred to the book of Mosè Ricci, New Paradigms, LISt Lab, Barcellona/Trento, 2012.


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Introduction - Project Location
One of the most telling ways to learn about a community or a particular culture is how the people treat their dead. Traditions and rituals across civilizations are varied, but persistently rooted in a sense of respect.

Cemeteries are common to many cultures throughout the world, and their relationships to these respective cultures are multi-faceted and continually evolving. Historically, cemeteries had been integral with the surrounding social fabric, serving as a precursor to modern-day parks; over time, many have come to associate cemeteries with morbidity – as a reminder of one's own mortality, of which one might prefer not to be reminded. Perceptions and feelings about these spaces cover a broad spectrum, but the fact remains that cemeteries are an essential component of most communities today. As such, these spaces are unlike any other when it comes to planning projects and community engagement.

Arlington National Cemetery (ANC), considered America's most hallowed ground, functions as an historical military shrine, contemporary military cemetery, and visitor attraction. Located just across the Potomac River, the cemetery is just 15 minutes away from downtown Washington DC and is in close proximity to other national monuments. At 624 acres, ANC is the largest military cemetery in the United States, serving as the final resting place for more than 400,000 military veterans and their immediate families, dating from the American Revolution on through subsequent military conflicts including World Wars I and II, Vietnam, the fronts of Iraq and Afghanistan, and the list goes on. More than four million people visit ANC each year.

Project Purpose
Arlington National Cemetery faces the same challenges as other cemeteries – notably, the finite nature of space. ANC performs 27 to
30 funeral services each weekday and five to eight services on Saturday. At this rate, given the current space available within ANC, cemetery space had been projected to reach full capacity in 2025. In an effort to extend the life of the cemetery, viable adjacent land had been identified and the first land transfers occurred in 2002 and 2004. The Millenium Project Expansion is a 27-acre expansion site located at the northwest portion of ANC. Part of the site consisted of the picnic grounds for Joint Base Myer-Henderson Hall and a jogging path remains adjacent. The Fort Myer Chapel is also adjacent to the site, to which access must be provided. The Southern Expansion is a 38-acre expansion site located to the south of ANC; it was the former Navy Annex Site, and the existing Air Force Memorial is within the project boundary. Essentially, the Millennium Site Expansion and Southern Expansion sites constitute the last possible expansion sites contiguous to ANC, so planning for these areas required the utmost care and consideration for the most responsible and appropriate program and design.

Planning considerations had been identified to better define the parameters for the project, and were consistently reiterated at various points throughout the planning process to ensure that any proposed plans were in alignment with the ultimate goals for the project. These considerations included:

- Extend the longevity of ANC
- Plan with respect to current rates and national trends for burials (e.g. cremation versus casket)
- Respect the aesthetic integrity of ANC (enhance the contemplative nature of the site)
- Avoid and then minimize impacts to environmental and cultural/historic resources
- Ensure that design decisions are based on data and facts
- Decisions are to be supported by facts regarding ANC current conditions and future need
- Consider cost-effectiveness of the options
- Use land wisely
- Incorporate sustainable practices where appropriate
- Involve stakeholders early and often in the process

**Early and Often**

Our team of landscape architects worked closely with the U.S. Army Corps of Engineers Norfolk District to organize design charrettes with stakeholders during the early planning stages. While extending the longevity of Arlington National Cemetery was a primary consideration, we were tasked with respecting the aesthetic integrity of ANC, as well as considering environmental and cultural/historic resources, sustainable design, and cost-effectiveness.

The early and frequent involvement with stakeholders had the greatest positive impact on the success of the planning project. In many such projects, design teams often are tasked with crafting design alternatives and then presenting them to stakeholders, only to be met with disapprobation and a stern sendoff back to the drawing board to begin again. With this project, the momentum was always moving forward. A series of meetings and charrettes in 2011 and 2012 allowed everyone to contribute simultaneously and inform how the design alternatives would develop. At the end of a week-long charrette, the plans included in the presentation were no surprise to anyone; rather, each person could take some ownership of the design. Additionally, repetition truly did keep everyone focused and moving in the same direction. Each time when the design team came back together with the stakeholders, the considerations that had been developed at the very beginning were reviewed and their respective value to the project evaluated and reaffirmed, not taken for granted.

The smooth and overall harmonious nature of the planning process was also due simply to the nature of working on a cemetery project. When it comes to other project types (e.g. town centers,
urban infill, retail), there are numerous disparate groups with their own interests; and each group believes their won respective interests should be placed at a higher priority than the others. Often these varied interests are seemingly in conflict, resulting in an environment of contention and distrust. While varied organizations and interests were represented among the stakeholders for the ANC expansion projects, everyone had the best interest for the client in mind first and foremost. This raises the question: who is the client?

Generally, the simplest answer to the question of clienthood for a given project is whoever owns the site or development, and whoever will be using the space. In the case of a national monument, it essentially belongs to the American people at large. Defining who is using the space becomes more interesting. In essence, there are two primary user groups; of course the families of those interred who come at the initial committal and return to visit their lost loved ones as often as they choose, and the visitors who wish to visit a national monument and pay a collective sort of respect. However, it’s not that simple. A cemetery is not defined only by its hours of operation, and it is not defined by its monuments and markers. There are people there, all the time. The dead have no voice; they do not have a place at the table where they can say ‘this is how my final resting place should be.’ Regardless of politics or prejudice, these were people who lived and died, as we all must do. This reverence for the past allows us to connect to something greater than ourselves. We take on the responsibility and honor of speaking on behalf of the dead, and that priority supersedes our own.

The design team and principle stakeholders for the project included:

- U.S. Army Corps of Engineers – Norfolk District
- The LA Group (design consultant, landscape architecture firm from New York)
- STV, Incorporated (design consultant, engineering firm from Maryland)
In 2011, during a week-long charrette, the planning team in concert with the stakeholders focused primarily on the Millennium Expansion site since that was slated for more immediate implementation. There were broad-brush discussion regarding the Southern Expansion, but further development would have to wait for a future time. During discussions and open-sketch sessions during the charrette, the team developed four primary Alternatives, known as A, B, C, and D. These were compared against a fifth No-Action Alternative, that considers a continuation of existing conditions without intervention, leading to full capacity in 2025. Further development involved combining aspects from the four alternatives and developing two additional Alternatives E and F. For additional information pertaining to the various options, a copy of the Arlington National Cemetery Millennium Project Final Environmental Assessment, June 2013 is available on-line. For the purpose of this paper the alternatives are summarized briefly as follows:

Millennium Site Design Development
Alternative A was based on a plan that had been initially developed in 2002. The primary change being that instead of standard burial plots, pre-placed crypts, which require less square footage, were proposed in order to maximize interment space. Pre-placed crypts also improve efficiency in that they are buried in place at the time of site construction; this minimizes the excavation needed at the time of each interment, thus
improving efficiency and consistency. This plan yielded the greatest number of burial spaces, but was the least environmentally sensitive. This plan would provide 42,150 total new burial sites: 14,250 3-foot x 8-foot crypts for casket burials, 4,900 3-foot x 8-foot crypts for inurnment (in-ground placement of cremated remains) burials, and 21,000 niches for remains. This Alternative was not pursued.

Alternative B had the second highest number of total burial sites, however the layout of the columbarium walls were not consistent with the traditional character of ANC; additionally, this design did not allow for a location where one could view the entire vista. This plan would provide 38,700 total new burial sites: 15,600 3-foot x 8-foot crypts for casket burials, 2,500 3-foot x 8-foot crypts for inurnment burials, and 20,600 niches for remains. This Alternative was not pursued.

Alternative C yielded the fewest total burial sites, but was more in keeping with the aesthetics of ANC, and was more environmentally sensitive. This plan would provide 35,620 total new burial sites: 13,700 3-foot x 8-foot crypts for casket burials, 2,550 3-foot x 8-foot crypts for inurnment burials, and 19,370 niches for remains. This Alternative was not pursued.

Alternative D ranked in the middle for total burials and environmental sensitivity, but required heavier site impacts. This plan would provide 37,280 total new burial sites: 12,150 3-foot x 8-foot crypts for casket burials, 4,850 3-foot x 8-foot crypts for inurnment burials, and 20,280 niches for remains. This Alternative was not pursued.

Alternative E balanced extending the longevity of ANC while minimizing impacts to the project area. This plan would provide 29,922 total new
burial sites: 6,565 crypts for casket burials, 3,822 in-ground sites for cremated remains, 1,590 in-ground traditional burials, 115 in-ground custom spaces, and 17,830 niches for remains. This Alternative was ultimately pursued for further development.

Alternative F combined the environmental sensitivity of Alternative C with an improved circulation system. This plan would provide 32,350 total new burial sites: 13,700 3-foot x 8-foot crypts for casket burials, 2,550 3-foot x 8-foot crypts for inurnment burials, and 16,100 niches for remains. This Alternative was not pursued. The process was a complex balancing act that led to a thoughtfully designed expansion plan with a harmonious configuration of interment options. For example, the Millennium Site was topographically challenging, but combination retaining/columbarium niche walls allowed the terracing of traditional open lawn casket burial areas. Niche walls were designed to not stack any taller than the height an average person can reach up to touch (established as 5 niches tall). When people visit the sites of their departed loved ones, it is important to be able to touch something, to feel a tangible connection. Taller niche walls would have allowed for greater capacity for storing cremains which would have extended the life of the cemetery even more so, but it was vitally important that we design for the experience of visitors and to treat all those interred with the sense of respect owing to the nation’s veterans. These retaining niche walls are an illustration of the fact that differing interests are not intrinsically opposed; they can yield more powerful solutions when combined.

Program elements incorporated into the final design included:
- Casket burial sections
- In-ground sites for ashes
- Columbarium niche courts and niche walls
- Two assembly areas including Committal Service Shelters
- Restrooms
Storage areas
- Water features (required for columbarium courts)
- Waterlines
- Sanitary sewer
- Storm drainage
- Underground electrical and communication/information systems
- Landscaping
- Retaining walls
- Perimeter fencing
- Vehicle and pedestrian access roads and walks
- Security systems
- Stream restoration
- Underground stormwater storage and conveyance system

An August 2012 meeting served as an opportunity to update all involved agencies and allow them the opportunity to respond to the project in turn and voice their concerns. The concerns noted during that meeting included:

- Access to the site and security issues for JBM-HH
- Consideration of historic site conditions
- Consideration of the new perimeter/retaining wall adjacent to JBM-HH; specifically on height and line of sight over the wall, and maintaining a consistent appearance to the wall on the exterior (non-ANC) side
- Impacts to jogging path
- Old Post Chapel, gate and security measures addressed at the gate
- Utilities
- Preserve historic nature of the woods behind Arlington House
- Retain as many old-growth trees as possible
- Recommendation for guide maps, kiosks, information areas
- Security at top of boundary wall and understanding that JBM-HH security requirements change over time
- Adjacent existing JBM-HH Motor Pool and loud noise which may come from that area
- Staging and access routes – to include access to the NPS parking lot stormwater management

While every effort was made to address all considerations, there is no perfect project. One particular consideration that remains continually in the forefront is the impact to cultural landscape resources. There are 20.7 acres of forest associated with the historic Arlington House within the project site. The project would impact a 2.63-acre area of forest, focusing on areas that had been clear-cut during the Civil War, and preserving areas of older growth.

**Alternative E - the Proposed Alternative**

The Proposed Alternative best meets the criteria and needs identified for the project. The plan preserves the existing woodland at the east edge of the site which serves as a buffer between the cemetery and the National Park Service property, in addition to retaining the natural aesthetic. This plan minimizes the amount of topographical cut and fill toward the stream, and includes restoration of the stream channel, allowing the stream to serve as a natural water feature onto which the columbarium court rooms open. Water features are a requirement for columbarium courts, so using a natural solution respects the natural and contemplative character of Arlington National Cemetery. A perimeter columbarium wall acts as a retaining wall, accommodates niches for cremains (cremated remains), and provides security separation for Fort Myer. There are two committal service shelters that serve as venues for interment ceremonies not conducted adjacent to an actual gravesite; these shelters provide space for the military honor guard. Meandering paths, preservation of mature trees, and additional landscaping further contribute to the aesthetic character of ANC.
Current Status and Beyond
Since the time of the preparation of graphics included in this paper, further refinement to the proposed plan has continued in order to better address concerns. The engagement process never stops, and rightfully so. Ultimately, it is projected that the Millennium Project will extend the life of Arlington National Cemetery into the 2030s, and the Southern Expansion will extend it further into the 2050s. The construction contract was awarded on September 24, 2013; the project is currently under construction and the expected completion date is August 2017. The first interments will likely occur in the summer of 2019.

Remember me
Of all the projects with which I’ve had the good fortune to be involved, Arlington National Cemetery remains the most significant and rewarding. While it stands apart from other engagement experience I’ve had, it gets at the essence of what it is to be a landscape architect. Yes, we are stewards of the earth, but we must all find our place in it. We want to know that we mattered during the time we had; we want to leave something behind, whether in the form of family or a legacy of another sort; we want so desperately to be remembered. As landscape architects, we have the unique opportunity to commemorate and to celebrate individuals and collective groups of people for what they’ve accomplished and how they lived. In continually living in these spaces we become connected to that ongoing legacy, connected to something greater than ourselves.

I will conclude with a short recollection from when I was a landscape architecture student in college. I had happened upon an inconspicuous gravestone while exploring a modest little cemetery in Muncie, Indiana, and had taken note of the inscription, self-authored by a forward-thinking young person by the name of Francis M. Mahoney, who in 1881 had perished after only 20 years of life. I leave you with his final words:
“Remember me
When this you see,
When this you look upon;
Wrote by my hand,
As this may stand
When I am dead and gone.”
Arlington National Cemetery - Millennium Site Expansion
Professional bodies are mandated to reflect on their core body of knowledge and to adapt their practice to face new challenges. Landscape architecture is no exception. The issues that we face as a consequence of our impact on the global ecosystem show no sign of abating. Climate change, resource depletion, population growth, pollution and urbanisation present formidable global challenges for humanity [1] and such complex environmental issues demand input from a range of different discipline areas. Educators, and those with responsibility for curriculum development, must build on foundation skills and theories whilst reflecting on contemporary and future challenges. Our profession has to take its place with others in addressing the complex problems facing society. Against this background, this paper discusses some recent research that looks at ways of maximising the efficient use of urban land, in building community resilience and in developing effective techniques in conducting co-creation workshops to engage citizens in the adaptive co-management and design of urban space. It examines a prototype app developed by researchers at University College Dublin (UCD) to map and record underused urban spaces. This paper discusses the trialling of the emerging methodology in a pilot study engaging groups of students from a range of disciplines in Aarhus (Denmark) and Dublin (Ireland).

**Recording our surrounding**

Map making and associated surveying as a precursor to future action is at the core of landscape architecture practice. Cartography, the science and practice of drawing maps, is an ancient activity. From prehistoric cave dwellers who scratched markings on their walls, via the ancient Babylonians with their city plans inscribed on clay tablets, to the contemporary revolution in map making resulting from satellite remote sensing, different societies have recorded and made sense of their surroundings for a range of reasons. In a study of the history of mapping Harley and Woodward make clear that ‘map making was one of the specialised intellectual
weapons by which power could be gained, administered, given legitimacy and codified’ [2]. Harley goes on to claim that maps ‘have been the weapons of imperialism’ as much as guns or warships [3]. Maps have long been associated with property rights and the ‘long term structural changes associated with the transition from feudalism to capitalism [4]. Detailed graphic plans superseded the earlier written surveys as inventories of landholdings in order to calculate rent and control boundaries. Today, map making is an endurable activity at the heart of spatial planning and design, while surveying is a more embodied process often ‘involving direct sensual contact with the spaces to be mapped’ [5].

**Societal challenges**

Each generation faces specific social and environmental challenges. Sometimes new problems arise, more often they emerge as iterations of previous issues. At the start of the twentieth century, Patrick Geddes, the Scottish pioneering town planner (and early champion of the title “landscape architect”) was responding to challenges familiar to those issues facing urban areas and society today, such as an inadequate understanding of the city as a social ecological system, dereliction and vacancy, inefficiencies in the use of resources, social inequity, stress on ecosystem services, and a lack of a comprehensive vision. Crucial to Geddes’s comprehensive response to these problems was the inclusion of the citizen in contributing to the new urban plans. He actively promoted surveying methods in the early 1900s as part of his pioneering town-planning work. In contrast to mapping as an exertion of power and control, Geddes regarded his civic projects as a way of intervening in the consciousness of citizens, and in promoting ‘an active, experienced environment’ [6] This belief anticipated the contemporary engagement of citizen science [7]. Geddes’s ambition to democratise mapping and to engage the ordinary citizen in engaging with their locality has potential, in the 21st century, to promote community resilience and techniques for co-creation.
Today, in spatial planning and design, the challenge of our time is responding to the inevitable process of urbanisation. This issue is associated with ‘increasing uncertainty due to climate change, migration of people and changes in the capacity to sustain ecosystem services’ [8]. Against such a backdrop the notion of urban resilience has received much attention. While a contested concept, the literature on resilience reveals two strands, resilience as recovery and resilience as transformation [9]. Described variously as the ability to cope with external shocks and surprises [10], the ability of a social system to withstand disturbances and to reorganise itself following disturbance-driven changes [11]. Broadly speaking, the notion of resilience is a counterpart to the concept of vulnerability, not only as a means of coping with external changes or shocks but also of responding actively and positively to risks [12], and how communities can employ their own collective and individual internal resources and capabilities to both “bounce back” from external shocks and reduce further vulnerabilities. A resilient world “is very strongly connected to the capacity of the people in that world to respond” [13].

The Project

It is against this backdrop that a team of researchers at University College Dublin (UCD), funded under a Horizon 2020 [14] research project “OrganiCity - Co-creating smart cities of the future” [15], developed an app “Opportunity Space” to engage citizens with their surroundings to promote a more efficient use of urban space. This research recognised that that space is a limited resource, and that the underuse of space is a widespread and “wicked” problem [16]. Underused spaces in the city can be vacant sites, expanses of flat roof, spaces left over after infrastructure planning, or rarely used public spaces. Such spaces can be considered opportunities for a town or city to reinvent itself, and to address social and ecological challenges in urban systems. Individual cities face different specific challenges. In Aarhus, (Denmark) there was awareness that many citizens lacked access
to open space, nature and fresh air, while in Dublin (Ireland) there was recognition of the inefficient use of space and associated systemic and negative consequences such as urban sprawl, negative visual and social impacts, and a false impression of scarcity.

“Opportunity Space” mapped these underused spaces and generated ideas for their reuse through crowd-sourcing. The project developed a smartphone app using Organicity data assets and tools that allows citizens to take geo-tagged images of spaces they find in the city that will automatically link to a shared map, contribute information and observations on the spaces, and put forward ideas for re-use to an online ideas noticeboard. The objective is that citizens can view the ideas through the map or online noticeboard, add comments, rate the ideas, and offer support. The experiment therefore initiated co-creation processes on the spaces that were further developed in a co-creation workshop.

At the pilot phase of this project, students in the two trial cities were used as proxies for citizens. The students in Aarhus were Masters students of Experience Economy in the Department of Culture and Society, while in Dublin the students were Stage 2 undergraduates on a BSc Landscape Architecture programme. At each location students were given an induction workshop which:

1. Introduced them to the project (i.e. the idea that urban space should and could be used more efficiently);
2. Provided the historical and theoretical context to the research project;
3. Gave an introduction to international examples of interactive mapping of underused spaces. (e.g. Groundedinphilly.org [17];
4. Introduced the app and how to use it in their city.

Following the workshop, the students were required to:
- Use the app to locate and record spaces, add information, and put up ideas;
- Meet as a group and decide on a couple of spaces to concentrate on;
- Use other mapping techniques to understand their selected space(s) better;
- Encourage citizens and friends to use the app via a social media campaign;
- Subsequently attend a co-creation workshop led by the “Opportunity Space” research team and attended by technical representatives from the Municipality;

This co-creation workshop took approximately four hours in total and started with an examination of the crowd-sourced map of urban vacancy in the city that the student group (and others) had contributed to. The nature and distribution of the sites and the ideas “captured” and uploaded by the students trialling the prototype app were reviewed. The next stage involved students working in small groups on a site selected by the group. One student per group was designated as the group leader. After a preliminary analysis and an idea-generation exercise the students were then randomly assigned specific roles (See Table 1) and asked to re-evaluate the site and the developing intervention from the perspective of their new roles.

In the final stage of the co-creation workshop all the students, with the exception of the individual group leader, swapped to a different group where they worked together to finalise draft proposals for interventions in the selected sites that met the challenge of the underuse of space in their city. The representatives from the Municipality moved between groups to listen and participate in discussions. At the end of the session each group presented their ideas to their class and the representatives from the Municipality. On conclusion, the student participants filled in a feedback sheet on their experience of using the app, and engaging in the co-creation workshop.

**Results**

In terms of the developing app the students noted that the experiment encouraged observation of the urban environment:
‘I pay more attention to spaces in my everyday life after using the app.’;

‘I looked for new things/spaces in the town I know so well. It opened my eyes’;

‘Yes, now I look for underused spaces when I move around the city’.

It was evident that the use of smartphone technologies facilitated a level of engagement and immediacy that proved successful with the student participants. However, participants were critical that the technology being used was not (yet) a fully developed app, i.e. that they had to engage in the first instance via a weblink in a browser rather than a smartphone app. There was an impatience in having to search for the weblink, rather than having an icon immediately available on their smartphones.

The number of potential sites uploaded in both cities revealed that information on local issues (such as underused spaces) does exist, often distributed among citizens and scattered throughout the city. It was evident that the system developed by Opportunity Space has the potential to accumulate data that might otherwise be very resource-intensive to gather due to its scale, fluidity and often tacit nature. The engagement from participants, and the data gathered, prompted a diverse range of valid ideas, many of which have the potential to meet the stated challenges (the need for more fresh air, external recreation space or greater efficiency in the use of urban space).

The process also proved to be very successful as a pedagogic tool, for example, providing opportunities for learning in relation to urban planning theory, participative planning, land use, regulatory, ecological, and social systems. It also demonstrates the potential of ICT and GIS for social engagement and change; co-creation processes and opportunities for innovation.
Conclusions

There were two objectives to this research; one is the continued development and refinement of an app that can be used by citizens to gather spatial information about their surroundings, the second is an on-going reflection on how landscape architecture practice can engage with the urban resilience agenda.

An iteration of the prototype app has subsequently secured Social Innovation funding and is being further developed. The crowd-sourced information that emerged from the project created an evolving map of the city, which as a pedagogic tool promoted more effective ways of seeing the city, generating knowledge and facilitating meaningful co-design. As Ahern, et al. states ‘This future urbanization is unprecedented and emphasizes the need for innovative approaches to generating knowledge before, during and after the process of urbanization in an adaptive mode.’ [18].

In terms of pedagogy, the participatory or co-creation workshops and associated role-play proved a valuable learning activity, the switching of roles, and moving from one site/issue to another promoted flexibility of approach and broke down barriers between the participants and the professional representatives from the Municipality. Those involved in the practice, education or research associated with such disciplines have to re-evaluate their approaches and priorities. Landscape architecture is no exception and has to reflect on its relevance in a changing world [19] Co-creation is a creative approach to problem-solving and sense-making which accommodates a broad range of design methods embracing both the expert and the non-expert, where people are actors in the process and not simply users. While students were used as proxies for citizens in this project, they had limited (2 year) or no background in spatial design. The level of smartphone ownership (72% USA, 77% Spain, 68% UK)[2] is growing rapidly,

and although a demographic digital divide still exists, the now extensive smartphone ownership means that tools based around such technology are becoming increasingly accessible to a wider public participation in the developed world. Future landscape architecture graduates will have to develop skills to harness ideas/insights from members of the communities they will be working with. Refinements of such co-creation workshops should assist in this objective.

Endnotes


[7] Citizen Science: the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.


[14] Horizon 2020, the EU Research and Innovation programme (2014 to 2020).

[15] OrganiCity is a service for experimentation that explores how citizens, businesses and city authorities can work together to create digital solutions to urban challenges.

[16] A wicked problem is a social or cultural problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognise.


Table 1 “Roles”
Biodiversity officer; Hydrological engineer; Roads and transport engineer; Elected representative (Councillor)
Child; Teenager; Adult; Parent with child; Older person; Refugee; Homeless person; Tourist
Visually impaired; Aurally impaired; Mobility impairment
Cyclist; Climate change activist; Community activist; Food security activist; Business owner
What is a revolutionary landscape? Under our point of view a revolutionary landscape is the one able to enhance transformation and change. It is the one able to be open for a kind of ‘permanent revolution’. However, ‘revolution’, is not understood here under its romantic approach linked with violent change from one day to another, but linked with continuous transformation and the quotidian events of everyday life of inhabitants. We would like to follow here the ‘unbound pragmatism’ defined by Brazilian philosopher R. Mangabeira Unger [1], which uses imagination as a tool for continuous change and permanent revolution, instead of using crisis as mandatory tool for change. This conforms the theoretical frame from which our approach to revolution and revolutionary landscapes emerges.

Where do we find these revolutionary landscapes, or their seeds, nowadays in our cities? We find the seeds of these revolutionary landscapes in the areas so called ‘terrain vague’ (Solá Morales, 1995) [2] or some others quite synonymous definitions: ‘third landscape’ (Clement, 2004), ‘fourth nature’ (Kowarik and Körner, 2005), ‘nouvelle nature’ (Girot, 2005), ‘third wilderness’ (Hofmeister, 2009) or ‘second nature’ (Geuze, 2010) [3]. What all these terms have in common is the reference to a succesional nature or ecosystem, developed in a former urban or industrial site but within the sphere of influence of an urban environment. To definitely transform a ‘terrain vague’ or ‘third landscape’ into a revolutionary landscape, we consider also its overlapping with a quite dense and continue social activity that is produced with an important dose of immersion within the geography of this ‘terrain vague’ or waste ground. Only in this case, these landscapes can develop their full potential. These last questions set, for our revolutionary areas, the following conditions: to be surrounded by residential fabric and to have the extension of some hectares- we don’t consider here single small abandoned plots.

To define this study case of already existing revolutionary landscapes, we have taken as reference the city of Madrid –our homeland- which has a collection of around thirty areas, with minimum surface of approximately 90Ha- adding, a total of 2.000Ha within the city [4]. Through the direct
observation of these places, walking along them, we have been recording the different alternative social practices of the citizens in their encounter with this geography. These practices encourage transformation of ecosystems, and diversity of social dynamics and politic of the space. We observe practices of ‘radical imagination’ for a continue revolution. We find here a ‘radical openness’ for reinventing our cities, and mostly, we find here the reality of time, a real time where we are conscious of changes and transformations. A short review of the practices that enhance the revolutionary character- being ready for on-going and uninterrupted transformations within plurality- would include mainly ‘Civic Ecology practices’, but also playgrounds and popular sports or domestic extensions. It is interesting in terms of reinvention both, what is done here- unexpected programs- and how is done- unexpected implementations and associations. Revolutionary landscapes are areas of impunity and freedom that call for a non-habitual action.

But these revolutionary landscapes habitually appear in the margins, and their innovations remain there. Only sometimes, are able to transcend to more central spaces- in social, geographical and political terms. Let’s put our attention in these spaces characterized by centrality...

**What if we would insert at the central areas of our cities these revolutionary landscapes in order to re-imagine and re-invent the core of our urban ecosystems? Could we transcend the limits of the margins bringing revolution where centrality, power and stereotypes predominate?**

The answers to these last questions are linked to the two case studies of research through design I bring here: Central Square in Plovdiv, Bulgaria; and Piazza Castello in Milan, Italy. In both cases, we put our attention in the central squares of these cities, some of the main public spaces of Plovdiv and Milan. Central areas where urbanity, public space, culture and history, also archaeology- mainly in Plovdiv- are intertwined. But both places share also the decay and obsolescence of their public space as it was conceived. After a long succession of chaotic and disconnected interventions that at the same time were
trying to conserve and respect such representational areas avoiding strong changes, they are not a chronicle of life anymore but just a void representation of it. For this reason, they can be just at the opposite place of the revolutionary landscapes we refer to, where citizen’s life and the landscape evolve at the same pace. In the core of these cities time has been somehow adulterated and desynchronized of life. Vegetation there, lacks biodiversity, one cannot feel seasonal changes, and their public space respond only to stereotyped actions that are repeated once and again, without a real exchange or dialogue in between the alive organisms, human or not, and the environment. What we achieve once we integrate some sparks of revolutionary landscapes here, is to mix them with these enlarged dimensions of culture, history and centrality. This conjunction can produce under our point of view, the change of the entire urban ecosystem into a more integrated ecological program. Let’s see which aspects allow the creation of this infiltration of permanent quotidian revolution in such a context.

We will move now in between spatial cognition and movements, and embodied politics and performances.

Spatial cognition and movements...

If the goal is to enhance continuous revolution and transformations, people involved in these landscapes must establish a strong dialogue with them. Actually, it is in the relationship with others and with our environments that we develop our ecosystem. In this sense we want to enhance plurality of individuals, trusting in their capacities and their own utopias to be realized. It is because of that, that these designs focus in the human being as an embodied organism-in continuous exchange with the medium- with a perceptive apparatus that correlates with the affordances found in the environment [9] and with a whole integrative system in which cognition, is related to the body-mind holistic structure- what is called “soma” [10]. These designs, are thought taking into account somatic interactions as a way of “awakening” the self, enhancing possibilities for development and transformation of both, inhabitants and landscapes, they evolve together [11]. It is through movement that this embodied spatial and holistic cognition is
Reached this point we cannot talk about these landscapes without talking about the ‘self’ and it is through the different kinds of self-knowledge that psychologist Ulrich Neisser conceives \[12\] that we will develop our considerations in relation to our two case studies of research through design.

First, he refers to what he calls ‘ecological self’, that would be the self as perceived with respect to the physical environment \[13\]. What do we propose in these revolutionary landscapes concerning the physical environment? Coming back to our reference model, one of the main things that emerge when you visit a ‘terrain vague’, almost always present, is a rough terrain, a hilly topography that on one hand, makes you to interact with your whole being with the physical medium, paying more attention, being engaged, and on the other choreographs somehow a different way of movement. A movement clearly distinguished from the automatic one that normally we are used to develop in the city and its public spaces. In addition, this produces also overwhelming and non-expected experiences, related to viewpoints and topological relations for observing the city in a non-habitual way. When we turn to look at Plovdiv Central Square in Bulgaria, we see clearly big opportunities to enhance alternative movements able to encourage transformations through topography. The nowadays square is full of different levels because of the presence of important archaeological ruins and layers coming mainly from the Roman Forum of Ancient Plovdiv (1\textsuperscript{st}-5\textsuperscript{th} centuries). All these levels are disconnected, creating a big chaos in the public space, which was conceived as a flat surface, now full of disruptions and holes. In this way, the creation of a new topography using the terrain coming from the archaeological excavations allows a more continue walking-through this environment, working with proprioceptive experience that ‘delivers a corresponding sense of body position relative to the environment, or a corresponding sense of self’ \[14\] in the sense that Neisser call ‘ecological self’. The development of this new topography configured as a collection of hills, multiplies the possibilities in topological terms of how we relate
to our environment in this public space. We can be under the small mountains, on top of the hills, in the valleys... a lot of proprioceptive relationships are created. And our movements produce shifting ways of intimacy, perception, or programmatic possibilities. We design atmosphere related to the whole somatic experience. Somehow, in this way we enhance also to pay attention to ourselves through awareness of what we perceive and feel, as R. Shusterman says ‘many qualities that constitute atmosphere are perceived through the senses that are distinctively bodily- namely, our proprioceptive, kinesthetic, vestibular, tactile senses’ [15]. Actually, in the second project for Piazza Castello in Milan, we follow the same strategy related to the organization of a choreographing topography- this time as we will see because of historical and memory reasons- and in addition, different textures, and tactile landmarks are included giving the possibility of perceiving using not only our far distance senses but also the ones linked to our skin and basic coordinates. Of course this information is always present but normally we don’t give awareness to it. Hence, it is the aim of these landscapes to enhance our full immersion in order to create a powerful engagement of our ‘ecological self’. The other aspects that contribute to this are in relation with the non-human organisms on site. The aim of these new topographies, set in Plovdiv and Milan, is also to host a collection of autochthonous species enhancing biodiversity and following the ‘behaviour’ of the ‘third landscape’, able to show really different configurations along seasons, revealing a real time dynamic. As an alternative to short cut lawns and flower beds, often found in these public spaces and needed to be replanted every year, we tapped into the wealth of biodiversity of native, stress-tolerant species, having low water and nutrient requirements, present in rural areas or waste-grounds- our seeds for revolutionary landscapes. The annual and biennial chosen species are self-seeding which don’t need to be replanted. The landscape design, hence, offers dynamic vegetation, changing with the natural seasonal patterns and transmitting the cultural awareness to appreciate the colours of the blooms and the winter shapes of “brown” vegetation. Most of the species are pollinators attractive. They are able to configure powerful experiences in terms of
atmosphere and learning. They also qualify spaces giving the ‘ecological self’ a powerful awareness [16].

Embodied politics and performances...

Continuing with our trip within the self and the revolutionary landscapes, we can talk now about another kind of the self-knowledge: the ‘extended self’. ‘It is the self as it was in the past and as we expect it to be in the future, known primarily on the basis of memory’ [17]. This is very important in our considerations about revolutionary landscapes and selves, as we are saying from the beginning that one of the main characteristics of this continuous revolution is the capacity to produce transformation from quotidian everyday events through imagination. To begin with, memory is a kind of imagination, and to be able to have expectations of ourselves in the future we need also to project, to imagine. How to enhance this through design? In our two case studies, we try to reveal the current of time both, through connection with history and culture, but also through the continuous transformation using a kind of creative cycle of destruction and reconstruction that each inhabitant can follow and be involved with. Let’s focus for a while in the project for Piazza Castello in Milan. The soft mounds created as new topography have a strong connection with history. They recall several famous historical paintings of the site from the centuries XIV and XVIII [18], which show this kind of landscape surrounding the Castello Sforzesco-historical building that governs the square. But also the hills perimeter builds a memory and opens a big window for continuous transformation: surrounding the mounds, the pavement will be set anew in the whole area following different stages. In first row near the hills, is proposed an “ornamental pavement” drawing a nature geometrical pattern. This drawing, somehow wants to remember that these hills are part of a “Second Nature” emerging under an urban and cultural process so it is a kind of different generation of naturalness able to combine living organisms and natural structures with some synthetic natures, the ornamental ones. This public ornament wants also to establish a dialogue with Leonardo Da Vinci “Salla delle Asse” inside the Castle, where an exuberant ornament linked to nature and vegetation is set. This ornamental pavement is made in rubber, printed
concrete and some embedded pieces to configure some of the drawings. The embedded pieces will be recycled pieces of the existing elements on site, in this way, the traces of the “story” of the place will be host on its pavement, on its skin, allowing time to go ahead adding layers but also more wisdom to the relation in between humans, non human organisms and their environments, under an on-going process of dismantling and constructing the new from the layers of the reality on place. Melting memory, innovation and continuous transformation. Continuing this kind of ‘cradle to cradle’ daily revolution, this is extended in the project also to other kinds of pavement, public furniture, and different reconstructions with dismountable pieces, giving birth to seasonal rituals and celebrations, where memory and projections are overlapped.

This capability of transforming our environments is linked also to the capability of changing the relations of power and cooperation in between us. Revolutionary landscapes aim to enhance ‘innovative cooperation’- following Mangabeira Unger- for citizens, building things together, experimenting over time, reinventing... and also observing, along time, these transformations... which bring us into the ‘interpersonal self’ but also into embodied politics and performances. Powering plurality and original selves, innovative cooperation creates practices and habits that reduce the distance in between our ordinary activities that conserve our social world, and the extraordinary activities through which, step, by step, we change that social world [19].

The ‘interpersonal self’ is the self as engaged in social interaction. Again like the other selves, most of the relevant information is essentially kinetic, in other words, consists of structures over time. But in this case come into existence only when two or more people are engaged in personal interaction [20]. For this, both projects, Milan and Plovdiv set a collection of open, natural and spontaneous auditoriums or urban scenarios conformed by the topography. We imagine these platforms as areas for citizen’s expression, urban debate and social exchange. Once again the aim is to enhance plurality and reinvention, not only through spontaneous
individual performances- we have talked about them concerning the ‘ecological self’- but also through cooperative reinventions and appropriations. The designs open everyday life quotidian events to transformations and exchanges, and intertwine social life of an array of different individuals, with arts and cultural performances available to everybody and done by everybody. The scenarios are the places to be programmed either in a collective communitarian way, made by citizens associations or groups of people; either sometimes, under a public management.

The combined management aim also to show how collaborative processes in between different layers of society can be an optimal way to train experimental politic evolutions. In this way environment –urban revolutionary landscapes- and people lives will continue evolving at the same time. Therefore, we think that revolutionary landscapes inserted at the heart of the cities, in their relation with each of us, can be the vehicle to achieve what Laclau and Mouffe call ‘radical democracy’ which has as one of its main aim to preserve one’s own power for ‘radical imagination’, which means the capability for utopia, for thinking the other [21].

But how these more intimate aspects of us like citizens can be considered into our designs? The two last kinds of self-knowledge can help us on this: ‘The private self’ has to do with the ‘conscious experiences that are not available to anyone else. Some of these are the inner aspects of perception and action; others- dreams for example- are quite independent of the individual’s present circumstances’ [22]. ‘The conceptual self’ refers to ‘the concept that each of us has of him or herself as a particular person in a familiar world’ [23]. These both are related to the radical democracy project that we have just mentioned above, and count with some spaces within the designed projects. In between the topography soft accidents, we can find intimacy, somehow, public spaces just for one, ready for own utopias... and in the flux of interpersonal, ecological, and extended knowledge, we hope to be able to open- to enrich- the catalogue of ‘conceptual selves’, but also of possible environments, further from the stereotypes to which sometimes we are attached.
Taking into account how the core of the cities are always maintained as something “untouchable”, to consider their evolution, including a second nature containing the seeds of a revolutionary landscape at the core of the urban experience, can be a model to extrapolate to other cities bringing a much more imaginative and wise urban ecosystem and society. If our environments define us, these projects for continuous reinvention through imagination and somatic experience maybe, can add some other layers to our urban ecosystems, making them more vivid and able to promote the whole potential of individuals... individuals engaged in their revolutionary landscapes.

Endnotes


3 [] These terms can be understood and compared at: Barron, P. & Mariani, M. 2014. Terrain Vague. Interstices at the edge of the pale. USA: Routledge.

4 [] From 2014- to nowadays- a group of studies was created by Mª Auxiliadora Gálvez in Madrid in order to know better the ‘revolutionary landscapes’ of the city. Together with Ana Fernández (Architect), Emilio Luque (Sociologist, participating from 2014 to 2015), Oscar Miralles (Forestry Engineer), Víctor Moreno (Film-maker), David Prieto (Sociologist, in the project from 2015), Alejandra Salvador (Architect) and Rocío Santo-Tomás (Architect, in the project since 2016) the group have been walking and studying these areas. Some of the discoveries can be followed and read in: Krasny, M. & Snyder, K. 2016. Civic Ecology. Stories about love of life, love of place. USA: Cornell University civic Ecology Lab, p. 110-120 and in the paper presented at the congress of FES (Spanish Federation of Sociology) 2016, Espacios en espera. La ecología cívica como agente de transformación urbana y reinvención social.

5 [] We refer here to ‘radical imagination’ in the terms that refer to it Ernesto Laclau and Chantal Mouffe in relation with their ideas for a ‘radical democracy project’. Laclau, E. & Mouffe, Ch. 1985. Hegemony and Socialist Strategy. To-
wards a Radical Democratic Politics. UK/USA: Verso.

6 We refer here to ‘radical openness’ in the terms that refers to bell hooks. 1990. *Yearning: Race, Gender and Cultural Politics*. Boston, MA: South End Press.

7 Civic Ecology practices are developed by citizens in broken places. They do so in order to recover their connection with the environment and in some way heal both, the environment and themselves. The principles of Civic Ecology are defined in: Krasny, M. & Tidball, K. 2015. *Civic Ecology. Adaptation and Transformation from the Ground Up*. USA: The MIT Press.

8 Both projects have been developed within the frame of international competitions. Piazza Castello’s project was finalist and exhibited to all the citizens at the Castello Sforzesco in Milan, in February, (2017).


10 The term ‘soma’ has its origins in the Greek word for body. Nowadays it is used in philosophy to design ‘the living, sentient, purposive body’ it is a way of designating embodiment but without all the problematic associations of the terms ‘body’ or ‘flesh’. It is referred to the ‘sentient lived body rather than merely a physical body’. Quotes from Richard Shusterman, to go deep see: Shusterman, R. 2012. *Thinking through the Body. Essays in Somaesthetics*. New York: Cambridge University Press, p. 3, 5.


13 ‘I am the person here in this place engaged in this particular activity’. Ibid., p. 386
14  

15  
   15  [ ] Ibid., p. 235

16  
   16  [ ] It is interesting how through awareness and training of proprioception- taking into account the discoveries done in Neurosciences- we develop the body representations of our nervous system. We refer to ‘Body image’ and ‘Body schema’, both being the ones receiving nowadays more consensus about how the nervous system work talking about sensory-motor activities. ‘Body image’ is the conscious image or representation, owned, but abstract and disintegrated, and appears to be something differentiated from its environment. ‘Body image’ groups all the other representations about the body that are not used for action, whether they are perceptual, conceptual or emotional. ‘Body schema’ guide action and movement, operates in a nonconscious way, is prepersonal, functions holistically, and is not something apart from its environment. To go deep in these concepts see: Gallagher, Shaun. 2005. *How the Body Shapes the Mind*. New York: Oxford University Press.

Under our approach about imaginative continuous transformations, these continuous re-adaptations at the level of our nervous systems are fundamental to be enhanced through the immersion into the designed landscapes.

The ‘Laboratory of Somatic applied to Architecture and Landscape’ directed by the author- Mª Auxiliadora Gálvez- uses these same principles in pedagogy of architecture and landscape. The Laboratory is developed since 2016 at the San Pablo C.E.U University, E.P.S Faculty of Architecture in Madrid, Spain.

17  
   17  [ ] Ibid., p. 395

18  
   18  [ ] One quite famous is the painting by Bernardo Bellotto: *Il Castello Sforzesco*, 1744. Some others, showing even more radical topographies are from unknown authors.

19  
   19  [ ] Ibid., p.206

20  
   20  [ ] Ibid., p.391

21  
   21  [ ] Ibid., p. 190

22  
   22  [ ] Ibid., p.398

23  
   23  [ ] Ibid., p.400
A revolutionary Landscape occurs as a transition between present and history but also, between today and a projected future as a collective human and ecological project.
Terrain Vague Study case: Madrid, Spain
VIEW 1. From the main site.
Focusing the river landscape at
housing opportunities and
innovative spaces.
Abstract
In today’s world with the push of urbanization and uncontrolled growth of cities we face with the great threat of environmental degradation such as soil erosion, desertification of farmlands, air and water pollutions. The emergence of these challenges significantly describes the importance of resilient growth and ecologically informed development in the domain of urban praxis (both theories and practices). Thus, this paper focuses on developing a design strategy, which support the resilient rural-urban integration in the context of ‘Nazhvan’ Recreational Park, on the west bank of Zayandeh River and one of the few groves which has been left safe during urban development of Isfahan.

The integrated design strategy offers an alternative analytical method that informatively communicates between several scales, ecologies, and infrastructures, aiming to strategically combine them within the site-specific projects. By employing this method, the research first through a critical analysis, proposes several development scenarios to primarily ensure the compatibility of urban growth to the natural system of region. Later, based on the notion of landscape 'stewardship', as a bridging concept, it concentrates on the regeneration of an underutilized industrial site, located at the south of Nazhvan Park, transforming it to an innovative campus through the development of several hybrid urban-landscape typologies.

Introduction
In the latter half of the 20th century the pressure for industrialization in Iran created the rapid and dramatic transformation of cities. Today, as Iran’s third largest city, Isfahan is home to some heavy industries. In the last 50 years the urban expansion, development of new urban centers, population growth, city migration and new industries all increase the water demand.1 The province of Isfahan locates into the arid and semi-arid zones and like much of the Iranian plateau suffers from shortage of water.2 The analysis revealed several problematic environmental conditions, such as the partial
interruption of the irrigation systems, the pollution of waterways and aquifers derived from domestic, industrial and fertilizers waste. All these issues cause the Zayande-Rood River become drought most of the year, and the productive green tissue in the periphery and open spaces inside the city are deteriorating. In fact, while the rural landscapes are undergoing a dramatic process of change and facing great environmental degradation (soil erosion, desertification of farmlands, air and water pollutions, and the loss of biodiversity), the significance of resilient development of rural landscape is an urgent need to our current urban century.

The concept of rural resilience has been studied mostly during the last decade due to the process of post-industrial urban change and the resulting polycentric urban regions. Soja argues the metropolitan urbanization as a distinct phase in the development of the industrial capitalist city, growing out of an earlier phase of more highly centralized industrial urbanism. Heijman introduced the concept of rural resilience, as “the capacity of a rural region to adapt to changing external circumstances in such a way that a satisfactory standard of living is maintained, while coping with its inherent ecological, economic and social vulnerability”. In analogy to urban resilience the concept of rural resilience determines the degree to which a specific rural area is able to tolerate alteration before reorganizing around a new set of structures and processes. So, it describes how well a rural area can balance ecosystem, economic and social functions through which sustainability is reached. Hence, the resiliency is forward-looking quality that is more or less defined as the capacity of a system to absorb shocks and disturbances, while still maintaining the same functions, structure and feedbacks. This perspective is based on the idea that ecological, economic and cultural systems become increasingly related, and interactions between these systems are interconnected in various scales. This means that changes in one domain of resilience can affect the other.
domains. Therefore, this research addresses the concept of resiliency and adaption quality, first through a territorial critical reading of the urban and rural inter-related ecologies, aiming for protecting a significant part of agriculture lands, establishing buffer zones, water treatments, and eco-armatures. In urban-local scale, with employing the concept of landscape stewardship, as bridging concept, the research investigates a balance and resilient combination between several landscapes and their producing systems. To be inclusive to this wide range of ecologies and scales, the research has adapted an integrated method, a relative design strategy, capable for communicating in between those multiple geographies.

The Integrated Design Strategy
The integrated design mainly reflects the necessity condition of today’s metropolis that drives from urban diversities and dynamics, which has been compelled the planners and architects to work with the complex multiplicity of issues –infrastructure, landscape, and urban cross-structures. Adapting to the fast transmuting nature of current territories, appear as the mosaics of urban fragments each with its own space-time logics, then an integrated design strategy intends rather than being imperative to be ‘informative’ regarding to the territorial complexities and possibilities. This informative quality describes the design project as a cross-scape traversed by several fields, spaces/times and dimensional scales, involved in the transformation process of landscape, driven by human and natural interactions.

In fact, while today diverse urban geographies and their tendencies are not driving by a common cause, the integrated models would be supportive for those “reassembling” and collective effects, fundamental to the concept of cityness and its public sphere. As V. Gregotti states: “...Landscape as ‘geographic dimension’ [...] is a new way of thinking about the problem of formal structure in architecture. This is not a...
unique operating level, but it means to control methodologies with several formal specifications at different scales..."³³
Therefore, the design process should begin with “a cognitive process of the territory, tending on one side to reveal implicit and latent potential of the context, on the other hand, taking responsibility for the critical modification of what exist.”⁴ In fact, the concept of “urbanization of collective territory”⁵, explains that today the architecture project is a synthetic process, combined by: the inclusive perception, and the communicative representation of territory, to single out an extended and profound value of each project, reframing it into the territorial network logic.⁶⁷
Accordingly, the research project on Nazhvan landscape adapted a synthetic method, aiming to integrate the territorial cognitive perception with the representation of potential development scenarios and the site-specific project. In each scale, the compatibility of urban systems to the ecological ones (the continuity of eco-tonalities and biodiversity) has been the looked-for quality, via developing the environmental-sensitive design strategies and landscape architectures.

**Perception- Nazhvan as a Regional Forest Park**
The image of Isfahan has been inextricably shaped both by its historic monuments and its royal gardens. In the expressive visual descriptions of Safavid and Qajar area in 16 the century, Isfahan has been identified as the “profusion of gardens”⁸; the impressive green resplendence after a journey through the dry, ochre yellow, almost moon-like landscape of central Persia.⁹
The Growth of Isfahan during the last years resulted the significant loss of its agricultural lands and the increase of environmental pollution and socio-economic problems.
The first phases of Isfahan`s growth was continuous in relation to the rapid population growth. In the next step, the planning of new industrial and military zones initiated the build of new suburban areas and the growth of the preexisted nearby villages turning them to
new towns. During this period with the aim to increase the industrial efficiency, more than ten industrial townships have been established near Isfahan. The population growth in the province has been sustained by water diverted from the Karun River to the Zayande-Rood, the only major river of the province. Though, during the last few decades, the agriculture-based economy has been significantly turned to the industrial and service based economies.

Located in the west fringe of Isfahan, Nazhvan Park (the only regional green tissue remained rather safe during the city’s expansion) is the threshold between the city fabric and the industrial poles in south west of Isfahan, working as a filter for the air pollution. Nazhvan Park is also the beginning of the small embankment of the river called ‘Maadies’ (water-canals). The significance of Nazhvan to the Environmental quality and sustainable growth of Isfahan region demonstrates the importance of a territorial coherent strategy that primarily takes into account the compatibility of urban development to the geographical features and ecological systems of the region. (Figure 2)

By this, and looking for a balanced territorial system that is compatible to the ecological continuity of Isfahan Region, the research adapts the method of Metropolitan Reticular Matrix planning introduced by World Bank Institution. Metro-Matrix is a planning strategy to manage the balance growth of metropolises and equal distribution of urban services. This method departs from the understanding that each city has its specific unique character that derives from many aspects such as the environmental context given by its green infrastructure and geo-topographic setting, urban pattern, city fabric, the connectivity provided by network of infrastructure.

Studying the proposal of Isfahan’s metro matrix, the analysis addresses the city’s characteristics like geographic context, socio economic relations and infrastructures. Greater Isfahan has the population over 1.5 million in 2016, while the Isfahan province has the population around 5.1 million. The policy
projected in this strategy for the future of the Isfahan Region is related to the public transport improvement intending for a dimension of equity and social justice, and designing the new Centralities, as places that have the quality and capacity to attract.\textsuperscript{23} (Figure 3)

\textbf{Re-presentation- Scenarios for Retrofitting the Nazhvan Landscape}

“Nazhvan park” has been lately the context to the Isfahan Municipality’s recent interventions. Underestimating its main identities and potentials, and merely focusing on the eco-tourism development, these strategies rather than management and negotiation between the conflicting systems existing to the context, simply aim to freeze and restrict them.\textsuperscript{24} In fact, Nazhvan area is the land of high quality productive fields that based on its significance to the environmental quality of Isfahan region it should keep its natural characteristic and productive value, mainly for urban agriculture, reforestation, and water management. Underestimating these natural assets in recent years, as part of the Project for prosperity of Nazhvan landscape, the local government of Isfahan created facilities along this park as nearby recreational areas like sport grounds, a swimming pool, playgrounds for children and so on.\textsuperscript{25} (Figure 4)

The thematic development of Nazhvan by Isfahan Municipality in fact has diminished the productivity of this area, transforming it to a lower boom and an unsafe investment. The general policy of this area is restriction of building in the productive lands. Despite this regulation some owners who have plots mostly in the fringe of the area are trying to intentionally transform their fields and gardens to bare lands to be able to have the built permits and be more benefited of the residential higher price per meter. Another effective factor is the water shortage and the high cost for gardening that a lot of owners prefer farming and cultivation, finding it more prosperous. Therefore, the Nazhvan productive landscape is losing its dense green tissue and gardens; and it has 42 hectares of arid fields out of 1200.\textsuperscript{26} (Figure5)
By this understanding, and based on the findings from previous analysis and perceptions, the project is looking for alternative approaches to the high quality productive landscape and its irrigation networks, first to protect them from uncontrolled urban occupations, proposing an extended environmental system composed by creeks, wetlands, and green corridors. In fact, an important goal is to transform degrading productive tissue into a resilient articulated system of self-sufficient productive landscape. Pursuing this goal, the concept of ‘landscape stewardship’ as a bridging concept has been studied. Gouverneur describes the Landscape Stewards as an efficient mechanism to defend the public realm. Stewards include uses, spatial and performative conditions that can engage the community. Engaging the community makes these spaces defendable, moving away from practices of legal protection, static surveillance, and policing. There is thus a pedagogic intent behind the notion of Stewards. Stewards are meant to “look after” the system of open spaces and other public assets. They can be institutions, community organizations, or even individuals who are trusted by the community. It is expected that gradually the community will develop a sense of attachment to the spaces that serve a common purpose.”

Accordingly, four scenarios have been proposed:

I. Protection scenario: To create a network of protected open spaces, several strips of new linear gardens suggested in the fringe of the Nazhvan zone, which were mainly abandoned or dried gardens in the first place. These Patches of productive gardens work as protectors that “slow the energetic urban expansion”. “Protectors include communal uses and institutions that help secure sensitive areas from unwanted occupation. The specialized patches of productive activities are meant to become important economic drivers, which provide goods and sources of income for the institutions that support jobs, services, and amenities for the residents. They facilitate investment from both the residents of the settlements and other members of the private sector.”
II. **Intensification scenario:** The corridors can incorporate recreational, cultural and productive facilities connecting different assets that would attract both city residents and tourists, working as intense public gardens consist of new activities, which works as ‘attractors’. “Attractors generate new and more diverse uses that facilitate the well-advised expansion.” The proposed attractors in the linear gardens serves as gathering places for the community, providing a wide array of services and activities. For instance: kitchen gardens, leisure garden, and the active centers such as restaurants or other facilities for visiting agritourists. 29 Combining leisure with community services can develop mixed income in some of the in between greenery and the fringe of the Nazhvan area, which is the most fragile and sensitive zone. (Figure 7)

III. **Connection scenario:** To improve the continuity of the scattered green tissues in the area, new green corridors have been proposed. These new corridors engaged with natural and cultural landscapes, working with organically forms of Maadi canals, are connecting the periphery with the city by creating a more accessible neighborhood. These bands act as green corridors at the neighborhood scale, and consist of waterways, new soft infrastructure, vegetated areas, agricultural land, and recreational strips linking buffers at peripheral areas, to the densely-populated Corridors of the city. (Figure 8)

IV. **Synthetic scenario:** A new hybrid “eco-armature”30 provides a soft infrastructure and transversal corridor that communicates between different interfaces and corridors of linear park, Public Park and the productive patches of landscape. This transversal eco-armature could integrate productive and recreational opportunities, organized in bands and ponds with different performative meanings (cleansing the waterways, creating biodiversity, improving agricultural output and alternative economies, such as agritourism). At the local scale, this armature creates an integrated system of public spaces, community services, and facilities such as institutes of higher and technical education that took advantage of their proximity to wetlands and agricultural fields. (Figure 9)

**Site-specific project:** Recovering the Landscape at Local

Regeneration of an underutilized and contaminated factory site at the ending point of the proposed “eco-armature” is in line with the
all informed scenarios. The proposal project for the transformation of this site to an innovative campus intended to define a new center that works as a “steward” for this knowledge-based, productive and multi-facet landscape, composed by recreational, educational, productive, and entrepreneurial activities, simultaneously respond to the different settings and scales from territorial to the local. Adjacent to the productive landscape and patches the campus includes a food market, food processing and distribution center, which take the advantage from its urban-rural location. It will affect the agritourism and become a new economical driver both for the locals and Isfahan citizens. (Figure 10-11)

The campus as an institution can incorporate uses compatible with the expanded landscape, while act as a corporative system between locals, students, and researchers with different interests. The participatory projects in the landscape with the cooperation of the students and locals could exchange the ideas and knowledge in relation to the sustainable methods of irrigation and cultivation. The test fields and test glasshouses provide the research facilities allowing the experience in local climate, testing the initiative through pilot projects, monitor their evolution, and the needed adjustments for the productive lands. In long term by educating the local farmers and implementing the climate specific tools the degrading productive tissue can be regenerated.

**Conclusion:**
The evolving landscape of our current urbanized territories and the following dramatic degradation of environmental qualities in rural areas arguably urge the need to explore the concepts and modes of design, which are responsive to the dynamic interaction of urban-rural settings.

This paper argues that the concept of resiliency as a relational quality that looks for a balance rural-urban linkage offers the grounds to develop analytical and integrated methods for redesigning the today city from an in-between milieu that is receptive and adaptive to several scales, urban/natural ecologies and infrastructural systems. On one hand, this demonstrates the need for holistic
and networked management of resources and territorial assets, embedding ecological concerns into urban-rural linkage practices. On the other hand, with providing the informative medium-s (such as synthetic maps) for the design project, these methods intend to communicate between planning process, policies and practical levels. In fact, this paper with studying the project of resilient development and retrofitting the Nazhvan Landscape in the west part of Isfahan looked for a mode of design, which is capable to enhance the disciplinary realignment within the field of urbanism and architecture in relation to the large-scale dynamics and multi-disciplinary inputs. Therefore, this academic exploration was an attempt to stretch the scalar and distinct boundaries of design agendas, posing the questions of what new rural-urban typologies might start to look like and how these new typologies could become supportive to the environmental improvement of today’s city-regions.

Endnotes
1 Shahr o khane’ consultation planning cooperation’s Masterplan for Nazhvan area, 1997
3 Moienian MThe natural landscape of the Zayandehrood River. Esfahan: Jahad Daneshgahi; 1999
Resilience of the World Summit on Sustainable Development on behalf of The Environmental Advisory Council to the Swedish Government.


9 If the ecological sources of a rural area would not be resilient, conditions for agriculture or green services would deteriorate and vulnerability of the economic and social systems increases. So, Rural resilience is mostly applicable in areas where economic, social and cultural measures are interconnected and work closely. Landscape and planning can define the degree of rural resilience of the area in terms of its tolerance and ability to withstand the external shocks and maintain its valuable structures, or in another scale can transform the eternal threats to opportunities. For this see: Ibid.


13 Gregotti, V. 1966. “La Forma del Territorio”, in Edilizia Moderna, pp.87-88


17 Buckingham J. S. 1830. Travels in Assyria, Media, and Persia, including a Journey from Baghdad by Mount Zagros, to Hamadan, the ancient Ecbatana, researches in Ispahan and the
20 Ibid.
22 Ibid.
Rouzane2004
28 ibd
29 ibd
Figure 9: The transversal Eco-armature communicates between several landscape-infrastructure systems.

Figure 10: The relation of the new Eco-armature, protected park and the underutilized void.

Figure 11: The proposal for transformation of an under-utilized site to the innovative campus.
An Urban Tree Pit Comparative Study

Introduction
The University of Greenwich Urban Tree Pit Comparative Study was set up in July 2014, in collaboration with Hadlow College, to evaluate the current solutions provided within the market to enable the successful implementation and establishment of trees within the urban landscape.

In 2008 the planet reached an important milestone. The world population, as a whole, moved from being predominantly rural to becoming mainly urban (UN Department of Economic and Social Affairs, Population Division, 2008) 1. This trend is set to intensify and it is predicted that by 2050 two thirds of the world’s population will be city-dwelling (UN Department of Economic and Social Affairs, Population Division, 2014) 2. In Europe, approximately 80% of the population will be living in urban areas by 2020 (European Environment Agency, 2006) 3. Almost 90% of the British population were already living in urban areas by 1991 (Denham & White, 1998) 4 and this propensity for urban living is likely to be matched by seven other European countries by 2020 (European Environment Agency, 2006) 5. The social and environmental implications of this are obviously enormous.

It is true that urban expansion, if adequately planned for, has the potential to improve peoples’ access to health care, education, housing and other services. It is also true that we have been exploiting trees within our urban landscapes, for the benefits they provide us, since the sixteenth century. In the UK, this use of trees within urban centres reached its peak with the garden city movement and workers’ colonies of the mid-to-late nineteenth century (Lawrence, 2006) 6, where pressure from social reformers to increase access to green open space not only helped in urban beautification but also improved the life of city inhabitants from all social classes. Formal street tree planting formed part of this urban greening and spread rapidly from London into urban development schemes for other UK cities and commercial centres, where it was...
seen as a symbol of civilisation. The result of this recognition of the importance of providing city populations with street tees and access to green open space means that many of the finest examples of our existing urban trees are a legacy from the Victorian era. It is sometimes sobering to consider that the longevity of some of these urban trees has proved to be greater than that of the built form around them. However, the unending development of an increasingly urban society places an ever mounting reliance upon built infrastructures and technology to provide the services and goods required to enable that society to function efficiently. The urban heat island effect, the expansion of impermeable surfaces, the inevitable increase in total energy consumption and the concomitant additional air pollution this creates leads to an ever increasingly decoupling and independence from ecological systems. Somewhat perversely, it is the solar shading, surface water attenuation, air quality improvements and increased physical and mental wellbeing (ecosystem services) provided by these ecological systems, of which urban trees and other vegetation are part, that play such an important role in making our cities much more pleasant places to be.

**Making Space for Trees**

Despite more trees being planted overall, we are finding fewer and fewer large species trees within our cities, typically due to conflicts during construction and the close proximity of hard, grey infrastructures. It is, afterall, these larger trees that are better-placed to deliver more of the environmental benefits for a greater period of time than smaller, shorter-lived species. Many of the large canopy tree species we plant have the genetic potential to survive for well over one hundred years, yet the redevelopment cycle of many urban plots will be significantly less at, perhaps, sixty to eighty years. To realise this potential for longevity, however, we must ensure that the trees we plant establish within the site selected and are equipped with the necessary resources to grow to productive maturity.

Incorporation of trees to urban environments
is very much a hot topic with both central and local Governments; designers need to be cognisant of not only the aesthetic qualities of trees, but also their physical and environmental benefits, and how they improve our mental wellbeing. For instance, in January 2012 the Mayor of London released the ‘Green Infrastructure and open Environments: Preparing Borough Tree and Woodland Strategies’ draft Supplementary Planning Guidance (SPG) for public consultation. This sets out a framework for London Boroughs to produce and implement tree and woodland strategies. Retention of existing trees and proposals for the planting of new trees are currently material considerations when determining planning applications and The Mayor’s SPG helps to define the extent that trees and woodlands are likely to have on the determination of planning applications. The document reinforces and formalises one of the recommendations put forward by the Department for Communities and Local Government (DCLG) report, Trees in Towns 2, published in 2008. This was the report from a research project commissioned by DCLG which investigated the condition and management of the urban tree population in England (Britt & Johnston, 2008) 7. It highlighted that, on average, over 24% of local authority trees planted in public open space and 23% of trees planted along highways die before they become established. These findings have been substantiated by other later research studies (Roman, et al., 2014) 8 (Jack-Scott, et al., 2013) 9 for publicly owned trees but may even be higher than this for trees in private ownership (Jack-Scott, et al., 2013) 10. A contemporaneous review of London’s street trees for the London Assembly, entitled ‘Chainsaw Massacre’ (GLA, 2007) 11, highlighted a worrying trend in the progressive reduction of overall tree canopy cover. Despite 48,000 trees being planted and 40,000 being removed, across London as a whole between 2002 and 2007, twelve of the thirty three boroughs still reported a net loss in publicly-owned tree stock for the same period. In many instances, large mature trees are being replaced with smaller, shorter-lived varieties
These findings were echoed by 'Trees in Towns II', which found that what is happening in London appears to be common to other urban conurbations throughout the UK (Britt & Johnston, 2008). If these trends continue, our green infrastructure legacy, in contrast to that of our Victorian forebears, will be one of perpetual immaturity, unable to provide the ecosystem benefits we require of it (Sjöman, et al., 2015).

In design terms, trees have always been seen as one of the urban planner’s most useful tools. They can improve urban landscapes by bringing an aesthetic value, helping to soften hard surfaces, guiding and framing views and by providing a setting for buildings, helping the user and viewer to negotiate that transition from tall built forms to ground level. They can be used to help delineate spaces by introducing visual and physical separation between areas, informing a hierarchy of use. They can deflect the eye to aid circulation. They can concentrate the view to guide movement, helping to inform direction, destination and a sense of arrival. They increase visual diversity by introducing shape and form, often bringing a leafy sense of calm to a setting. They can also introduce vibrancy and excitement with some quite spectacular colour displays during otherwise dull times of the year. Despite all these aesthetic qualities they bring to the landscape, urban trees are being threatened as never before, due to reduced local authority budgets, increased development pressure, public apathy and a risk-averse insurance industry.

**Urban places can be tree-hostile**

Unlike the natural environments to which trees have adapted, urban locations can be stressful and far from ideal; yet we still expect these hostile environments to provide the resources necessary for healthy tree growth. A variety of conditions and factors can cause stress to urban trees; they are surrounded by buildings, often planted within a sea of impervious surfaces and subjected to reflected and radiated heat, wind funnelling and shade from sun and rain (Whitlow & Bassuk, 1988). These result in two critical
issues which greatly impact the success of the urban tree:

- **Soil compaction**: in order to support engineered surfaces and structures, soils are typically required to be compacted far beyond the limit at which root penetration is prevented. Compaction also reduces the amount of pore space within the soil profile which, in turn, restricts the movement of oxygen to the root zone and can create localised waterlogging (Craul, 1985) (Lichter & Lindsey, 1994) (Randrup, 1998).

- **Restricted root volume**: concrete kerbs, building foundations and basements, utility infrastructure, construction rubble and engineered build-up all help to restrict the amount of soil available for tree roots to explore for required water and nutrients (Lyndsey & Bassuk, 1992).

To provide sufficient support for engineered surfaces, soil sub-grades are typically compacted to 90% of their peak bulk density, making them unsuitable for root growth. The overlying, granular sub-base is also well-compacted to ensure structural stability. With such compaction and with little or no clay or silt material, it also has very low nutrient retention or water holding capacity. Urban trees are typically planted in tree pits which have been excavated from these highly compacted substrates which are not suitable for root growth. Rooting therefore, tends to be restricted to within the tree pit and at a typical 1200x1200mm by 600mm deep, these pits provide a mere 0.864 cu.m. of rootable volume. Even a fairly modest street tree, in order to develop into something of stature will typically require a minimum root volume of 5 cu.m. to provide the required amount of water, nutrients and root volume. In response, trees will exploit less compacted and moist materials close to the surface and along utility excavations, disrupting the integrity of surfaces and other infrastructure.

**The Tree Pit Study**

There are several manufacturers who promote the use of their system or product as a way to provide trees with the required, accessible root volume, so overcoming the restrictions typically imposed on urban street trees. Initially four tree pit systems, typically employed in streetscapes, were installed to enable a comparative study of the selected tree pit products available on the
market. These were:

- StrataCell, provided by DeepBlue Urban
- SilvaCell, provided by DeepRoot UK
- Structural Tree Sand, provided by Bourne Amenity
- CU Structural Soil, provided by Landtech Soils (UK) Ltd

Each 4m x 4m x 1m deep tree pit was excavated and one of the four systems was installed. Clonal 14-16cm *Tilia cordata* ‘Greenspire’ (provided by Barcham Trees), as a typical urban street tree, were planted in each tree pit. Each system, except StrataCell, was replicated three times.

Four pits were installed with the StrataCell system, two using the native soil and two using an imported, manufactured topsoil from Bourne Amenity. The DeepRoot system used native soil to fill the vaults. Each tree pit was surfaced with a 200mm layer of MOT Type 2 roadstone material, leaving a 1.2m x 1.2m opening to allow a tree to be planted in each. In addition, three trees were planted into unimproved ground, to provide controls. In total, sixteen trees were planted in this initial setting up phase.

The following data were collected from each tree, during the growing season and following leaf fall, the year after planting:

- Once the canopy was fully expanded, relative chlorophyll content was measured with a Minolta SPAD 502 chlorophyll meter. SPAD meters are used as a field diagnostic tool to measure leaf transmittance as a proxy for chlorophyll content or nutrient status in leaf tissue. The oldest leaf of the current year’s shoot extension was measured on five separate shoots, at each of the cardinal points of the canopy. The medians of relative chlorophyll concentration data for each tree was analysed. Initial measurements were taken on 12 August 2015. Measurements were again taken on 19 August 2016.

- Following leaf fall, annual shoot extension growth was measured on ten randomly selected exterior shoots from the middle and top two-thirds of the tree canopies, measuring the length from the end of the shoot to the terminal bud scars of the previous year. The mean for each tree was tabulated, ranked, and evaluated by root zone treatment. The initial measurements were taken on 15 December 2015. Measurements were again taken on 29 October 2016.

The following year, three more pits of the same dimensions (4m x 4m x 1m deep) were excavated
and filled with reject demolition crush material within the screen range of 63-100mm. This was installed in four lifts, each compacted with a plate compactor and composted green waste was washed into the voids between the crush material at each lift. It was intended to create a group of tree pits that approximate to the system employed in the City of Stockholm, Sweden. The implications of being able to use modified crushed demolition waste as a rooting medium within urban developments, where the basic unmodified material is ubiquitous, are obviously significant and will be investigated further. These three pits were also surfaced with a 200mm layer of MOT Type 1 roadstone. It was intended to add three pits using the Arborraft system, supplied by Green-Tech but a range of organisational difficulties have meant that, to date, only one pit has been installed using this system. Data from these trees were collected during the 2016 data captures.

Another area of data capture has been the use of a Lidar 3-D scanner. This has been used to capture a 3-D model of the entire research site. An initial scan conducted during the winter of 2016 captured the trees without leaves. It is planned to carry out further scans in the summer and winter each year so that a record of canopy expansion can be determined. It is hoped that this data can also provide information on leaf area indices.

**Funding Rationale**

Initial seed-funding was successfully sought from the University of Greenwich to kick-start the project and cover the cost of excavation. The external partners have all provided the necessary materials required for each of the tree pits so far installed. Although the main cost of the project is ‘front loaded’, this is a long term project which will benefit staff, students and the urban environment community for years into the future. The University of Greenwich Urban Tree Pit Comparative Study has provided a valuable working urban tree research resource with potential for expansion. Such a resource has been used to further the knowledge base of University
of Greenwich staff and students, academics from other institutions, materials suppliers and urban planning and landscape practitioners. Such a project has helped to establish and build upon a network of industry links and contacts providing greater exposure of the University, students and staff to individuals and organisations within both the private and public sectors. It is hoped that the study will be extremely important in providing data for further research purposes and should be considered as a catalyst for more research in the School of Architecture and Landscape as a whole. This can only help elevate awareness of the University of Greenwich as a useful and viable research resource within the natural and built environment professions

Endnotes


18 Randrup, T. B., 1998. Soil compaction

Abstract
Green structure and its multiple benefits are widely recognized, but at the same its position is questioned in accelerating urban densification process. This research analyses the conflicts between green structure and urbanism in the new master plan 2016 of Helsinki (Finland). The study is based on master planning documents and an analysis of the development of the green structure planning in Helsinki.

Helsinki, as many other metropolitan areas, is rapidly expanding. The current focus on infill development has a major effect on green structure network and leads to new planning strategies of urban green. This new approach indicates a clear paradigm shift in planning and poses several challenges to existing green structure. Examples of these growth-oriented strategies are objectives stressing coherent city instead of coherent green structure, quality instead of quantity, development instead of preservation and urban character instead of nature-based values. The strategies reveal a detrimental polarisation between urban and green and a one-sided concept of urbanism where the values of green areas are not fully recognized.

This research paper discusses the described paradigm shift and values attached to it. It presents two topical case studies in the master plan 2016 for deeper narrative analysis: the infill development plans of Central Park of Helsinki and the infill project of a protected cultural landscape in northern Helsinki. As a background, the historical development of green structure planning in Helsinki is reviewed, in addition to the design objectives of the previous master plans.

The paper emphasizes that the role of the green structure needs to be redefined in the urban densification context and new tools must be developed to promote sustainable development. Concurrently, the multiple values of green areas need to be cherished as an integral part of the urban environment and the concept of urbanism.
Introduction

1. The Relationship between Green Structure and Urbanism

The relationship between green structure and urbanism, the balance between nature and urbanity, belongs to the cornerstones of a sustainable community. Green structure and its multiple benefits are widely recognised, but at the same time, its significance is questioned in accelerating urban densification [1]. Urbanisation, climate change and the objectives of the densification of urban structure are changing the role of green areas in city planning and subjecting them to new expectations. Global ecological arguments for densification are conflicting with local environmental values connected with valuable green areas. Although green areas are still considered important, urban nature is also seen as an obstacle for urban development [2]. For example, nature represents the wrong type of urban environment, it occupies too much space or it is located in the wrong place. Urbanism aims to re-define green structure and question its standardised design objectives. It is necessary to discuss the significance of green structure network without prejudice in relation to densification, but, concurrently, it is important to ensure that urbanism focusing on growth does not become lopsided [3] and the multi-dimensional nature of green structure is not forgotten.

2. Research Design

The purpose of the paper is to analyse the conflicts between green structure and urbanism in the new master plan of Helsinki, Finland. Helsinki, as many other metropolitan areas, is rapidly expanding. The central principle of the new master plan, approved in 2016, is the densification of urban structure. The plan proposes major residential development on existing urban area, including a significant amount of green areas. This paper examines the role of the green structure network in the densification dialogue. The study is based on master planning documents and two case studies. The aim is to determine how the
paradigm shift pertaining to green areas is apparent in the urban planning of the master plan 2016 and what factors influence the conflicts between the green structure network and urbanism. The paper identifies problems in current urban planning and discusses the challenge to create a new balance between nature and urban structure. Findings from this study contribute to the debate on the relationship between the green and the urban and are relevant to sustainable urban planning.

The study of the master plan was conducted as a narrative analysis which aims to identify the story-telling of urban planning. Planning can be seen as a performed story and as a political choice concerning the stories which are told and which remain untold [4]. The analysed data consisted of planning documents, planning reports and discussions related to the master plan. As a background, the historical development of green structure planning in Helsinki was reviewed, including the previous master plans from the years 1960, 1970, 1992 and 2002. Comparing the new master plan with the earlier green planning strategies identified several differences in planning principles which can be interpreted as a paradigm shift in planning. The analysis of the new master plan was deepened with two case studies: the infill development plan of Central Park and the infill project of Tuomarinkylä Manor, a protected cultural landscape in northern Helsinki. The reason for selecting these areas was that they were the most conflicting and debated cases which included infill construction in valuable green areas. The data for the analysed case studies contained planning documents, reports and discussions. The focus was on exploring how the discovered planning strategies of the master plan were implemented in a more detailed level.
Analysis: Green Structure Planning in Helsinki

1. Development of Green Structure Planning in Helsinki

Helsinki is a green city, where green areas cover approximately 40% of the land area. Nature and the sea are recognised as attractive factors, which have become an established part of the urban brand. Distinct features of the green structure network are five radial zones referred to as the ‘green fingers’, of which Central Park is the most centrally located. In addition to the green fingers, another underlying principle is the green shoreline, which has created a strong seaside identity for Helsinki. [5] The third central characteristic of the green structure network is the green zones surrounding suburban areas, which became an established component of the suburban planning ideology in the 1940-60s. The fourth defining factor is the low-density urban structure and green cityscape, which is specifically evident in garden city areas, forest suburbs and cultural landscapes of river valleys.

The green core of Helsinki is a result of persistent urban planning over a long period of time. The planning of the green structure network started already in the 1910s and has continued with the city plans throughout the decades. [6] Helsinki’s first town planning architect, Bertel Jung, prepared the Central Park plan in 1911. In 1918, he created the Pro Helsingfors plan in cooperation with Eliel Saarinen, which introduced the entity with the radial ‘green fingers’, green areas on shorelines and green zones between suburbs. [7] The plan reflected international examples of green zones in Chicago, Vienna and Boston, which were perceived to have a positive effect on health, cityscape and urban structure [8].

The regional expansion of Helsinki and the land incorporation in 1946 set a new perspective to the planning of green areas. The first legally required master plan was completed in 1960 and highlighted natural perspectives and the functional needs for recreation. The following 1970 master plan examined the green structure network in much more detail and included
landscape inventory and analysis for the entire city, in addition to a comprehensive recreation area system. The work reflected a concern for polluting the environment, fragmenting recreational areas and destroying cultural environments. Growth was directed using comprehensive recreation area plans and cultural environment surveys, which expanded the preservation perspective from buildings to cultural landscapes and historical parks. [9]

In the master plans of 1992 and 2002, the central characteristics of Helsinki’s green structure network became prominent. Green fingers, green areas near shorelines and cultural landscapes were highlighted as defining characteristics to be preserved. In the 2002 master plan, the significant entities for cultural history, cityscape and landscape were clearly indicated on the primary map of the plan, which has led to the preservation of several sites in local detailed plans. A new combining concept was introduced, Helsinki Park, which connects Central Park with the green areas along Vantaa River and islet areas. [10]

2. Green Structure in Master Plan 2016
The new master plan significantly highlights urbanism and redefining urban green. It is strategic and general in nature, which defers decision-making to the next levels of planning. The master plan prepares for a population growth of 860,000 new inhabitants by 2050. A third of the planned building volume is infill construction, including building on 1900 hectares of green areas. [11]

Regarding the green structure network, the plan significantly differs from the design principles of the previous master plans. Four central arguments can be identified, which make the paradigm shift on green structure apparent. Firstly, instead of the established planning principle of a coherent green structure network, it highlights a coherent urban structure where green areas are perceived as obstacles for growth rather than integral components. Especially the
green areas of low-density suburbs are seen as unorganised, sparse and fragmenting the urban structure. The ecological goal for densification surpasses local nature values, the historical landscape and the perceived values of the residents. [12]

Secondly, instead of focusing on the quantity of green areas, the focus is on quality, which is used to justify the reduction of green areas. This argument connects quality specifically with the built urban parks, which are expected to fulfill the requirements of urban life and increasing consumption [13]. Although quality as such is the correct goal, it is not defined in more detail and its relationship with the quantity or scope of green areas is not examined. The scope of green areas is significantly linked with qualitative factors, the diversity of landscapes and the diversity of functions. [14]

A third perspective is that preservation is seen as limiting growth, which differs notably from the previous master plan’s policy highlighting historical sites in the plan. Cultural and historical areas are recognised, but at the same time, the values are not wanted to prevent developing urban areas. Preservation is even seen as damaging for urban development [15]. Boundaries of preservation areas are regarded as too detailed and limiting, which is why they are not included on the plan. This transfers the consideration on preservation to individual local detailed plans, where the matter can no longer be comprehensively resolved. [16]

The fourth argument pertains to the role of nature in urbanism. A low-density green structure network and nature is considered anti-urban in city planning highlighting urban bustle and an element that does not belong in urban life. According to the description in the master plan, Helsinki is an urban metropolis, which offers the framework for an active social life [17]. Pocket parks and plazas with lots of people and youthful street cafés depict the master plan and its communal goals. Vast forest areas and
cultural landscape entities are not a part of the approved story-telling, although according to surveys conducted on Helsinki city residents, they are their favourite places [18]. Furthermore, with critical examination, the images of communal urban spaces can also be interpreted as consumption-oriented and stereotypical regarding categorisation of generations.

Analysis: Central Park and Tuomarinkylä Manor Landscape as Case Studies

1. Central Park

Central Park is a 700-hectare recreational area located in the Helsinki city centre and extends to the agricultural areas in the northern parts of the city. The park is the most well-known green area of the city and a popular recreational area that is used annually by up to two million people [19]. The park was outlined in the 1911 plan and its status has been later acknowledged in the consequent urban plans. The local master plan of the Central Park was completed in 1978 and the boundaries of the area were confirmed in the 2002 master plan. The status of the park was re-confirmed in the 2006 planning principles, which mandate that the area is not reduced in size and no functions are built that negatively affect its recreational use or landscape [20]. In addition, the park has been confirmed in numerous local detailed plans and comprehensive political agreement on its integrity has prevailed.

However, the integrity of Central Park was challenged in 2015, when the new master plan draft proposed construction on its edges, along the Hämeenlinnanväylä motorway [21]. The construction initiative was based on a central goal of the master plan to change the entrance motorways to urban boulevards by reducing driving speeds, removing traffic buffer zones, and instead building streets with urbanised dense construction. At the centre section of Central Park, this would result in construction which would extend up to 200 m into the park. The same area was secured as a recreational area in the 2014 local detailed plan [22].
The case illustrates the shift of values and preservation status of green areas. The local detailed plan in 2014 emphasized a coherent green structure whereas the master plan approved in 2016 assumed the starting point to be a coherent urban structure. At the same time, the project invokes questions on the nature of the green structure network. According to the master plan, edges of Central Park have been “revised” while construction aims to protect the central areas of the park from noise [23]. However, justifying urban development as grounds for noise-prevention is not convincing. Revising the edges is also a misleading concept, as it refers to unclear boundaries which should be improved by construction. The same rhetoric about unorganised nature of the green areas and ‘constructive improvement’ can be identified in the report concerning the green structure of suburbs [24].

2. Tuomarinkylä Manor Landscape

The Tuomarinkylä Manor is an exceptionally intact area with 110 hectares of manor landscape, including a functioning manor yard in addition to the buildings, parks and vast farming fields along Vantaa River. The manor hill is seen as a landmark amidst agricultural landscape. The manor, dating back to the late 18th century, has been designated a nationally significant cultural environment and several studies have identified it as one of the most significant cultural landscapes in Helsinki. The area also belongs to the Helsinki Park marked on the 2002 master plan, an important green finger connected to Central Park. The manor landscape and its buildings and parks have been protected in the local detailed plan in 2012. The original proposed plan also included the protection of the field area, but the proposal was cancelled during political processing. Instead of preservation, the western field was to be evaluated for residential construction, due to its good traffic connections and particularly the future rail connection [25]. The proposed urban development was adopted as the underlying objective also for the new master plan [26].
As the infill project of Central Park, also this case demonstrates the changed attitudes toward preservation, as densification along the track line was set above the protection of a manor landscape. The change is notable, as the 2002 master plan still identified the area as a culturally and historically significant landscape, but the status is omitted in the new master plan. The preservation is limited to the manor buildings and park, but the landscape as a whole has not been recognised. Construction on the field was justified based on the low historical value of the field and its young age, as the area in question used to be the manor’s meadow and was not converted into a field only in the 1930s [27]. Evaluation based on the age of the field, however, is indisputably deficient. The scenic significance of the manor landscape and its status as a landmark are largely based on the vast, open area that surrounds it, which would be lost through urban development. In addition, the decision to build demonstrates the attitudes toward extensive green areas in a growing city, where low-density is often seen as undeveloped land area for lots. The case also reflects the basic premise of the master plan and aspirations for small parks built with high quality, instead of large recreational areas. The goal of high quality is naturally acceptable, but at the same time it is important to recognise the diverse values of the green structure network. For example, in addition to historical value, the Tuomarinkylä fields also have high recreational and natural value. [28]

IV Discussion and conclusions
The status of the green structure network and its planning principles in a densifying urban structure are undergoing a transition. The paradigm shift is evident from planning conflicts between green structure and urbanism and in new planning objectives with a focus on growth. The narrative analysis of the Helsinki master plan and the case studies identify the following strategies: coherent city instead of coherent green structure, quality instead of quantity, development instead of preservation and urban
character instead of nature-based values. These strategies indicate that the concept of urban green is tightly connected with the urban planning agenda and its values and political interests. The strategies also imply aspirations to modify green structure in order to pursue the political aims of urban planning. The analysis of the Helsinki master plan shows that green structure can be seen as an obstacle and an anti-urban component in urban densification. In addition, the study reveals a detrimental polarisation between the urban and the green and a one-sided view of the urban green where recreational, historical and social values are not fully recognised.

The turning point of the planning ideology creates an opportunity for inventing new practices. Nevertheless, it is important to lean on the planning tradition and recognise the design objectives proven to be beneficial. The multidimensional nature of the green structure requires qualitative evaluation and visibility in decision-making. The diversity of the landscape is part of the diversity of the urban culture. Further discussion is needed to redefine the role of green structure in the urban densification context. Green structure requires comprehensive development and preparations for the future. Further research is needed to combine biodiversity and ecological functionality with the increasing pressure for recreational use and reducing maintenance resources. In addition, the story-telling of urbanism requires critical examination and a broader perspective. The green structure network is an integral component of a city and urbanism, not its opposite or an obstacle for development.

Endnotes
[1] e.g. James, P. et al. 2009. Towards an integrated understanding of green space in the European built environment. Urban Forestry and
of Helsinki’s manors within the urban structure (Kartanot kaupungissa. Helsingin kartanoypäristöjen kaupunkimaistuminen, säilyttäminen ja yhteensovittaminen kaupunkirakenteeseen). Espoo: Aalto University, p213.


Helsinki: City Planning Department, p32.
Leader. Helsinki needs small residential building areas (Helsinki tarvitsee pientaloalueita).

FIGURE 1. Infill construction on green areas in the master plan of Helsinki. The case study areas are marked with yellow circles. (Map by Helsinki Nature Conservation Society 2015)

FIGURE 2. Infill development in Central Park (on the left the plan by City of Helsinki, on the right an aerial photo from the site in 2016, City of Helsinki).
FIGURE 3. Infill development in Tuomarinkylä manor landscape (on the left the plan by City of Helsinki, on the right an aerial photo from the site in 2011, City of Helsinki).
Abstract
In 1830s America, the tradition of creating rural cemeteries began with Mount Auburn Cemetery (1831) in Boston. Père Lachaise Cemetery in Paris preceded it in 1804, but Mount Auburn paralleled and inspired the development of others in America and Europe, such as Laurel Hill (Philadelphia), Green-Wood (Brooklyn), and the Magnificent Seven (London). During the same period, arboreta, supporting diverse collections of trees, became a popular landscape type, and many rural cemeteries in nineteenth century America formed symbiotic relationships with specialized tree plantings, including at Mount Auburn and Laurel Hill. In most cases, park-like rural cemeteries and arboreta formed sound partnerships. Trees, revered as living memorials among the gravesites, benefited from excellent growing conditions and care. However, not all rural American cemeteries and their arboreta have had as seemingly straightforward histories. In particular, Arlington National Cemetery, which began as the home of George Washington’s step-grandson, George Washington Parke Custis, in 1802, was contested ground when the cemetery was first established during the Civil War in 1864. From its early years as a cemetery to the present day, the challenge of combining burials and tree plantings on this historic estate has raised significant issues with regard to both functions. This paper examines two areas of the landscape where synergy and opposition between the functions are most acute: John F. Kennedy’s gravesite and the Millennium Project in Arlington Woods. The paper argues that the pressing need for space for more burials has had some negative effects on the historic character of the treed landscape, but the cemetery’s recent recognition as an arboretum on its 150th anniversary and the continued pressure for more burial spaces actually augur well for sustained positive interactions between the cemetery and the arboretum.

Introduction
The concept of an arboretum emerged in middle of the 18th century as an offshoot of
European botanical gardens. In 19th century Europe and America, arboreta fused with a variety of other functions, besides their early scientific and economic roles. For instance, rural cemeteries sprung up in the 1830s that housed diverse collections of trees, much like arboreta. Arboreta and rural cemeteries came into vogue together, preceding the creation of urban parks in American cities. At Mount Auburn (Boston), Laurel Hill (Philadelphia), and Greenwood (Brooklyn) rural cemeteries served as some of the first public parks, cultivating a wide array of trees, as well as places for burial. As cities invested in public parks independent of cemeteries in the second half of the 19th century, the park use of cemeteries faded to some extent, but their capacity as places of burial and tree collection persisted and the explicit combination of arboretum and cemetery continues in many locations today.

This is not surprising because it remains quite customary to plant memorial trees. In addition, cemetery grounds offer excellent and rather undisturbed conditions for growing trees. Trees also create desirable living canopies over gravesites, providing shade, dappled light, seasonal blooms, and beautifully textured foliage, as well as more intimate and perhaps memorable sub-spaces within the larger grounds. Whether or not a cemetery intends to create a diverse collection of trees, a variety of impressive trees tends to grow up in them over time through some combination of cultivation and benign neglect. In most cases, the process of burial and the growth of trees is symbiotic.

However, the relationship between arboreta and cemeteries is not always mutually supportive. There can be conflicts between the need for burial space and the design of an arboretum and the needs of its trees. This is especially true in those rural cemeteries now surrounded by urban development, limiting their expansion. Such is the case at Arlington National Cemetery, which has sustained a steady demand for burial space for over 150 years and counting. How has Arlington
weighed the continued pressure to create space for new burials and living memorials against the needs of its arboretum? How has the continued growth of the cemetery worked well to expand the arboretum and conflicted with it?

This paper examines the contemporary relationship between arboreta and cemeteries through the case of Arlington National Cemetery. It seeks to understand the synergies and conflicts between arboreta and cemeteries through an analysis of two specific areas within Arlington National Cemetery: John F. Kennedy's gravesite and the Millennium Project. The John F. Kennedy gravesite shows how a national tragedy unexpectedly changed one of the most memorable tree-studded vistas of Washington and the Millennium Project in Arlington Woods reveals that even forest preserved in perpetuity is vulnerable. These examples demonstrate that we must continue to refine our understanding of the relationship between arboreta and cemeteries because even though it is usually symbiotic, it is not without challenges, both unexpected and planned.

How Arlington became a cemetery and an arboretum

In 2014, on its 150th anniversary, Arlington National Cemetery became an official arboretum, using the Morton Arboretum's ArbNet indexing system. However, the lands that now comprise Arlington National Cemetery supported a varied collection of great trees long before it even became a cemetery. Indeed, some of the massive oaks are over 250 years in age, pre-dating all remaining structures on the site, from the wooded hilltop where Arlington House sits to the now lost Arlington Spring along the shores of the Potomac. The trees on this land have always been one of its defining features and were one of the qualities George Washington Parke Custis, George Washington's adopted grandson, admired about the place when he settled on it in 1802. He built Arlington House on the hilltop, nurtured a farm on the fertile lowlands, and planted specimen trees on the slopes skirting
his home to create a fine landscape park (Figure 1). The landscape included a native woodland behind Arlington House, a dark and dense backdrop for his neoclassical mansion. Mary Custis, G.W.P. Custis’ daughter, married Robert E. Lee in 1831 and inherited her father’s estate in 1857. In 1861, with Civil War upon them, the Lees abandoned the home. The Union Army seized the hilltop estate, which was of strategic military importance, commanding the Potomac and the City of Washington.

The Union officers of the Army of the Potomac set up their headquarters in the mansion. Immediately, the army began to cut trees—the orchards on the lowlands and the big trees around Arlington Spring—and they constructed earthwork defenses throughout the property. On the uplands, they constructed a series of forts on the ring of hills around Arlington House. The soldiers cut swaths of trees for sight lines between the forts and the mansion, but a portion of native hilltop forest remained. In addition, they preserved many of the trees around the house for much needed shade. While the war operations demanded major changes, the officers went so far as to hang placards on some of the greatest trees to dissuade soldiers from cutting them. The many who visited the site post war reported mixed impressions about the survival rate of the trees. In any case, the several hundred trees exceeding 150 years today and are a testament to the staying power of a portion of the trees through the war.

Beginning in the 1870s, the Department of the Army, who administers the cemetery, hired D.H. Rhodes as a landscape gardener. During Rhodes’ nearly sixty-year tenure, the tree diversity increased and some of his plantings have grown to be Virginia State Champion Trees. He set up a tree nursery and greenhouses on the old kitchen and flower garden plots behind Arlington House and used the home as the cemetery’s horticulture facility. Thirty years after Rhodes retired, army botanist Jack R. McMillen inventoried the trees of Arlington, finding 6079 trees, excluding
the forested areas, including 177 species and varieties—native and cultivated. At the present, almost sixty years after McMillen’s mapping, Arlington Cemetery claims 8600 trees and 300 different species and varieties—a marked jump in the number of varieties.

Through the twentieth century, many changes took place at Arlington Cemetery, but some of the most defining shifts occurred around Arlington House and its east slope looking towards the city. In the 1920s, there was a push to restore Arlington House as Robert E. Lee’s home. In the 1930s, the Department of the Army transferred Arlington House to the Department of the Interior and over time added nearly 30 acres around it, including 24 acres (10 hectares) of native woods, those G.W.P. Custis preserved, which the National Park Service agreed to maintain in perpetuity beginning in 1964. From the 1920s to the 1950s, several landscape architects, including James Greenleaf and Ferruccio Vitale, consulted on the grounds around Arlington House. Both, along with Charles Moore of the Commission of Fine Arts, were intent on keeping the view to the city relatively free of graves, especially in the foreground on the slope immediately east of and below the mansion’s porch. Moore and others recommended the removal of L’Enfant’s tomb and the Wright monument from the crown of the slope and suggested evergreen plantings to screen the monumental grave of Sheridan. L’Enfant’s tomb—placed in this location in 1911—continues to sit in the view, presiding over the city he planned. Added to the background of the view were the Lincoln Memorial (1922) and Memorial Bridge (1932), the bridge connecting the Lincoln Memorial to Arlington National Cemetery. In the middle ground of the view, rows of modestly sized marble headstones lined the ground among large trees, the trees some of which G.W.P. Custis might have planted in the early 19th century. In 1963, a century after the founding of the cemetery, the tragic loss of President John F. Kennedy changed the view and visitors experience of the cemetery for all time introducing a new monument at the foot of the
east slope of Arlington House.

**The Kennedy gravesite: Trees, tombstone, or both in the view**

President John F. Kennedy visited Arlington National Cemetery on Armistice Day in 1963, just eleven days before his assassination. Earlier in the year, March 3, 1963, he made a spontaneous visit to the cemetery. On that visit, Paul Fugua, a Park Service employee, remembered the President saying that he could stay there forever.\(^{12}\)

For this and a host of other reasons, John F. Kennedy lies in Arlington Cemetery in a place that is freely accessible to the American people. The setting of Kennedy’s burial site is significant in a couple of key ways—it is directly in the view from Arlington House and it was under the shade of the Arlington Oak for its first 48 years. For ninety-nine years before that, the slope and its impressive trees had remained free of gravestones, except for three headstones at its crown, which some had aimed to remove over the years. From the mansion, the view from the house looked more like an arboretum with a cemetery in the distance. The addition of Kennedy’s grave shifted the weight of the scene toward the role of the site as a cemetery—occupying one of the last remaining areas devoted to lawn and trees without graves.

In the days and months that followed Kennedy’s death and burial at Arlington, thousands and then millions came to pay their respects. In the first three years, 18 million visited. The crowds overwhelmed the site.\(^{13}\) Originally, the gravesite was a simple 20’ x 30’ (6m x 9m) plot inside a low white picket fence, near the Arlington Oak. Then architect John Warnecke and Associates of Washington created a more permanent design, installed between 1965 and 1967, to accommodate many more visitors and sensitively incorporate the oak. The new gravesite is on the line between Arlington House and the Lincoln Memorial. It is a low-profile terrace with black granite gravestones lying flush in a field of rectangular blocks of Cape Cod granite—Jacqueline Kennedy rests with the President
and two of their deceased infant children in the presence of an eternal flame. Access to the terrace is by curving walks that surround the now toppled Arlington Oak. It fell in Hurricane Irene in September 2011. Now there are three sapling Arlington Oaks in the oval space formed by the walks, replacements grown by American Forests.14

The Kennedy gravesite shows that alterations inevitably occur even with the best intentions to preserve views and other aspects of an historic landscape. The need for a significant site for a significant individual trumped many other concerns. The burial needs outweighed the arboretum in one of the few places where the trees still reigned freely. However, the design of the gravesite respected the existing conditions, kept a low profile and fit into the low end of the hill, masked in part by the convex slope in the view from the house above. It also worked to preserve the Arlington Oak for nearly 50 years—no small feat. In addition, it undoubtedly raised the visibility of the Arlington Oak, forever connecting it with John F. Kennedy, such that American Forests propagated the tree and had at the ready three for the gravesite, where there had been one, and two others for the cemetery at large. In this way, the act of burial brought attention to the tree, keeping its stock alive. However, just as the horticulturists replanting the tree could not restrain from planting several, the addition of JFK to this prominent location in the cemetery sparked a Kennedy family plot. Robert (1968), Joseph (2012, died 1944) and Edward (2009), all now have a place at the foot of the hill—theirs marked with simple white crosses. Overall, the Kennedy markers show restraint in this prominent location, when compared with others across the cemetery grounds. Even so, the Kennedys’ graves lie directly in one of the last vistas from Arlington House with few graves (Figure 2). On the opposite side of the mansion, on the western slope, in the preserved woods, the Millennium Project also strains the relationship between the arboretum and cemetery.
The Millennium Project: Trees or burials in perpetuity

Arlington National Cemetery faces continuous demand for more burial space. It has met this challenge through expansion in land area (acquiring more property) and through developing areas already in its possession. In recent decades, the cemetery has created columbaria to allow for a greater density of burials on less land. In the mid-1990s, Arlington expected to reach capacity in a decade. In response, they proposed the Millennium Project, which included expansion of the cemetery into a portion of Arlington Woods, the section forest to the west of and behind Arlington House.\(^{15}\) This is the section preserved in 1964, one hundred years after the founding of the cemetery and transferred from the Department of the Army to the Department of the Interior as part of the Lee Memorial. The western half of the 24 acre (10 hectare) Section 29 was meadow with scattered trees, while the eastern half, still preserved, is a healthy example of an oak-hickory-beech forest on gravel terrace, the oldest example of this type in Arlington County, Virginia.\(^{16}\) The Millennium Project cleared the western half, 12 acres (4.5 hectares) of the site, including some forest trees up to 150 years in age on the edge of the older forest tract.

The demand for more burial space challenges Arlington to create more plots and niches, while preserving significant aspects of the cemetery, such as the woods. The compromise of The Millennium Project is to take twelve of the twenty-four preserved acres, diminishing this important part of the arboretum, but respecting the area of oldest growth nearest the mansion. Environmentalists and preservationists (those concerned with the integrity of the Lee Memorial) voiced concerns about the destruction of a valuable and rare ecosystem and the loss of the historic character of the Custis-Lee site within the cemetery, respectively. Both are valid concerns, but the cemetery expansion moved forward and is now nearing completion. To the cemetery’s credit, they selected the lowest impact proposal from Jacobs Engineering, the project’s
The design relies on columbaria and in-ground urnments, increasing density with the least disturbance. One of the most prudent features is the use of a new perimeter wall as a linear columbarium (Figure 3).

Further, the design is sensitive to the hydrology of the stream running through Arlington Woods and may even improve upon it, providing places for infiltration and lessening the incisions on its banks. The contemporary environmental design strategies for water retention and bio-infiltration contrast quite strongly with the traditional method of dealing with water in the cemetery down-stream from Arlington Woods. There the method was to pipe and cover the stream. Graves are kept out in the lowest lying land. The piped stream is below a grassy swale with trees, but little of the hydrology is visible. At least the Millennium Project preserves this aspect of the woods through a constructed system. The hydrology is an easier aspect to reconstruct and recover than the forest. Recovering the great oaks and beeches removed is a long-term proposition. It is not likely that they will ever grow in the manner of a native woodland, especially at the density of forest-grown trees in the remaining woods. Despite the loss of a portion of the forest, and even if it takes a century to heal, it is hard to imagine another use that is more compatible with a woodland than a cemetery.

Conclusion
Although this paper has focused on two of the more dramatic changes to Arlington National Cemetery, where the needs of the cemetery have forced its hand at some expense to the arboretum-like character of the landscape, trees and gravesites coexist quite well at Arlington. At the same time as the Millennium Project got underway, the cemetery planted Medal of Honor Trees—offspring of special American trees like Connecticut’s Charter Oak or the Ute Council Cottonwood. These living memorials are another way to grow the arboretum, serving a commemorative as well as arboretum purpose. The planting of living memorials—trees that
are much more in the spotlight—may ensure improved maintenance to the tree collection over time because of the added significance of the trees, yet another reason why arboreta and cemeteries are compatible.

The symbiosis between arboretum and cemetery starts to fail, when the demands for burial outweigh the concern for particular trees. However, an active burial program signals public investment and may encourage continued management and maintenance of the tree collections. The examples explored here at Arlington Cemetery suggest that both arboreta and cemeteries have limits. The design of the arboretum must respect the need for more burials and the design of the cemetery must ensure the health of the trees. Expanding a cemetery within a limited area has its costs, as the Millennium Project demonstrates. In the both the examples, John F. Kennedy’s gravesite and the Arlington Woods, there were costs to the historic design, which compromised the historic landscape, which contributes greatly to the character of the arboretum. Nevertheless, Kennedy’s gravesite is and the Millennium Project will become a highly visited site, which ultimately may bode well for the trees, even if their current state is as saplings. Arlington National Cemetery is a testament to the enduring concept of a rural cemetery and is significant for how it continues to deal with both synergy and friction between the needs of both.

**Endnotes**
4 Linden-Ward, B. 1989. Silent City on a Hill.
Ohio State University Press: Columbus.
7 Ibid, p72.
13 Ibid.
17 Arlington National Cemetery. 2012. Millennium Project Environmental Assessment. U.S. Army Corps of Engineers, Norfolk District, and
U.S. Park National Park Service.


Figure 1. View of the city of Washington, the metropolis of the United States of America, taken from Arlington House, the residence of George Washington P. Custis Esq. by F.H. Lane, c1838. Courtesy of L.O.C. Prints and Photographs Division Washington, D.C.

Figure 2. Visitors to the John F. Kennedy gravesite with a young Arlington Oak just beyond the terrace (Photo by author).
Figure 3. Looking west through a thin portion of the remaining Arlington Woods to the Millennium Project toward perimeter wall columbarium (Photo by author).
Past, present and future perspectives

Niall Hobhouse, the distinguished writer, architectural critic and former estate owner, declared that ‘intervening in a rural landscape is in many ways trickier (and more interesting) than in any urban one’. At the Hadspen estate (Somerset, England) he invited a whole range of design professionals to come up with ideas and concepts for the future of the estate. Although many of them were never implemented, they nonetheless enriched and invigorated a debate on the future of the rural landscape. Hobhouse’s purpose was to look beyond existing models of conservationism predetermining the way these places are inhabited and used. Instead, he searched for new approaches which relate to the continuity and the intricacy of the estate – a more subtle and future-orientated manner of design. This approach is illustrated by the wonderful cowshed of the Shatwell farm at the Hadspen estate as a provocative marriage of classical and vernacular themes. It reveals how architectural and land-use projects can reflect ‘some up-to-date understanding of life in the country’ and at once respond to the issues of ‘maintenance and economic viability’ [1].

To what extent is contemporary landscape architecture tackling the challenges the rural estates face in the beginning of the 21st century? To answer this question it may be helpful to elaborate on the different roles that landscape architects have on rural estates. Although there is certainly much overlap between these roles, it nonetheless gives an indication of the different responsibilities and opportunities for landscape architecture with regards to rural estates.

It is clear that some projects focus mainly on aesthetic considerations. They bring delight and sensory enjoyment through their forms and their spatial arrangements. One may think of some of the projects by Wirtz International (Belgium), Erik Dhont (Belgium), Louis Benech (France), Arne Maynard (England) along with countless others. In this role, landscape architects certainly contribute to the cultural values of these places. Such high profile projects are, however, not necessarily applicable to a broader range of rural...
estates. They may involve a significant increase in costs for purposes of implementation and maintenance.

Many other projects are more modest or more functionally orientated. Landscape architects may be commissioned, for instance, to integrate new playing facilities on a rural estate, to make a new management plan or work on historic restorations. In this role, the involvement of a contemporary landscape architect may not even be recognizable as such. Within these projects more attention is given to the reconciliation of the natural and the cultural values of an estate, or to issues of sustainability within the context of implementation and management.

From this role, some design practices are now evolving towards a strategic role. It shares similarities with the aforementioned roles, but strategic design is different in its process, its goals and its outcomes. A useful example is the design by Strootman Landscape Architects for the Lankheet estate in the Netherlands. The project includes an innovative water system as an experiment on new forms of aquatic production systems. Berno Strootman in this context wrote about a shift he noticed with regards to the division of tasks between the client and the designer. Whereas landscape architects have traditionally been commissioned within the more-or-less predetermined boundaries of a project’s program, he explains how they are now involved earlier on during the process. The role of the different partners was also not set in stone beforehand. As they go through the process, the project’s program is formulated through a dialogue between the client and the designer supported by a whole range of specialists from different backgrounds. Berno Strootman noticed within this context that during recent years, never before, he had collaborated this much with financial managers, planning economists, regional economists and financial treasurers [2].

The rural estate as a laboratory for innovation
Our interest is orientated towards the role of landscape architecture with regards to the redevelopment of rural estates. We investigate
design practices from different countries in Europe with a focus on Flanders (the northern part of Belgium). A rural estate is defined as a multifunctional rural enterprise composed of different parts which are managed as a unity [3]. It is, thus, different from a country seat (a country house with an ornamental garden) or a conventional farming enterprise. Yet both may be a part of a rural estate. While the term ‘country estate’ refers to ensembles of at least 3 000 acres (1 214 ha) in size, we use the term ‘rural estate’ to cover a broader range of multifunctional enterprises including the smaller scale rural enterprises. The term ‘rural estate’ also coincides with its Dutch translation as ‘landgoed’ which takes multifunctionality as one of its core characteristics including smaller multifunctional enterprises from at least 5 hectares in size. Indeed, there is a sort of blurred line of what constitutes a rural estate and a multi-enterprise farm [4].

A rural estate, most typically, includes a country house at its core surrounded by parklands, water features, a walled kitchen garden with one or more glasshouses, a carefully distributed range of buildings, tree avenues, and larger landscapes of farms, farmland, woodlands and natural areas (e.g. heathland) and so on [5]. In the past, a wide range of products were delivered from an estate such as food from agriculture, all kinds of wood products for different purposes but also luxury products such as exclusive flowers, grapes, peaches, wild meat and fish. The economic function has often been the raison d’être for the expansion and the continuity of the combination of different parts (agriculture, forestry, etc.) within one rural estate. Their viability was assured by means of incomes from agricultural and hunting leases as well as forestry. Unprofitable parts of the estate, such as ornamental gardens, were (partly) maintained through the incomes from other parts of the estate [6]. Some estates were also financed from incomes from urban properties or from the involvement of owners in other industries. The importance of the rural estate as a coherent, economic unity should not be underestimated. However, research on
both the economic functioning and identity over different rural estates is still scarce.

Until the 20th century, many rural estates have been the epicentra of rural innovation; where new innovations in terms of forestry and agriculture were developed and from where they infiltrated into the wider countryside, where design innovation took place, where leisure activities were invented, and where the cultural history of Europe is imprinted onto the land.

One example of a more recent period may serve. When the Dartington Hall estate (South Devon, United Kingdom) was bought by its new owners in 1925, it was developed with the ambition of sustainability and social inclusiveness at times when governments were still largely indifferent to these themes. The estate gradually evolved into a hub of sustainability and social innovation.

The number of social and environmental achievements on the Dartington Hall estate are daunting [7]. Trend setting was the establishment of a pioneering research institute, the Agroforestry Research Trust in 1992 on the estate. It initiated research and innovation in terms of agroforestry and inspired all kinds of other initiatives in the United Kingdom and other countries across the world.

Many rural estates have, however, faced a deep crisis during the 20th century continuing up to the present. The causes and the effects of this are complex and differ between countries. Exemplary was the situation in the Netherlands, were the ‘death of our estates’ was reported in the beginning of the 20th century due to their rapid decline [8]. As a result, many rural estates are now only shadows of what they originally have been. Yet investigating the future of the rural estate in Europe is no mere nostalgia. As multifunctional enterprises composed of different parts (historic parks, productive gardens, forestry, agriculture, etc.) they potentially deliver all kinds of benefits for the 21th-century society. One may think of circular economy, the integration of different waste and production streams or sustainable energy production. Also, there are additional benefits to be gained in terms of cultural development, leisure and recreation. As numerous public goods may be delivered from
rural estates, these opportunities urge us to look at rural estates as a multifunctional whole.

**Envisaging the future of the rural estate**

Strategic design is concerned with exploring new concepts, new agendas, enabling new forms of collaborations, fostering shared visions amongst stakeholders, setting long-term goals and informing policy decisions. It distinguishes itself from other forms of design which are principally orientated towards formal solutions – design in the traditional sense as something to be implemented on site from a plan [9]. The effectiveness of a strategic design is, therefore, not to be measured from what is implemented on site, but how, for instance, stakeholders now collaborate and work towards shared goals. Its relevance for rural estates is not to be underestimated. Nowadays, rural estates have become places of contested meanings. Different stakeholders with their own interest – economy, nature, heritage, recreation and agriculture – all have their own views on how an estate should be developed. The tension and the limitations that this puts on the future of rural estates is a recurring topic amongst estate owners. Strategic design has an important potential within these kinds of projects as an ‘integrative dialogue’ [10]. The aspect of concept development within strategic design – a coherent concept that steers the goals, the agendas and a long-term perspective – deserves to be discussed here. Concept development is concerned with exploring different views and solutions. A good example is Buro Harro’s design for the Beekhuizen estate in the Netherlands. The design studio was contacted in order to formulate a solution to some of the practical issues the estate camping was facing. However, the contribution of the design studio was to turn the problem into an opportunity. Instead of disconnecting the camping site from the surrounding nature and wildlife, they created the concept of ‘going on safari in your own country’. Visitors are now camping in natural setting amidst the wild deers and boars [11]. ‘Going on safari in your own country’ eloquently captures how the estate
now envisages itself as a sort of local branding supported by an overarching narrative. A strong narrative potentially contributes to the long-term viability of a rural estate. One of the most successful gardens in terms of attracting visitors to ensure the economic viability is the Heligan Estate in the United Kingdom. Its whole ‘product’ is built around the narrative of ‘the Lost Gardens of Heligan’. It effectively captures our imagination of a garden that was lost and abandoned and is now revived. Narratives, like the one at the Beekhuizen estate or at the Heligan Estate are strongly convincing, as they hold the potential of attracting new investors, funding or to create an affinity amongst stakeholders with shared goals. Its discursive narrative of ‘going on safari in your own country’ was illustrated by digitally rendered photorealistic images. As examples of the Heligan estate and the Beekhuizen estate illustrate, narratives can potentially have a more strategic role within a broader context of sustainability and rural entrepreneurship.

To what extent are contemporary landscape architects tackling the challenges the rural estates face at the beginning of the 21st century? It is clear that the different roles of landscape architects on rural estates each have a value in their own right. Especially the evolution towards a strategic design practice that serves broader purposes on rural estates seems very rewarding. It challenges landscape architects to be aware of a daunting range of topics and to see their project within a broader context.

Yet it seems that the disciplinary knowledge that is needed for these kinds of projects might also need to be refined and further adjusted. Landscape architects are now still mostly involved in projects related to the gardens and the parks of a rural estate. Certainly, there are many examples in which landscape architects are working on the wider scale level of a rural estate, but usually they are then work on the management of greenery, recreation infrastructure or historical reconstructions. Only a few projects seem to be genuinely concerned with the productive or the economic functions of
an estate. Yet it is exactly these functions that will determine the economic viability of a rural estate as multifunctional rural enterprises in the future. In order to evolve further into their new role, landscape architecture design studios should have a more profound understanding of the agrarian activities and the economic forces that are shaping rural estates. This way, the discipline will be capable to effectively deal with rural estates as a whole, and to explore real solutions for the future.

Our research project at the University College Ghent aims to unravel some of the processes and the knowledge that is needed to ensure the future economic viability rural estates combined with the delivery of public goods. The research approaches the topic through an inquiry into best practices from across Europe. By means of in-depth interviews further knowledge will be gained on the role and the contribution of landscape architects within these projects. In the next phase, future possibilities are explored by means of living labs with several rural estates in Flanders as real-life case studies. The term living labs refers to the close involvement of the different stakeholders throughout the process. The project envisages new insights on the (potential) role of landscape architects within these type of projects, new knowledge on the development process of rural estates and policy recommendations with regards to the preservation and the development of rural estates – a topic that has until now received little attention within research.
(Endnotes)
4 [] ibid., p. 4.
7 [] https:/ /www.dartington.org/our-work/our-land/growing-community/
10 [] ibid.
11 [] http:/ /buroharro.nl/buiten-plaats-beekhuizen/
In France, since the 80s, the reconversion of industrial wasteland sites has developed and their future constitutes a major paradigm in land management and economic terms. Originally perceived as the traces of economic decline to be made to disappear, wasteland sites have become a sustainable development issue. They require thinking in terms of different scales and imply interaction between many public and private sector stakeholders. The regional land development agency of Normandy (in French, Établissement Public Foncier de Normandie or EFPN) was created in 1968. The EFPN is a major stakeholder in the rehabilitation of industrial wasteland sites because between 1989 and 2012 it rehabilitated 300 sites in the region of Normandy, enabling the re-use of more than 500 ha of land. As defined by EFPN, a wasteland site is: “a site which may or may not be built-up and which has been used for economic activities (except agriculture) and is no longer in use. Wasteland sites intended for re-use are listed as such as long as development or construction work is not commenced”.

Within this framework, the activities of the EFPN, as a representative of the State, have evolved substantially regarding the reconversion of industrial wasteland. Strengthening of legislation and amendments to national strategies have provided different approaches to the rehabilitation of polluted sites and soils according to the uses assigned to them. In order to convert these sites to new uses they often need to be de-polluted because of prior industrial activities. Most of them are listed as environmentally sensitive sites (in French, installations classées pour la protection de l’environnement or ICPE) and are subject to prefectural control. In the case of the closure or change of use of a site, French law requires measures be taken to prevent health and environmental risks. These obligations are evolving from the rehabilitation of industrial sites towards managing the risks of polluted sites according to their future use. In 2003, the “Bachelot” law ratified this notion of the rehabilitation of polluted sites (LAMBERT, 2014).

The purpose of this article is to present research...
being conducted by EPFN within the framework of an industrial training and research agreement thesis, in collaboration with the LAREP laboratory of the Ecole Nationale Supérieure de Paysage de Versailles. The aim is to consider possible changes in the way of managing the different phases in the rehabilitation of these wasteland sites by including a landscape project as a lever for their regeneration. These proposed changes have been influenced by the theoretical and practical work conducted \textit{in situ} on land re-use by a group of landscape architects (CHAUVEL; RUMELHART, 2005). A relevant response must also take into account the variability of time frames in rehabilitation processes. It must establish a link between past and future, without forgetting the inherent intangible values of the project (DONADIEU, 2002).

Our research topic concerns the Seine Valley, an area with a long industrial past stretching between Paris and Le Havre with many industrial activities as well as a great many wasteland sites due to economic decline. In 2011, EPFN conducted an exhaustive survey of these wasteland sites in the Basse-Seine region (see Fig.1) within the framework of a master plan for the Greater Seine area. This contributed to developing a forward-looking multiform economic redevelopment approach to fight against urban sprawl and preserve farmland. It made it possible to deploy a “regional development programme in which local authorities and stakeholders can contribute to a sustainable development approach addressing issues relating to the river”\textsuperscript{3}. The survey of these wasteland sites made it possible to provide a precise mapping of the industrial sites in the Basse-Seine region and a more comprehensive understanding of their possible re-use.

Based on our observations, the wasteland sites intended for landscaping or environmental projects present different characteristics. There are sites with high levels of pollution preventing certain uses for them, such as sites in flood zones inappropriate for building, zones presenting
geological risks or sensitive natural zones, and zones situated on land earmarked as building land for development projects. However, the development of these sites is subjected to delays which vary according to fluctuations in land prices. They also share the following characteristics: heterogeneous topographies and diverse substrata of degraded soils transformed and impacted by industrial activities.

Off-site management of polluted soil is costly and seldom encouraged in rehabilitation policies. The treatment of pollution needs to be defined according to future uses. These sites are also sometimes overrun by spontaneous vegetation which can make them unattractive to the population, and they are often isolated from the urban fabric.

Within the framework of the EPFN we also examined the process of a rehabilitation project from the acquisition of the land until completion of the project, analysing the different links and impediments that arose and their spatial and temporal impact on the project design. This approach forced the EPFN to extend the scope of reflection upstream to include the preparation for reconversion and seek to integrate landscape design within the rehabilitation and land management process. Such a pragmatic approach helps the decision-makers (EPFN included) to reconcile the management of wasteland sites with the constraints of treating polluted sites. This approach is also aimed at studying, in an iterative manner, environmental constraints and urban planning in order to optimise the management of polluted sites according to the most adapted future uses for them.

How did we proceed?
We first started by conducting an in-situ observation of the rehabilitation process at the EPFN. At the EPFN, the reconversion of a wasteland site is conducted in two phases:
- An exhaustive study is made to evaluate the advantages and constraints of the site (including pollution studies), the needs, and the price of the land in view of defining a sustainable strategy for
its re-use.
- The rehabilitation works are conducted to enable the re-use decided on during the study phase; these works are carried out under the control of the EPFN and are co-funded within the framework of agreements signed with the two regions of Haute-Normandie and Basse-Normandie.

The rehabilitation process of a polluted site implies an iterative process involving these two phases. Especially regarding the management plan for polluted soils which, from an engineering standpoint, depends on the development project itself which must provide the most cost-efficient designs for an appropriate use of the site. This interaction between the management plan for the polluted soils and the designing of the project sometimes results in an interruption in the project design process.

In our analysis we identified seven different impediments based on case studies and experiments conducted during entire projects, from the acquisition of the land to delivery. They are presented in Figure 2. These impediments and blocking points which concern the land, governance, and technical risks, jeopardise the rehabilitation process.

We then established the links between these impediments, which are considered as obscure blocking points that are difficult to control, with possible impacts on the parameters of the landscape project (space, time and stakeholders) (see Fig 3). Our analysis revealed that these impediments can strongly impact the design of the landscape project which intervenes at a later stage in the rehabilitation process.

For example, according to our study, obstacles to the acquisition of the land, which are traditionally perceived as being due to economic or land management issues, can influence the form of the project.

The following examples illustrate these links. The MUSTAD plant is a case we studied in the Seine Valley. The project involved reconverting a nail factory into an urban park. The authorities started the reconversion of the site as soon as
the factory closed. The first study dated from 1991, before the closure of the plant in 1992. In spite of the firm intention of the public authorities to reconver the site, acquiring the land took 7 years, the time needed for all the stakeholders to reach an agreement. However, in the 7 years it took to acquire the land the regulations changed with the passing of a decree concerning polluted sites in 1993 and a law on flood risks in 1995. In addition, the requests for the different uses of the land changed. As a result the design phase of the project was rather chaotic. The project at the outset, which only concerned urban renewal, was faced with other challenges such as addressing the issue of flood risks and the treatment of sources of pollution. This clearly illustrates the importance of the time factor which may not have been taken into account in the programme or by its designer. The project design was greatly modified to the extent of becoming a hydraulic structure, a holding pond combined with an aquatic garden.

The time dimension is not the only important factor in slowing down the acquisition of the land, financial reasons can also play a part. In another example, a foundry and paper plant near Vernon (a town of 20 000 inhabitants in the Seine Valley), the acquisition of the land cost the EPFN a large sum due to a court ruling. The former owner of the land won a lawsuit which forced EPFN to buy the land at a market price that did not take into account the cost of rehabilitation. The cost of acquisition will impact the objective of the development programme forcing the developer (SPL - the contracting authority for the project) to rethink its development approach. Normally the contracting authority calculates the gross floor area surface\(^{\text{2}}\) based on the surface area of the building land. In the case of Vernon, contrary to the usual practice, the building surfaces had to be calculated on the basis of the global economic profitability of the whole operation. The developer therefore had to design a more detailed programme and find alternative solutions in terms of space.
To consolidate our approach, on the sites proposed by EPFN we applied the methodological principles of the research strategy developed by Swaffield and Deming (2011), which is a practical, interactive approach involving academic research and practise. The three case studies selected have in common the fact that they will probably be affected by structural changes because the objectives and prerequisites have changed. In the rehabilitation process, according to Nadaï, the relationship between the use of the site and the objective of rehabilitation induces a time variable and the stakeholders do not sufficiently take into account the emergence of the landscape which has to be based on the “site” as “a hybrid entity which offers its material matrix” (Nadaï, 2005) (substrate, memory, constraint, etc.) for the project as a construction procedure (Besse, 2001). Rehabilitation projects are often organised around an urban development plan addressing multiple challenges, under an organisational and plurisdisciplinary form (Boutinet, 21001; Poussin, 2001), we also propose to privilege the notion of integrating four dimensions in the landscape: horizontality, verticality, time and stakeholder interaction (H, V, T, SI), drawn from our observations and analyses conducted during the entire land management process for the three operations conducted by EPFN during an assignment for the contracting authority. The project process represents the essence of “landscape production” in which the challenges of the production of spatial forms are related to social, economic and ecological challenges. In his book, “Clés pour le paysage” Pierre Donadieu explains that: “The landscape may be apprehended from the perspective of a material reality as the product of a visible form determined by many factors (relating to ecology, economics and land tenure)”. We tested some of the phases involved in a landscape project (pre-study, design, estimates and works) to define an approach and a strategy which could be transposed in this case to address the different organisational and technical problems encountered when dealing with polluted sites and soils.
For the town of Elbeuf, a development study was conducted for a project concerning many wasteland sites which were presenting impediments to real estate transactions. We initiated the study of a landscape design which would enhance the real estate development project. For the site of the foundry and paper mill in Vernon a reduction in the surface of the building land and a change in governance of the project impacted its nature and advancement. We proposed a park that would evolve with the commercialisation of the real estate. EFPN as the owner of the land, in charge of the management of the pollution and of preparing the development, was able to make a cost estimate per square meter of the future park. This projection made it possible to predict the possible results of the initial and final stages of development. For Schenker, the aim is to develop a transitional use for such plots which are wasteland sites half-way through being developed into an eco-neighbourhood. These three cases are interesting examples because they are at different stages of rehabilitation via a landscape project and therefore present a wide range of observable case studies.

We analysed the process of the reconversion of the sites and the rehabilitation programmes while seeking to understand why the time factor in each site varied. We compared the solutions adopted for managing the issues of space in the conversion of former industrial sites within an urban renewal project on a different scale. We also analysed the interactions between the contracting authorities and the contractors to see at which point in time the landscape design came into play during the rehabilitation process. During the interviews, we took into account the influence of the participation of other stakeholders, such as the users.

In conclusion, it is possible to define a practical approach for the management of pollution by benefiting from the knowledge and know-how of the landscape architect from the beginning of the project and by taking into account the issue of the landscape before conducting a
land re-use study. During the works phase, two usually distinct stages are closely combined: the de-pollution of the site and the definition of a landscape development programme optimising the transformation of the space. Finally, “the substrate upon which the new urban fabric will be installed is prepared beforehand” (DONADIEU, 2005). The variable time frames for the rehabilitation of polluted sites oblige landscape architects to hone their skills in this area: evolving from working on simple project design towards developing project strategies (DONADIEU, 2012) within programmes, and from being unknowledgeable about pollution risks towards planning the management of polluted soils. This implies a landscape “project strategy” combining an inventive approach, mediation between stakeholders, and coordination of the project planning schedule. This sequencing of elements supports our research hypothesis concerning the need for a symbiosis of the four dimensions (H, V, T, SI) which contribute to building a coherent rehabilitated landscape.

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Recueil de la journée de conférence :

Current Impediments and Blocking Points Impeding the Rehabilitation Project

1. Impediments in acquisition of the land
2. Impediments from the authorities (Regional Environmental Directorate or DREAL, River Police) concerning environmental and health risks
3. Impediments due to protest movements
4. Impediments from governing bodies (change of elected representatives, change of contracting authority)
5. Impediments in terms of competence of the works contractors (landscape architect, study office, building contractor)
6. Delays and contingencies on the working site
7. Impediments in commercialisation of the real estate

Figure 2: Chart of the current impediments and blocking points of the rehabilitation project. Hong ZHU, 2017.

Impacts of the impediments on the different parameters of the landscape project.

- Impediments to acquisition of the land
- Impediments from the authorities (Regional Environmental Directorate or DREAL, River Police) concerning environmental and health risks
- Impediments due to protest movements
- Impediments from governing bodies (change of elected representatives, change of contracting authority)
- Impediments in terms of competence of the works contractors (landscape architect, study office, building contractor)
- Delays and contingencies on the working site
- Impediments in commercialisation of the real estate

Figure 3: Graph showing the impacts of the impediments on the different parameters of the landscape project. Hong ZHU, 2017.
The creation of a profession

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Abstract:
The establishment of the profession of landscape architecture in Norway took place during the first few decades of the 20th Century. Two key moments of the pioneering phase were the launch of a new graduate programme in “Garden Architecture” at the Agricultural University of Norway in 1919, and the founding of professional organisation “Norwegian Garden Architects’ League” in 1929. The present study, based on archival sources in Norway, shows how the historical context, including the Norwegian independence from the Swedish Crown in 1905, World War I from 1914 to 1918, and the awakening modernism in art and architecture, played a significant role in the shaping of the programme as well as of the professional association. The paper emphasises the period between 1919 and 1929, and seeks to explain the relations between the professional community of garden architects, architects, art historians, etc, and the new academic programme at the department of horticulture at the Agricultural University in Norway before, during and after this period. Key figures in this period are Marius Røhne, the first head gardener of Oslo, Carl W. Schnitler, art critic in Aftenposten - the main newspaper in Oslo, Gustav Vigeland, sculptor, and Olav L. Moen, docent and later professor of garden architecture at the Agricultural University of Norway. The links presented and discussed in this study have repercussions on contemporary landscape architecture in Norway.

From apprenticeship to a formal education at the agricultural school
Like in many other countries, the establishment of the profession of landscape architecture in Norway happened around turn of the 20th Century. Norway was a relatively poor country during the 19th Century, the emigration was high, and there was hardly any nobility class e.g. compared to Sweden and Denmark, and thus few palace gardeners and possibilities for apprenticeships. Gardeners’ education was limited to a few gardener schools. Gardeners at the royal palace in Oslo in general had their
education from abroad (Germany, Sweden and Denmark).

In 1859, a national agricultural college was established, as part of an agricultural reform policy. The college was established in a rural setting at Ås, 30 km south of Oslo. The buildings were kept in a modest, barrack-like style, and the budgets were minimal. In 1860, the young Swedish gardener Abel Bergström was appointed. He started implementing the plan for the college grounds, and at the same time, he was teaching horticultural subjects in the college. In 1887, Bergström succeeded in establishing a horticultural division at the college, as the first specialisation at the agricultural school. (Four others followed in 1897: agriculture, forestry, land surveying, and dairy production.) Among the subjects taught by Bergström in the new division from 1887 was the history of garden art, as well as the design of gardens. During the following decades a certain proportion of the horticultural candidates from this study programme practiced as “garden architects” – usually combined with the practice of landscape gardening.

The developments of 1897 were parts of a fundamental shift in focus and engagement of the agricultural college. The institution was renamed Norges Landbrukshøgskole – NLH, and was given a status as scientific institution with the aim to carry out research and give higher education, a parallel to the German Wissenschaftlicher Hochschüler. This installed a completely new principle of governmentally funded professional education. (The only university in Norway, University of Oslo, was founded 1811, so with this reform, NLH became the second higher education institution. In 1900 it was decided to establish also a technical college at the same level in Trondheim, it was realised in 1910, and included an architectural department.)

The new commitment at NLH is visible in the architecture: the existing campus buildings was renovated and extended considerably, this time in a more “palace-like” architecture. It is clearly also a sign of the nation-building period of Norwegian history: after almost 100 years of Royal union with Sweden, there was a strong independence
movement. Another proof of the new undertaking was the major competition for the design of the campus grounds. The winning entry was made by a young candidate from the horticultural division who had graduated in 1899: Hans Misvær. He was appointed head gardener in lecturer of horticulture in 1901 when Bergstrøm stepped down, and continued his teaching in garden art and design, at the same time as he developed the campus grounds according to his winning design.

The pioneers
Among the 10 – 20 horticultural candidates who chose to work as garden architects between 1890 and 1920 were Iosef Oscar Nickelsen, Ingilf Eide, Ivar Stæger Holst and Marius Røhne. Røhne established his office in 1913, and in 1914 he was commissioned to design the exhibition grounds for a major international exhibition at Frogner in Oslo for the centenary celebration of the Norwegian constitution of 1814. He worked together with Iosef Oscar Nickelsen, who had established his office shortly after 1900. Ingolf Eide established his office in Bergen 1898 and Ivar Stæger Holst established his in Arendal around the same time. Both Stæger Holst, Eide and Nickelsen had their education from abroad (Denmark and Germany) and were not candidates from NLH, and also Røhne studied and practiced in Denmark and Germany before he entered the programme at NLH, Ås, and after he graduated in 1911. When Oslo municipality established a parks department and a position as head gardener in 1916, Marius Røhne was appointed, and he stayed in this position as a central figure in the profession until he retired in 1948. The same year, a leading art historian in Norway, Carl W. Schnitler, published a major work on historic gardens in Norway. He was also a journalist and art critic in the leading newspaper in Oslo, Aftenposten, and had written very positively about the designs of Røhne and Nickelsen at the Frogner exhibition. In the credo of the book, Norske Hager, he elaborated this:

“Time has now come to seek to regain some of the past’s attitude and beauty, even in the greater context - the artistic harmony of the
house with its surroundings. It is architecture in the extended sense. The beautiful unity between the town’s houses, streets and monuments, between the house of the country and the terrain around it, is now what we should strive for. (...) In this book an attempt has been made to put forward the typological development and at the same time as the result of European art, the most important of what Norway has produced in one of these areas. Could it help us to work independently on the basis of the best in our domestic traditions, a significant step in the work of our artistic recovery would have been made. “(Schnitler 1916)

These words from the influential art critic and later professor of art history at the University of Oslo, places great expectations on the shoulders of this young profession and its capacity to enhance the modern cultural development and contribute in the nation-building project that was so prevailing in the first decades of the 20th Century in Norway.

A study programme at university level
The horticulturally based education at NLH, Ås, was criticised for being inadequate, a fact that is demonstrated by the efforts most of the garden architects made to enhance their competences through studies abroad. In 1911, there was an initiative made by the horticultural students to strengthen the programme with regards to garden design and in 1917 a select committee was appointed to evaluate the programme. They gave a very clear recommendation:

“Garden Architecture is a profession that includes big responsibilities and has many opportunities for development. And it is a subject of importance to all layers in society. In the teaching at NLH it has grown beyond its hitherto relatively modest frame, and can henceforth only be held at the necessary level with time and development by the establishment of an own chair. (...) This important profession is now about to be recognized more widely, and thus garden architecture will sooner or later be offered by one university college or another in this
country. The Committee is of the firm opinion that the subject’s natural place is at NLH and that there would be irreparable harm for horticulture and garden architecture itself, if it were separated from the horticulture department and established at another educational institution. ” (NLH archive 1917 )

The same year a professorship in garden architecture was announced. None of the applicants were found qualified. When the position was announced again two years later, one of the applicants, Olav L. Moen, who had graduated from the horticultural programme in 1918, was offered a study grant in order to qualify for the position. He accepted this, made a comprehensive study tour, including a 6 months study at the Hohere Gartenkehranstalt in Berlin, Dahlem, and returned in 1921 to start teaching the class of garden architecture students who had started their studies in August 1919. NLH this year went through a reform raising the level of the studies as well as of the institution itself. It was given the right to award doctoral degrees, and was thus raised to the level of universities. The entry requirements were also sharpened; to start the studies in garden architecture, one needed a three years gardening school and three years of practice. The studies also took three years. In the beginning, there were only a handful of candidates each year who completed the programme and received their certificates. Most of them were appointed as head gardeners in municipalities or other public positions. Only a few established their own firms. Two who did were Eivind Strøm and Harald Hindhamar, who graduated in 1926 and established their firm Strøm og Hindhamar in 1927. In 1936, Strøm was recruited to the Oslo Parks Department by Marius Røhne, and Hindhamar joined forces with another firm, Ellef Grobstok, and formed Norske Hager - a leading company for many years.

A national association – or two?
The recognition that came with the establishment of the education at NLH seems to have given the small group of professionals a bit of self-confidence. During the 1920ies, the idea of a
national association was discussed on several occasions. There was a lot of resistance, mainly among the older members of the professions, but also some in the younger generation were sceptical: “In the Norwegian context, both climatic and economical, I do not believe in any pure garden architecture association” said Ellef Grobstok in a meeting. This position was based in the ambivalent relationships between the garden or landscape gardeners and the landscape architects: most garden architecture firms would also have their own landscape gardeners to carry out the actual construction of the gardens or parks, or they would at times indeed take part in the work themselves, and even have plant nurseries themselves. On the other hand, the landscape gardeners would often make the designs of gardens themselves. For some of the members, the borders between the two professions were more than blurry, and in 1928 there was a long debate in the Gardener’s Journal whether the gardeners and the architects should join forces and form one bigger association instead of two. Harald Hindhamar, on the other hand, who himself was the leader of a combination company, took a clear view: Designing and performing construction are two very different tasks, he said, and the best would therefore be two distinct associations.

Olav Moen, who was regarded as an unquestioned leader figure of the garden architecture community in Norway was surprisingly negative to the idea of a separate association for garden architects. Moen had strong objections to the proposed name “Norsk Hagearkitektforening” (Norwegian Garden Architects’ Association), which he thought seemed too pretentious. He also saw no basis for a nationwide organization with so few members, echoing the argument Charles Eliot offered Warren H. Manning, when he wrote to get support for the idea to set up an association of landscape architects in USA three decades earlier.

One year prior to this, in 1927, a small group of quite young garden architects met in Marius Røhne’s office in the Oslo parks department,
and laid out the structure and policies of an association of garden architects. They even appointed Røhne as a provisional chairperson, but the association was not formalised and the few meetings held were only announced within a limited group. In 1929, the same group in addition to a few more – eleven men in all – met again in Røhne’s office in Oslo and set up the organisation “Norsk Hagearkitektlag” (Norwegian Garden Architects’ League) with the abbreviation “NHL”. (The decision to use “Lag” (League) instead of e.g. “Forening” (Association) might have been influenced by the prospect to benefit from the similarity to the strong brand of NLH.) Moen was elected as chairperson, but refused to function in the position. At the annual meeting the following year, Moen proposed to extend the membership base to include landscape gardeners and change the name to “Norsk Hagearkitekt- og Anleggsgartnerlag.” (Norwegian Garden Architecture and Landscape Gardening League) The lack of common interest between the two groups was obvious however, and after one year, in 1931, the Landscape Gardeners established their own association. Many landscape gardeners kept their membership in the combined organisation however. In 1939, there was a crisis in the relationship between the two professions, when the landscape gardeners’ association changed names to “Oslo Hagearkitekt- og Anleggsgartnerlag.” (Oslo Garden Architecture and Landscape Gardening League). In an extraordinary annual meeting in April 1939, NHL regained their original name in a unanimous vote. The conflict was difficult to settle, it was prolonged due to the Second World War, and only solved in 1949, followed by several years of bad relationship between the two organisations.

Gustav Vigeland and Olav Moen

Olav L. Moen engaged in the public debate on many occasions. In 1930’ies he was involved in the discussion about the Vigelandsparken in Oslo. The City Council of Oslo decided to set aside the former exhibition grounds of the Frogner exhibition for the display of the sculptures of the famous Norwegian sculptor and earlier Rodin-pupil, Gustav Vigeland. Instead of consulting any
garden architects, Vigeland drafted a plan for the design of the landscape, which was accepted by the City Council. Moen was a sharp critic, in his view the plan was based on «an extensive use of avenues with no starting or ending points, cutting the whole area in pieces of useless sizes and shapes». He presented an alternative plan in one of the main newspapers and exclaimed: «No other European city would even consider building anything as bad as this» he said. “The potentials in the existing landscape are totally neglected, and the use of vegetation give no value in bounding the area against the city outside». In addition, Marius Røhne was critical to the Vigeland Park development, but was not able to interfere, even if he was the Director of the Parks Department. Unfortunately, Schnitler had passed away a few years earlier; otherwise he might have added some weight to the argument. Some of the younger art critics also commented the park project, but focused mainly on the sculptures and not on the landscape. In the end, Nickelsen managed to get into a position where he could guide the old Master, and the original plan was modified.

From Garden To Landscape Architecture
In 1966, two young garden architects, Bjarne Aasen and Toralf Lønrusten established a company under the name “Landskapsarkitektene AS” (The landscape Architects Ltd). They had found that the title landscape architect better reflected the company’s engagement by Oslo Power Works for the Aurland hydropower development. The change seemed overdue. After Aasen and Lønrusten adopted the new title, almost all Norwegian companies followed, and the new ones that appeared consistently used “landscape architect”. In 1969, Norwegian Garden Architects League became Norwegian Association of Landscape Architects NLA. (This time the similarity to the abbreviation of the architects’ association – NAL – surely guided the choice of the terms.) Finally, in 1972, the department at NLH followed fashion, and changed from Department of Garden Art, to Department of Landscape Architecture.
The change of titles significantly coincides with a change of professional focus. From having been primarily concerned with gardens and green planning in small or moderate scale in the first half of the Century, the landscape architects’ attention was increasingly directed to large interventions like hydropower developments, gravel pits, quarries and road projects, as well as larger office buildings and urban contexts in the latter half of the 20th Century. Aasen and Lønrusten’s cooperation with Oslo Lysverker marks a crucial phase in Norwegian landscape architecture.

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Landscape As A Lens Of Reinterpretation And Design

Landscape is not merely a philosophical term or a spectacular view of nature but it is also a design product, an intervention of big scale, a project with biological infrastructure. Landscape design is a cultural act of incorporation and compositional sewing of all the parameters that characterize a site: morphology, hydrology, ecology, scale, vulnerabilities and latent dynamics, as well as local myths and beliefs, atmospheres, in totality the genius loci. The landscape designer usually works with the place in order to achieve to reinterpret it.

The landscape architect through design should be the translator of all these complexities and different layers of meaning. A design appears to belong to a place if it also respects and draws from the history recorded there.

This paper will explore the way landscape, identity of a place and ecology interact through design and its visual representation, using examples from professional and educational projects on postindustrial sites.

Rethinking The Postindustrial Site's Landscape

Abandoned industrial areas have become a contemporary problem in many advanced places throughout the world. It seems that in the postindustrial age, western society tries to rethink on how to deal with these industrial leftovers. Their recuperation is becoming an important topic of industrial heritage and landscape. Projects such as La Villette architectural competition (1981) and its park construction (1984-87) in the old slaughterhouses of Paris, the Barcelona 22@ district and the rehabilitation of post industries’ buildings and public spaces (2000-2017), the High line competition (2003) and elevated park promenade (2006-2017), show the urban and social necessity of reappropriating such sites. The IBA Ruhr Emscher Park competition (1991) and strategic regeneration plan of Peter Latz (1991-2002), emphasizes on the possible solutions to regain polluted industrial spaces even in the countryside. It is a design challenge
to restore these sites and bring them “back to life” without losing the special atmosphere, memory and inherent sense of place they emanate. At the same time, they offer a territory for design experimentation and technological innovation in order to achieve a new landscape creation of economic sustainability and ecological resiliency. The following research questions arise:

How can Landscape architecture assist in the recuperation of such “broken” sites? In which way the design responds to change over time and reconciles layers in a contemporary sustainable project? How can current landscape design contribute in a creative way in the transformation of a derelict postindustrial place?

Michael Hough, pioneering landscape architect and professor in the Faculty of Environmental Studies in York University, Toronto explains:

The restructuring of old industrial areas in Germany has begun with ecological, *not* economic, renewal as recent experience in the Ruhr Valley is demonstrating. Proposals to introduce networks of multi-functional corridors and parks in Toronto’s Port Lands is seen as an essential environmental framework for future development – establishing landscape as the precursor to built form. [1]

**Landscape As Educational Process: Research And Teaching**

Landscape design as a methodological tool of education is more and more crucial for architectural studies. This interdisciplinary field of research is particularly important for understanding the construction of culture and place, identities and space, environmental issues and habitats. Michel Corajoud, famous French landscaper and educator, in his essay ‘Nine rules for students of landscape architecture’, advices that it is very important when visiting a site to sharpen the personal glance to it. He insists that all information and answers are *a priori* there. The only issue left for the landscaper is to pose the right question. A landscape project should try to awaken, to reveal, to
underline with subtraction the strongest elements that form the identity of a place and achieve it in a biological


Framework
The following diploma project was researched and presented in the School of Architecture in the Technical university of Crete Chania on June 2016 by the students Elli Alexiou and Alexandros Kapsalis, with supervisor professor Mrs. Panita Karamanea, Lecturer of Architectural and Landscape design.

“Geosocial Fields”- Touristic Demands And Social Needs
1. Landscape Professional Practices: The “Eco-Corridors” Project – Regeneration And Reuse
The project “eco_corridors” is the 1st Prize of the landscape competition “Regeneration and Reuse of former lignite mines in Western Macedonia”, held by the Public Power Company of Greece in 2016. The area of 188,737 ha, is a former lignite mine in Ptolemaida.
The team is Topio7 by Katerina Andritsou, Panita Karamanea, Thanasis Polyzoidis, (architects and landscape architects) and Collaborators-3d Visualization, in collaboration with Thanasis Polyzoidis, Chrisanthi Vathi-architect, Lida Driva-architect, Adamantia Samiou-architect, Lela Chronopoulou-student of architecture.

The current typical inland landscape of Western Macedonia although changed through human made actions has preserved its beauty with dominant natural elements and interesting views. However, it is characterized by fragmentation, access difficulty and discontinuities. This landscape needs a mild project gesture in order to be enhanced, environmentally and aesthetically improved and become a public attractive place.

Main aim of the project is to maintain the special atmosphere of the place using the unification and the integration through scales. The project
acts as a strategy that is being expressed in three thematic axes: (i) biodiversity and ecological connectivity (ii) the water net (iii) the spatial organization of movements and stops and the new uses and constructions. The evolution of the project in time frames is also taken into consideration from the start.

The interpretation of the existing section and the relief, emphasizing in the individual special spatial qualities of the place has played a significant role. The empty space – clearings between the individual landscape areas has been considered as a spatial and ecological virtue to be maintained. The movement and rest area network has been designed to be embedded in the relief and the individual spatial qualities providing variety between enclosed and extrovert areas and viewpoints. The concept derives from the longitudinal shape of the site that functions as an ecological corridor (figure 4).

The need for environmental enrichment and enhancement of biodiversity, has leaded to manage the landscape as a system of fluxes that organizes and connects in synergy the spatial relationships with the individual habitats. The resulting landscape is crossed by a series of ecological itineraries (eco_corridors) with different characters and qualities. The “eco_corridors” project is being proposed forming different uses in the landscape, such as cultural uses, sport facilities, cultivations and leisure.

Plantation being a main structural element of the place is being used as an entrance marker, as a filter, as a mantle, in masses giving birth to enclosed or extrovert landscapes, to densities and clearings.

The proposal is structured in various landscape zones and intermediate transition zones with characterized spatial identities such as:

- the athletic park (sports activities, racing circuit in the forest, playgrounds, recreation, parkings)
- the spectacles’ place (amphitheater embedded in the landscape, existing motocross) (figure 5)
- The Conifer forest (net of movement and
rest areas - picnic areas, belvederes)
- The central meadow (lineal guarrigue gardens, places for social happenings, clearings of natural regeneration, outdoor activities, market places, exhibition of sculptures and industrial installations as “objects trouvés”)
- the Robinia pseudoacacia forest (net of movement and rest areas - picnic areas, adventures park, belvederes)
- the artificial wetlands aiming to irrigate the whole area (rainwater deposits, macrofita)
- the hills (main viewports – belvederes for the whole area and the observation of the fauna)

The ‘eco-corridors’ project tackled a former industrial mining landscape that had been partially degraded. The idea is not to deny the former identity but instead to accept it and heal it. The Master Plan offers a vision and a guiding framework for how the Park may be strategically improved and developed over time. At the same time, it is intended to be dynamic and flexible, capable of being adapted to changing needs and desires. The project works “with nature” in order to enhance, organize and enrich the hidden unexploited qualities of the site that needs firstly remediation and biodiversity’s recovery and secondly a new program of uses and connections in order to become a pole of attraction. A sequence of landscape-themes appears that constitute the revealed site’s narrative. The idea is to achieve the goals of unity, connectivity, sense-of-place, ecosystem, identity and inclusion in one park in the countryside (figure 7).

The huge scale accentuates the problem of organizing and appropriating the site in human scale. Thus, a strategy of actions and gestures is acquired in order to achieve renewal and resiliency. New circulation systems, vegetation, signage and design elements will shape the park as one. Ecology as a concept, as the main design tool of recreating quality resilient space is at the epicenter of the project. The competition is the first of that kind in Greece and is of a great political and societal impact in the local societies. In addition, in a supralocal and
regional level it represents a new attitude of the administration towards landscape and ecological issues, that was absent in the past. The appealing existing atmosphere is preserved and the genius loci of the place is being emphasized. The final result is a new version of the existing landscape, a version of a hybrid resilient and cultural character that combines human made traces and natural elements.

The “eco-corridors” envisioned a set of goals for the transformation of the existing territory. The project proposes a public-spirited leisure 21st century park that enriches the quality of life, and at the same time defines and shapes ecologically the landscape.

Postindustrial Sites And Landscape Design As Process - Conclusions

The presented projects showed research and practices of how to recuperate abandoned postindustrial sites by using a system of collaborative strategies. The term “hybrid landscapes” may be understood as this combination of methodologies and elements that “bridge” the past memories and current situation, with their future regenerated version. The alliance of biological and technological structures used in the remediation of postindustrial landscapes, gives birth to innovative design practices. An interdisciplinary approach design is needed, that will act as a long-term process in synergy with techniques that rejuvenate a site’s degraded conditions. Some conclusions and design considerations arise vividly:

- ecology, water management and time phasing are crucial in order to organize and program a landscape architecture creative design outcome.
- it is very important for the social success and economic sustainability of such projects, to propose a design paradigm that unites activities with new site programs and uses.
- contemporary landscape creation should facilitate innovative ways of responding to the genius loci and the potent atmosphere these places emanate, and reinterpret the identity of each place that bears interesting memories.
The innovation of these examples relies on the fact that both propose ecological regeneration in order to achieve territorial reactivation. This strategic decision is not common till now, in Greece. They create softscaped architectures that favor open air uses and social activities. They are spaces for leisure, recreation, relationship with the natural elements, with sport facilities, experimental cultivations for scientific and educational purposes.

Regarding the diploma project “Geosocial fields”, usually large abandoned areas in front of the sea, become resorts for high incomes that wish to spend their vacation in the country. They get exploited as enclosed to public, private properties which aim to please only a certain type of visitors. Tourism acts as a catalytic lever that transforms the territory regarding only economic terms and demands, neglecting environmental necessities and cultural traces. The specific project succeeded to combine a touristic profile with an eco-friendly approach, creating an open public space that maintains the local memories alive and is able to host social events.

The “Eco-corridors” winning competition entry, also proposes an alternative ecological way to plan the site. The habitual condition after exploitation in such areas, is abandonment and indifference. It is a common image in the urban periphery or in the countryside, to observe postindustrial derelict spaces, ex-mines and quarries that lack identity and new use. The Public Power Company’s initiative to convoke an architectural competition for the reuse of the site, is already an innovation and a paradox worldwide. The proposal to restore the site ecologically and create a new narrative based on the spatial qualities of the landscape and not in the construction of new buildings or residencies for example, is again a non-common reality. Usually such spaces are or totally abandoned or under urbanization and privatization. Reclaiming them back in terms of social reconquer and site’s “renaturalization” seems new and promising. The uniqueness of these projects relies first of all in the inherent spatial qualities its site carries.
The Santorini’s balcony to the crater, the ex-theraic earth mine, and the ex-lignite mine in the countryside of Western Macedonia. Places where landscape is so present and impressing, cannot but be reclaimed by reusing ecological restoration as a strategic priority. But mainly the uniqueness of these two projects relies on the social impact such free naturalized spaces may evoke through time.

Postindustrial sites are places of big scale, and usually need diverse systems of remediation. They require a process-driven landscape design approach that allows an “open-ended” plan, not a definite procedure, a plan that will promote flexibility and changes over the years. Masterplans are rather frameworks of territorial organization than strict formal designs. An integrated approach to restoration provides the essential opportunities for dealing with many problems that should be seen not as physical constraints but as means of inspiration for 21st century landscape creations. The creative alliances of ecology and hydrology, the opportunities brought by the collaborative and integrative exchanges between landscape and design, reconnects postindustrial sites with nature both visually and integrally. To envision them as hybrid systems that encompass life again, is a creative act of hope that shows new professional and research initiatives. The way we design and respond to these contaminated and derelict areas, the emerging technologies and design strategies used in reclaiming them back, the crucial use of ecological practices, construct a contemporary regenerative approach that is more and more valid and present. These industrial places have been called the parks of the 21st century and the way we treat them reflects the maturity and the cultural level where our societies stand.

References
*Remaking Landscapes*, 1999, catalogue of the 1st Biennial of European Landscape Architecture, Barcelona: COAC.
figure 1. Fira and the mine of theraic earth - current situation

figure 2. The post mine masterplan and longitudinal view from the caldera.
figure 3. Topography diagrams and time phasing

figure 4. "Eco corridors" masterplan
the cultivations (extensive timber, nurseries, fruit trees, ecological orchards)
the riparian forest (net of movement, rest areas - picnic areas, social games, recreation) (figure 6)
figure 5. The cultivations and the amphitheater

figure 6. The stream

figure 7. Leisure area – the central meadow
Introduction
Facts about the origin and development of botanical gardens of Korea are yet unclear. The discussion about the birth of botanical gardens in Korea ranges from the record that the Changgyeongwon Botanical Garden (Figure 1), a modern facility built by the Japanese government, was the first botanical garden of Korea [1], to the overstretched theory that a palace of Gyeongju from the Silla dynasty may provide clues for identifying the root of botanical gardens [2]. In light of the revival of botanical gardens in Korea, however, Korean society faces the challenge of evaluating the botanical gardens of Korea from a historical perspective. The purpose of this paper was to provide a comprehensive picture of the birth of Korean botanical gardens and illustrate their significance by identifying and studying the botanical gardens of the past. In an effort to examine the background of the birth of Korean botanical gardens and its significance, this paper studies the botanical gardens that existed before the founding of the Changgyeongwon Botanical Garden. Particular attention is given to the “birth of modern science” [3] in tracing the root of botanical gardens. The history of botanical gardens is examined, while an analysis of the three periods that saw significant changes in Korea’s history of botany is also provided in this paper.

Physic Gardens in the Age of Herbal Medicine Study, 13-15 Century

Hopefully, plant and grow all kinds of medicinal herbs, collect medicinal herbs that naturally grow in the mountains and fields by season, give all that is sought by the ill, and in March, June, September, and December, have inspectors always examine how many medicinal herbs were planted and grown, and how industrious or idle the use of medicine has been [4].

Herbal Study and Systems in Ancient Times
Since ancient times, East Asian countries including Korea believed plants were the key to treating a variety of diseases. Also, plant research, or boncho (本草, medicinal herbs), was a part of the medical field. Under these two premises, ancient herbal medicine studies and the medical care system of those times
were carefully examined. The birth and development of physic gardens really began in the late Goryeo (高麗, 918 – 1392 CE) dynasty, when herbal medicine study had entered a new phase. During this time, interest in native herbs grew and the perception of nature changed due to a renewed understanding of locality from Neo-Confucianist influences [5]. As the herbal medicine focus shifted from dangyak (唐藥, Chinese herbs), which was hard to gain, to hyangyak (鄕藥, native herbs) which was more easily accessible, academic theories supporting the classification and medicinal properties of hyangyak developed. These changes are presumed to have laid the foundation for the utilization and collection of hyangyak, in cases confirmed with newly-arisen scholar officials who advocated for Neo-Confucianism. Therefore, herb gardens should be considered the beginning stages of physic gardens, for many gentries showed tendencies to collect herbs and cultivate them as an act of academic interest in herbal medicine study [6]. This is due to the fact that hyangyak theory began to thrive in the early Joseon dynasty.

The Jong-yakjeon in the Joseon Dynasty
Policies regarding hyangyak were actively had been implemented since the early years of the Joseon dynasty. The Joseon dynasty’s political ideology was based on “injeong (仁政, benevolent politics),” which was to rule benevolently for the people. An important means to demonstrate injeong was medical care, of which herbal medicine study, especially hyangyak, was a crucial part of. In this context, theoretical research on the ecology and medicinal properties, and publications on hyangyak, were implemented, along with policies regarding the investigation of native herbs based on geographical distribution and the establishment of a system, for collection and production.

The management of the Jong-yakjeon (種薬田, medicinal herb garden) medical facility was also a part of the medical change movement. A combination of references featuring facts regarding Jong-yakjeon’s
affiliation, facilitation purpose, regulations and standards, featured its establishment period, location (Figure 2), size, types of herbs, and members show that all the Jong-yakjeon were royal physic gardens in the sense that they were national facilities that secured and produced medicinal herbs, both native and foreign herbs.

To determine the influence of Joseon dynasty’s Jong-yakjeon on herbal history, the following two points should be discussed. The first idea is that scientific research was the core function of botanical gardens. There is a possibility that Jong-yakjeon was a place for medicinal herb research and education because it was affiliated with central medical systems such as Naeuiwon (內醫院, royal physicians’ court) and Hyeminseo (惠民署, public hospital for the people), the former having been an institution that conducted medical research, provided education and offered treatments for diseases. However, there are no remaining records that show how Jong-yakjeon contributed to boncho research and education.

Another issue related to herbal history is whether or not botanical gardens evolved from physic gardens. Although herbal medicine study became natural history during the late Joseon dynasty, there is no evidence regarding the evolution of Jong-yakjeon’s, changes in cultigen or naturalistic achievements that can help us state that Jong-yakjeon evolved into botanical gardens. Therefore, the Jong-yakjeon was evidently a royal physic garden for a nursery affiliated with the institutions managed medicine when plants were perceived as medicine.

Jong-yakjeon cannot officially be recognized as the physic garden that developed into a botanical garden. However, it is an important garden because it was established in the early fifteenth century, earlier than those of Europe and Japan. Though Jong-yakjeon seems to have been present till the late Joseon dynasty, it is unclear as to when and why it disappeared. Moreover, there is still a lack of evidence that allows for a comprehensive picture of the Jong-yakjeon. It is crucial that more evidence be found
in the future to better represent the nature of Jong-yakjeon.

**Gardens of Aficionados in the Age of Natural History, 18-19 Century**

*If he hears there is a strange flower in someone's house, he seeks it even if he has to pay a fortune, and if he sees that a flower is hidden deep inside a vessel abroad, he travels 10,000 ri (about 0.393km) to get it. Pomegranate flowers in the summer, plum blossoms in the winter, peach blossoms in the spring, and chrysanthemums in the fall—flowers bloom all year round.* [7]

The Emergence of Natural History and Aficionados

In the late eighteenth century, a part of herbal medicine studies went beyond the boundaries of the medicine field into that of natural history. The introduction of *Ben cao gang mu* (*Compendium of Materia Medica*) and the way the book was used as an encyclopedic dictionary may have served as the turning point of this change in society’s perception of herbal medicine. Animals, plants, and minerals that were previously regarded simply as drugs had become subjects of admiration and study. A large proportion of Joseon scholars began seeking a state of so-called *byeok* (癖, obsession), a complete engrossment in or obsession towards an object. Given this background, the most important factor for such a change in perspective may have internally been the active commercialization that promoted product trade and exchange. Externally, the evidence-based studies from the Qing period may have been most influential. Interestingly, a shift in paradigm was an even more important factor. With the spread of the Confucian teaching *gewuzhizhi* (*belief that one could acquire knowledge through the study of matters*), physical objects became an area of interest and a subject of study for scholars [8]. Aficionados who, methodically and scientifically studied physical objects rather than merely expressing
curiosity were thought to set an example for other gentlemen (Figure 3).

Gardens of Aficionados
Gardening and horticulture topography also evolved in the late Joseon dynasty. People started to enjoy gardening, and aficionados who collected and studied flowers began to appear. In a subset of fanatics, curiosity about unfamiliar and eccentric flowers grew (Figure 4). An encyclopedic text describing a systematic method to categorize and organize flowers was published (Figure 5). The flower-filled gardens soon became a resource for an ever-growing repository of knowledge. The intimate relationship between a naturalist’s disposition and gardening is prominently exemplified in Ryu Bak (1730–1787)’s garden Baekhwaaam, and in his book Hwaamsurok, Essays on gardening and flowers at Baekhwaaam. As a botanical microcosm housing over a hundred kinds of flowers of both domestic and foreign breeds, Baekhwaaam became a resourceful platform for floriculture studies. This came down to Ryu Bak’s masterful management of the garden, through his thirst for knowledge and incessant collection, which is also how he, who was merely a retired and possibly unsuccessful scholar, became recognized as a knowledgeable gentleman amongst reputable scholars of the day.

Being a naturalist was a mark of the educated during the late Joseon dynasty. It was not uncommon for scholars of the Joseon dynasty to be botanical collectors or naturalists. But what they did not know was that their miniature plots and their horticultural activities, that is, their work with botany, contributed to the making of future botanical gardens. The various flower collections in these gardens became the platform for subsequent research on flower species classification and the like although it does not seem that there were any efforts to educate others or hold exhibitions through these gardens. Therefore, because the scientific study that serves as the core, inherent component of botanical gardens had been fortuitously conceived through these gardens, it is vital we take notice of them when studying the history of botany.
Visits to Botanical Gardens in the Age of Enlightenment, 1876-1910

Civilized nations consider botany—a study that explains the characteristics of plants and the methods of cultivation—the beginning of education and are teaching its students this subject [9].

The Civilization and Enlightenment Movement and the Expansion of Knowledge

The trend of natural history in Joseon society during the late nineteenth century can be summarized as the institutionalization of educational curriculum (Figure 6). However, it is important to note that the system of natural history education was adopted from the West, and not developed from the trend of natural history that was on the rise during the late Joseon dynasty. Natural history and botany during the late Joseon dynasty were understood as studies of civilized countries and a part of the new thought. Indeed, in late nineteenth century Joseon, new thought emerged as part of the effort to resolve crises both at home and abroad. Called gaewha – came from the Japanese word “Bunmei Kaika (civilization and enlightenment)” during the Meiji Restoration – the new thought was asserted by new intellectuals who were gleaning knowledge of foreign affairs and cultures through the Qing dynasty. The purpose of gaewha was the civilization of the state and the means to achieve it was through the adoption of Western culture and systems [10]. Gaewha thought was a new paradigm that arose during the transition from the old system to the new system. In addition to this foundation, it is highly likely that the adoption and systemization of natural history and botany education were also realized through encounters with Western cultures.

Visits to Botanical Gardens in the World

Based on research results, Joseon intellectuals of the enlightenment period encountered distinguished botanical gardens during trips to Japan, United States of America, the United Kingdom, etc. when
they were dispatched as delegates or studied abroad as students. Their records of the trips show not only observations and descriptions of botanical gardens, but also the perception of the concept and role of botanical gardens. The basis of that perception was that the botanical garden was a representative facility of the West, a symbol of civilization, and a model of enlightenment. One example of this perception can be found in the writings of Min Young-hwan about the botanical garden he visited in London a year after he visited a botanical garden in St. Petersburg. He considered the greenhouse—equipped with steam systems and glass structures—a representative facility of the West and a scientific institution.

> Generally, regardless of where the flower is replanted from, Westerners grow flowers by installing a steam system or placing a heater to create an environment where the temperature is identical to the place in which the flowers were grown, using a thermometer to gauge the temperature. For instance, if a Singapore tree—a plant grown in a tropical region—is replanted in a cold region, more steam systems must be installed so that the plant can not only survive at the same temperature as that of Singapore, but also flourish and blossom like the trees grown on the mainland. Moreover, if the greenhouse is covered in glass, the heat from the sun is as warm as fire even in the winter. Such techniques are all reasonable, so they are recorded here [11].

Yu Kil-chun also said, “Such places [botanical gardens] exist in all big cities of many Western countries,” [12] and emphasized the West as grounds for an argument when determining the meaning of botanical gardens. Therefore, the botanical garden, which was found in all major cities of the West, was one of the cultural elements that the state had to adopt.

However, visits to botanical gardens did not lead to the construction of actual botanical gardens. Nevertheless, discussions regarding botanical gardens during the enlightenment period were important in two respects. To start, the word “sikmulwon” (botanical garden) was identified for
the first time. Min Young-hwan and Kim Deuk-ryeon, who were not informed of foreign affairs, used the Joseon dynasty word “hwawon” (花園, flower garden) to refer to botanical gardens, but Yu Kil-chun and Yun Tchi-ho, who traveled around the world, used modern vocabulary. For example, in the 1895 edition of Seoyugyeonmun, Yu Kil-chun mentioned the term “sikmulwon” (植物園, botanical garden), and in 1896, Yun Tchi-ho used “botanical garden” and “botanical conservatory” in his English diary. Besides, the definition of a botanical garden contained all the conditions that made up a botanical garden: collection of plants, research, exhibition, and education. Therefore, although they only focused on concepts and vocabulary, discussions regarding botanical gardens during the enlightenment period are meaningful in that they show the perception of botanical gardens and the path by which they formed.

The other aspect is the influence of discussions about botanical gardens during the enlightenment period. The concept of botanical gardens drawn by new intellectuals of the enlightenment period would have had an influence later on when building botanical gardens. This is supported that those who had visited botanical gardens abroad and argued for their adoption, such as Min Young-hwan, Yun Tchi-ho, and Yu Kil-chun, were leaders and politicians who actively led enlightenment efforts. They contributed to major enlightenment newspapers and magazines until the early twentieth century. Moreover, what they conveyed of botanical gardens were modern and desirable images such as academy, knowledge, and enlightenment. Therefore, visits to botanical gardens in the West and discussions of botanical gardens during the enlightenment period must be examined when studying the context of the establishment of Changgyeongwon Botanical Garden.

Conclusion

The analysis of the four periods that saw significant developments in the history of botany has led to the following conclusion in respect to the origin of botanical gardens. First, not one of the gardens that existed during the three phases of development perfectly met the functional
requirements of a modern botanical garden. However, this does not mean that the gardens did not contribute to the birth of botanical gardens, since the unforeseen seeds of botanical gardens blossomed in Jong-yakjeon and in the gardens owned by aficionados. Although Jong-yakjeon did not meet such functional requirements as botanical research, education and display, plants that fell under the category of herbs were found to be “collected” at the facility. Functions of botany education and display were neither found in the gardens owned by aficionados. However, a wide range of plants, including herbal plants, was “collected” and natural history was “researched” in those gardens owned by aficionados. Furthermore, the appearance of the word “botanical garden” in the records of the trips of intellectuals during the early modern period illustrates that the understanding of the concept of botanical gardens existed at the time.

Second, botanical gardens did not evolve from one entity. Jong-yakjeon remained as a physic garden even after the latter part of the eighteenth century; the period in which herbal medicine study developed into natural history. Jong-yakjeon ceased to exist in the Joseon dynasty, and no evidence is found on its influence on the gardens owned by aficionados or on the discussions about botanical gardens in the early modern period. Circumstances that led to the development of Jong-yakjeon, gardens owned by aficionados, discussions about botanical gardens in the early modern period, principal agents that led the construction of the Changgyeongwon Botanical Garden, and the creation of the garden itself were not the same. Thus, it may be said that the development process of Korean botanical gardens was discontinuous and sporadic.

References


Figure 2. Location of Jong-yakjeon in Seoul area. (Source: author’s diagram on the Gyeongjoobudo [Detailed map of Seoul area], 1861, 520.0 x 630.0 cm, Seoul Museum of History.)
Abstract
The 14 new green roofs of the new Architecture and Landscape building at Stockwell Street, Greenwich, London were planned and designed to deliver a wide range of ecosystem services. Whilst most green roofs provide one or two functions, the overall strategy for the roofs was to provide a wide range of functions which would benefit the environment as well the users, which in this case are students as well as staff. The wide ranging benefits which include urban agriculture and aquaponics helped the building to be shortlisted for the prestigious Stirling Prize and to receive a BREEAM Innovation Credit, which is the first and last time that this will occur for these types of roofs. This paper presents a history of the green roofs, the strategy behind the designs, some of the issues of the design and maintenance of the roofs and the research activities that have started to be undertaken with green infrastructure at the University of Greenwich. In reference to the Stockwell Street roofs the paper will discuss the necessity for green roofs, the benefits, legislation, technology as well as a number of past and contemporary exemplars. The address at the conference will also provide an in-depth view of the roofs, which will be on view by the conference participants.

Introduction
It is obvious why this paper was written. It was written because this year’s ECLAS conference is being held at the University of Greenwich in the Stockwell Street building, which has 14 new green roofs. One can readily say that the roofs came about by chance. If Heneghan Peng did not win the international competition to design the building to house the architecture and landscape departments it is unlikely that the roofs would exist. The 14 flat roofs arise due to the sensitive integration of context (higher non-sensitive buildings to the west and lower sensitive housing to the east), and the function of creating light wells between fingers of space accommodated by studios.

Before the landscape department became integrated into the design and procurement team,
the scope and design of the roofs, which are over 4000 m² in area, was restricted to extensive areas of turf and sedum planting. Although this would have been remarkable in Greenwich, in terms of scale and providing ecosystem services (SuDS, insulation, noise damping, biodiversity), the great potential of what these roofs could achieve would have been missed. Eventually the landscape department was invited to contribute, (an important and necessary step), and the wide spectrum of roofs as we see them today began to evolve (Figure 1). The initial evolution was directed by Robert Holden and then for the most part by Tom Turner and Benz Kotzen

‘How the roofs was won’

The necessity to design these roofs as an exemplar contribution to the green infrastructure (GI) of London and city development around the world created a challenge, but one that was readily taken aboard by the University Court and particularly the architects Heneghan Peng with Róisín Heneghan at the helm and it is the roofs that have become the stand out feature of the building that hundreds of people have come to look at. To be honest, there is nothing really ‘fancy;’ about the roofs, but what they do illustrate is the range of function and aesthetics that can be achieved.

Tom and Benz decided that every roof should be multi objective and multi-functional. This led to Tom Turner creating the acronym MOER (Multi Objective Environmental Roof), a term which hardly flows off the tongue, but which describes exactly what every green roof should do and be. They should fulfil numerous ecosystem services. The obvious ones are, water control, insulation (helping to manage the urban heat island effect), biodiversity enhancement and some noise mitigation. Additionally they needed to have social and aesthetic functions and because we are a department of architecture and landscape, education and research functions as well. The design process commenced with a brief by Tom Turner and Benz Kotzen (March 2012), which provided a theme for each of the 14 roofs. This theme created an overall identity, which we can
see today. Initially the brief stated:

‘General Points
1. Ensure that rainwater management, biodiversity and research are primary considerations for the entire roof area.
2. Research: We are particularly interested in research into human and animal use of the roof, while also interested in ecology, hydrology, microclimate, aesthetics, acoustics and other aspects of roof space usage. We are also interested in the influence of ideas from art and architecture upon landscape design projects (see notes on Aesthetics, below).
3. We like the idea of the roof areas having colour themes in two senses (1) colour composition, as discussed in Michael Lancaster’s books on colour (2) colour themes, as discussed in Chapter 16 ‘Harlequin Space’ of Tom Turner’s book City as landscape.
4. In cost planning terms, our priorities are (1) substrates and irrigation (2) good paving materials: flint gravel wherever allowable, brick or stone in sitting areas and where necessary to allow wheelchair access across gravel (3) structure planting only – because much of the other planting can be done by staff and students in the years to come.
5. All building walls which adjoin roof space should have provision for plants (soils in which to plant and fixings on the walls where necessary). About 50% of the wall planting should be related to urban food production.
6. With regard to the selection of paving materials, we are in two minds (1) we are fascinated by the idea of taking one material and investigating the different things which can be done by pushing a single material (e.g. a stone) to an extreme by using it in different sizes, textures etc. (riven, sawn, polished, hammered, setts, gravel etc.) to create ‘an essay in stone’ or a ‘sermon in stone’ (2) on the other hand, a colleague believes that a range of materials would be useful for teaching purposes: he suggests consideration of the following: brick paviors; blue engineering, red engineering, hand made, soft (so they can break up in frost), pcc slabs; ranges of commercial paving; stone: sandstone (Yorkstone)
including millstone grit, Caithness stone; Granite, flamed and rough and polished (narrow strips); limestone including Purbeck limestone (and of course for those who work with Fosters, Kilkenny Blue limestone; setts in granite, basalt, marble, limestone, as well as bound gravel and loose gravel; cobbles and pitching. One possibility would be to find a rectangular area and design it as patchwork quilt of hard materials. They could surely be obtained, free, from manufacturers and the result might be a homage to the Piazza Metallica’.

The Themes for the 14 roofs are as follows:
Flowery Mead (Bee hives), Vegetable Grid (urban agriculture), Song of Songs (nature and fruit), Outdoor Play Garden (social space), Secret Garden (intimate flower garden), Library Garden (outdoor learning), Avatar Garden (Reflection, meetings), academy garden (seminar space), Gramanoid roof (grass biodiversity).

An instructive, thoughtful brief was given to the landscape consultants (Allen Scott Partnership) who were successful in tendering for the detail landscape design work. Each of the functions of 14 spaces was formulated as described for the ‘Vegetable Grid’ as follows:
The Vegetable Grid
Use
The intention for the Vegetable Grid is to provide an area mainly for research in rooftop urban agriculture with regard to substrates, crop types, water regimes and associated issues and problems that arise. The garden also provides opportunities for staff and students to increase their capabilities, in research and growing food, particularly on rooftops. There is the added benefit that these gardens will provide an education for some staff and students (as long as they do not compromise the research) to participate in urban agriculture at roof level.

No actual restriction on access but designed so that (1) the footpaths between beds, raised 150-200mm above path level, look as though they are intended only for gardeners (2) the outer beds are raised slightly more to allow access for wheelchair gardeners (3) the footpaths are
surfaced in flint gravel and of ‘medieval’ width (about 450mm)
Aesthetics : Deformed grid. Bridget Riley.
Research : Urban agriculture
Planting : No planting should take place under the contract. It will be done by staff, students, technicians etc.’
Responsibilities : Overall responsibility for the Vegetable Grid will the Landscape and Environmental Research Group as part of the Department of Architecture and Landscape. A Steering Group will be set up for the overall use and management of the roof spaces, with the focus on delivering Research and Education (Figure 2).

**How good is that? - BREEAM**
One of the key ways that sustainability is controlled in development and construction in the UK and in many other countries is through ‘BREEAM’. BREEAM stands for the British Research Establishment Environmental Assessment Method. Their website states ‘BREEAM is the world’s leading sustainability assessment method for masterplanning projects, infrastructure and buildings. It addresses a number of lifecycle stages such as New Construction, Refurbishment and In-Use.’ The method is based on credits achieved for various sustainability criteria including amongst others energy efficiency, waste management and ecology. Credits are given for achievement and planning authorities rely on this system to ensure that buildings are high quality and achieve high environmental standards. Apart from the Stockwell Street building achieving the highest ‘Excellent’ rating, the roofs at Greenwich won a prestigious Innovation credit, which has not been achieved previously and now that it has been achieved cannot be attained again. The innovation credit was achieved on the strength of the following

**University of Greenwich, School of Architecture and Construction Multi-Purpose Green Roof Innovation**
The roof of the proposed new School of
Architecture and Construction is unique in its conception and design as an overall research project. The role of the roof comprises an important part the School of Architecture and University of Greenwich’s research, educational and outreach remits. Unlike any other green roof in the UK and indeed possibly the world, the roof has been designed purposefully to facilitate wide-ranging research into an array of environmentally important and innovative areas, which will help to develop knowledge and skills in green roof design and use. A great strength of the roof is that it is expansive with multiple sections and levels, which allows for the development of numerous environmental conditions which will be used to test a wide range of social and environmental scenarios ranging from the social use of roof top space to growing food at rooftop level in urban conditions, to increasing biodiversity in our cities and decreasing the heat island effect. This roof will not only start out with cutting edge design but it will continue to be used over the years as a leading educational resource and to further best practice in green roof design and implementation. The roof will be used day in and day out for experiments. The inclusion of a weather station on the roof, which is a unique feature in Greenwich will not only tie into the building’s management systems but will allow for extensive data collection and experiments in 9 broad categories:

1. Climate and Microclimate Research:
Including the effects of vegetated roofs and green walls on the urban heat island effect;

2. Green Roofs and Vegetation Research:
Includes research on various aspects on green roof design with regards to vegetation types and sub bases on extensive, semi-intensive and intensive systems;

3. Hydrology / SUDS – Sustainable Urban Drainage Systems: Research on green roof design including aspects of vegetation and sub bases to store and control water as part of hydrological management regimes in cities;

4. Urban Food Farming / ‘Urban Ag.’:
Extensive research into growing food in urban areas on roofs. The roofs include large areas
for growing vegetables, herbs, fruit, soft fruit (berries), nuts, grape vines etc. to provide safe, nutritious (low/no food miles) sustainable locally grown food. The research also includes ‘aquaponics’ where fish as well as vegetables / fruit will be grown using within the same recirculating system and apiaries. The roof will become London and South-East centres both for rooftop bee-keeping and aquaponics. Rooftop aquaponics will most likely be a first for the UK;

5. Rooftop Biodiversity and Ecological Research; Ecological research on vegetation, substrates, microclimate, fauna including mammals (bats) and birds, invertebrates etc. to maximize biodiversity and ecology of roofs in urban areas.

6. Urban Rooftop Noise Attenuation Research: Research on urban noise and particularly plant at roof level;

7. Air Quality Research; Research on various aspects of air quality relative mainly to the use of various types of horizontal and vertical planting;

8. Visual Research: Visual Research into the design of themes and visual character, views and visual enclosure relating to green roofs; and

9. Social Use of Space Research: Research as to how people use spaces and particularly roof spaces particularly with regards to microclimate in order to determine better future design of open spaces / roof and terrace space including for teaching, informal games, use of tablet computer devices, outdoor sitting, rest and relaxation.

The weather station will also provide data in real time to the local community via and authorities via a dedicated website. This data will also be useful for other parts of the university and environmental research in London and the South East.

We suggest that all the above research scenarios open up opportunities to establish connections with other institutions and companies thus opening up the market for a host of new innovative technologies and practices. With regard to the ‘Eligibility Criteria for Innovation Credits’, we suggest that the following features of the roof aim to reduce the building’s impact on
the following overarching environmental/social issues?:
• Climate Change – Green roofs and green roof research will assist in reducing the current urban heat island and innovate new ways of reducing urban temperatures;
• Eco-toxicity – Plants ameliorate air pollution and research into various plant types at roof level will explore new ways and vegetation types to reduce eco-toxicity as well as rain born pollutants;
• Deforestation – The roof acts as a micro – urban forest, with a hierarchy of vegetation;
• Urban Sprawl – The green roof concentrates numerous activities at roof level thus ameliorating the need for additional space which exacerbates urban sprawl;
• Reduction of Biodiversity – The roof will significantly increase biodiversity in the area.
• Noise and Nuisance – Soil on roof and other green structures will help to ‘soften’ urban noise. Research will be undertaken into the use of vegetation and materials at roof level to ascertain potentials for mitigating urban noise at roof level.

We suggest the BRE – Global list itself requires innovation and that Food Production should be included as an innovation.

Conclusions
The green green roofs of Greenwich (Stockwell Street roofs) are indeed green in their ability to create green biomass and also to improve environmental conditions. Where there was no or little biodiversity, now we have ducks (Figure 3), and most of the major London species of birds flying in. We even have foxes! The water areas (Figure 4), host numerous invertebrates and we are waiting for our first newts and fish to arrive. (These can and will eventually arrive on the ducks’ legs.) We produce apricots and potatoes, fennel and onions as well as tomatoes, radish, corn, quinces and cut flowers in abundance (Figure 5). And fish and exotic vegetables in our Aquaponics Lab. Our ‘Mediterranean Roof’ is a real delight and a place for outdoor social interaction – tutorials,
meetings and lunches (Figure 6). The roofs have also allowed us to create the ‘University of Greenwich Green Roofs and Living Walls Centre’ (https://greenroofsandlivingwalls.org), providing a focus for research and events. For example, the testing of lighter substrates which is going on will eventually reduce the cost of construction as lighter substrates will require less steel and concrete for support (Figure 7). The roofs demand energy and commitment, but they also provide a delightful and valuable educational resource for staff and students and without them our building would be rather dull (Figure 8).
Figure 1. Aerial view of the 14 Stockwell Street roofs. The roofs are used as an exemplar by national and local authorities.

Figure 2. Vegetable grid in June 2015 with ruby chard, onions, sunflowers, potatoes, lettuce and fennel.
Figure 3. Pair of Mallard ducks in 2015. Ducks arrive every year and we have had 4 ducks on the roofs at one time.

Figure 4. The natural pond area on the roofs attracts an array of birds as well as terrestrial and water invertebrates.
Figure 5.

Figure 6. The Mediterranean Garden is an important research resource as the English climate warms up.
Figure 7. Substrate experiment in planters with wildflower mixtures

Figure 8.
How The Texts Of Georg Simmel, Joachim Ritter And Ernst H. Gombrich Set The Renaissance As The Starting Point Of The Landscape Theory

The Renaissance starts when the Theocratic Middle Ages are gradually abandoned and a quest begins for direct connection with the ancient ages, ancient Greece and ancient Rome. That shift to the ancient scripts lead the scholars to the desire to cut off any relationship with the Theocracy that was dominant in the West during the Middle Ages. At the same time Byzantium filters it’s perception of the world through God and this is the reason why Byzantium is considered not to have produced and contributed to the perception and the vision of the landscape.

The texts of Georg Simmel, Joachim Ritter and Ernst H. Gombrich about landscape, as well as Daskalothanassis comments in the book (The Landscape), are setting the starting point of the landscape overview in the Renaissance [1].

According to Ritter, the Western perception of the landscape begins with Petrarch’s inscription about the Ascent of the Mount Ventoux with his brother in April 1366. The cause of Petrarch and the ascent was the narrative of Livius in his book The History of Rome about Philip of Macedon, who ascended to mount Emos in order to acquire a general strategic image from the Black Sea to Adriatic Sea. That overview was the reason why Petrarch wants to experience Nature’s contemplation from the Mount Ventoux in order to discover what this ascent has to offer him [2]. After several unsuccessful attempts, while his brother and his companions have already reached the ascent, Petrarch also reaches the top, as well. Afterwards, Petrarch, reading the confessions of Augustine, realizes that the task of ascending to the mountain and the metaphor of the idea of raising the body to the rise of the spirit breaks down. The reason is that, - according to Augustine, the ascension to the mountain, which Petrarch ‘attempted to observe and enjoy the great nature around him, to feel closer to God, was rejected by Augustine as “self-oblivion”’ [3]. Ritter then refers to the concept of the “view” of nature as a turn of the spirit towards the “wholeness” and “the divine” [4] and concludes that this view of
the landscape by Petrarch creates one time point after which ‘nature, as landscape, is the fruit and product of the theoretical spirit’. Simmel, G., Ritter, J., & Gombrich, E. H., [5]. A prerequisite for the reception of nature as a landscape seems to be, according to Ritter, the non-habitation of the landscape. Moving towards nature to receive it as a landscape seems indispensable, and that implies that the habitation of nature and the practical occupation of it negates the “unrestrained” enjoy of the view’ Simmel, G., Ritter, J., & Gombrich, E. H., [6] which allows the perception of nature as landscape.

Ernst H. Gombrich approaches the view of nature as a landscape through the history of art. Speaking of landscape, as an autonomous artistic genre developed in the 16th century, he sets its roots in the Renaissance art theories. Before the 15th and 16th centuries, the landscape is designed as a part or as a background of a theme with a narrative character. In the 16th century, the art of landscape painting is mainly cultivated in Northern Europe, however, as Gombrich mentions, the first refer to the term “landscape” for the description of a personalized painting comes from Venice [7]. Gombrich refers to the development of landscaping throughout central Europe as a consequence of the Italian Renaissance which cultivated the theory of landscape and created the terms and the economic conditions for the development of the market of paintings with countryside themes [8]. Gombrich’s quote on landscape perception is, as Daskalothanasis says, the following paradox: ‘Ecstasy in front of the view of nature is possible only because of a long tradition of landscape references’ [9].

Simmel approaches the landscape as a part of nature (natural) without human intervention or structural hierarchy (artificial or urban landscape). He sets the ability to detach a part from the wholeness as a prerequisite to intake the nature as landscape. However, that individual part has to refer to a continuity of nature in a similar way as the different characteristics of a
person are perceived by the unified character of the individual. Simmel links the birth of the landscape, according to Daskalothanasis, with the process of personalization and the division of labour following the post-medieval times [10]. Thus, it identifies the birth of the landscape theory at the Renaissance, where the individual man redefines himself as part of the entire city or society. Simmel has experienced the unification of the German Empire by Bismarck in 1871 [11], incorporating different kingdoms into one. The political situation of German citizens (Simmel is no exception) may lead him to a conclusion about the landscape theory and the following state in his text *Philosophie der Landschaft*:

A landscape emerges when some natural phenomena, which are successively dispersed on the ground, are summed up in a particular kind of unity, which includes the same field of view and it is different for the reasoned thinker, for the religious sentient nature lover, for the teleological oriented farmer or the general [12].

Summing up, these texts set the Renaissance as the starting point of landscape theory, each one from a different approach. The question that arises is why there are no references about what happens in the area of the Eastern Roman Empire (Byzantium) during the same period and especially during the Western Middle Ages. The possible desire to seize the Western way of thinking from the idea of viewing nature through a religious filter and the turn to Humanism is probably the reason why there is no reference to the Byzantine relation with the landscape. Regarding to the Byzantine civilization, but also to those from the beginning of history, it is rather unlikely that we can assume with certainty that there is no perception of the landscape, since each culture has criteria of aesthetic evaluation of its environment.
The Vision And Perception Of Nature As A Landscape By The Byzantines In The 11th Century. The Landscape References Of Michael Psellos

Petrarch ascended Mount Ventoux in 1336AD. This ascent and the description that accompanies it, are setting the starting point of the Western Landscape view according to Ritter. However the Byzantine scholar and monk Michael Psellos described the beauty of the landscape since the 11th century. He refers to the landscape in three snippets of his writings. The first one is in a letter that is contained in Scripta Minora collection [13]. In this letter he talks about the beauty of the landscape, he describes the vegetation, the color similarities of the flax with the blue of the sea, the hyacinths and daffodils, the high trees, as well as the singing birds, heard in the grove, connecting the senses to the nature. He also talks about the way the sounds, the eyesight, the smells and tastes are creating pleasure from the beauty of the landscape [14]. For the definition of space, Psellos uses the term ‘pedion’ (field) that comes from the Greek word ‘podas’ (foot) and gives nature boundaries that transform it to landscape. He delimits nature with his gaze, he describes and reflects on the visual stimuli he perceives and therefore he makes a landscape view.

His second reference is in a description of mount Olympus which is referred to it as a celestial meadow adorned by the variety of plants and the overlying stars, non-homogeneous and uneven, full of harmony and pleasures for all gods. Then he refers to the rivers (in an allegorical way likening them as the result of the pouring of the sweat of the earth) that give birth and irrigate plants, plane trees and other trees with high foliage. Referring to the arrangement of the trees, he says that the first ones are in line, while the second ones piles with their foliage creating a paradise [15]. His narrative continues with references to the landscape, to rivers, streams and myrtles, and caves, which are glorified as hugs of the mountains, shining brightly [16].

In the third reference, Psellos refers to God as a
weaver, saying that he is admired and glorified (and) ‘for the way he overwhelmed such a great meadow’ [17]. We could say that Psellos was interested in the landscape around him. He uses the descriptions as parts of much larger texts and speaks of the landscape as a Divine creation, but the way he talks about beauty and the organization of the landscape lets us understand that he has a clear perception of space and nature as a landscape, as it is organized in Psello’s mind. The Psellos nearby story of Mount Olympus and its beauty, as a dwelling of gods, may have been a reason for the ascent of Mount Ventoux by Petrarch, which did not reach to our days. The all encompassing view of the landscape in Psello’s text is as strong as that in Petrarch’s letter. The idea that an 11th-century Byzantine has the capacity to view the nature as a landscape challenges the setting of Landscape theory starting point in the Renaissance. To have a correct interpretation of the way that the Byzantines approached nature as a landscape, it is necessary to know how they view their world in the 11th century, when Psellos wrote his writings.

The Byzantines perceive nature as God’s creation and therefore they admire the landscape as his creation. In the 11th century in Byzantium art and literature turn to naturalism where, as Khazhdan and Epstein mentions in their book ‘the tendencies of cultural popularization as well as the new materialism ... led the writers to deal more with people and their environment’ [18]. As a consequence, Byzantine literature is also turning to nature as a landscape with Psellos references to the charm of a beautiful landscape [19]. The Byzantines of the 11th century have assimilated the classical writers, and they rebuild and reinterpret the ancient texts through their theological approach. A typical example is the original Byzantine interpretation of Homer by Nikita, in which the adventures are rendered as moral parables [20].

This Byzantine approach of nature as a creation of God is already a theoretical approach that
transforms nature into landscape and allows its observation for enjoyment. That is the reason the Byzantines conceptually integrate the landscape into city planning. Their relationship to the landscape design is revealed on the design of Constantinople (4th century), which, as Concina mentions:

Certain hills were included within its walls, which allowed the ritual re-interpretation of the Constantinopolitan landscape. The hills of the city appeared like the Septimontium of Rome: in fact, by becoming the SEVEN HILLS LADY, Constantinople finally became the New Rome [21].

The ability of thinking about nature and defining it as a landscape was associated with the rise of Neo-Platonism in the West, during the Renaissance and therefore with the way of viewing the landscape. While in the West Neo-Platonism appears in the 15th century during the Italian Renaissance, in the Eastern Roman Empire Neo-Platonism appears in the 4th century by Basil of Caesarea, Gregory Nazianzinos and Gregory of Nyssa, who are ranked by Eliade as Otherians and Neo-Platonic, determining the course of the orthodoxy’s definition [22]. This knowledge will challenge once more the temporal starting point of the landscape theory and will make clear the spread of Platonic ideas to the Byzantines. The Renaissance coincides with the fall of Constantinople and the years that preceded it, a great part of Byzantine scholars moving between Byzantium and the Italian peninsula, most notably Georgios Gemistos and his disciples [23]. So it is reasonable to reach to a conclusion that the Renaissance would not exist in the form we know today if there was no contact with the Greek space and the Byzantine scholars and that the Renaissance perception of nature and its perception as a landscape has its roots in Byzantine naturalism of the 11th century.
The way the Byzantines perceive and recapture the landscape through their relationship with God. The perception of the Sublime.

In order to better understand the relationship of Byzantines with the landscape, it is necessary to take a distance from the Western perception and vision which established in the Renaissance and move towards the concept of the Sublime, which dominated the Eastern Roman Empire. For the Byzantines, the starting point for the perception of the world is their relation with God. ‘The world is perceived through the dipole of physics and metaphysics, which are inextricably linked’.

The Sublime is the counterpart of the ancient Greek Beautiful and links to the material with the intangible world. The first reference to the sublime is done by Longinus or Dionysius (1st century AD) in On the Sublime, in which sublime is not defined, but it is described by examples as reflection and thought of criticism of things. Longinus writes: Five are... the predominantly fertile sources of the sublime... First and foremost the power for the creation of spirits ... Second the intense and enthusiastic passion... In addition to these, the noble expression, which again is the choice of words, the metaphors and the word creation. Fifth the cause of magnitude, which completes all the previous, the dominant and subordinate composition.

The concept of the Sublime, is probably linked to the concept of ‘ ’ (the unspoken), ‘The unsubstantiated, indistinguishable and indescribable. In the sense of secrecy: the mysterious...’

The divine is connected with all the activities of the Byzantines. Their urban landscape is perceived as “Theofylakto” (God guarded); every fortification is not only material but also intangible, with litanies on the walls as a part of the completion of the fortifications of the city [27]. An example of the Divine Protection of the Byzantine cities
is the Hypermachus Hymn (Akathist Hymn) to please Virgin Mary for the salvation of the city by the Avars in 626 AD, when a tornado created a storm and immersed their ships [28].

He inhabitant of the Byzantine Empire has the same understanding about his space and his environment, as an ancient Greek or an Italian of the Renaissance, but he creates different sensible associations. Edmund Burke refers to the idea of the Sublime, talking about it as intertwined with the Beautiful. Burke says in his book *A philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful*, that ‘whatever is fitted in any sort to excite the ideas of pain and danger…is a source of the sublime [29]. We could say that sublime is the feeling we have when we are confronted with infinitely large, vast objects that cause us an unpleasant initial experience, while at the same time allowing us to have the pleasure of perceiving something which is beyond us. At the same time, the feeling of the Sublime is also a subject for Immanuel Kant. Speaking of the sentiment caused by the Sublime, Kant classifies it as ‘mathematical sublime’, related to things that have are vast their own (such as the sky or the ocean) and the ‘dynamical sublime’ associated with things that impress us and have an influence on our will (a waterfall) [30].

Based on the above criteria, for the Byzantines, Hagia Sophia should be the ideal building that inspires the feeling of the sublime. Even today, when someone visits Hagia Sophia, he initially realizes that it is a building of immense size due to the scale of its surrounding buildings. But the feeling that arises as soon as the visitor enters the building is the awe and the awareness of the scale of the work, but above all the insignificance of the human being. Due to the way of viewing, you can see the people around you as signs under a huge dome. We could say that the experience of this place produces the sense of the sublime. For the citizen of Constantinople, this sense would be much stronger given his relation to the indifference and the perception of Divine intervention and creation. Transferring the experience of Hagia Sophia to the landscape...
surrounding the Byzantine cities, we can assume that nature is for the Byzantines a landscape that refers to paradise and gives him the freedom of thought on it (Psellos), unlike the Western inwardness taught by Augustine and Petrarch. In our days the metaphysical vision has disappeared and only some experiences, such as a strong seashore or a phenomenon such as the Northern Lights, make us aware of our sense of permeability and the pleasure of understanding the transcendence by nature or God.

Conclusions
The vision and perception of the landscape is linked to every culture. It would be wrong to think that there exists an atopic civilization without an understanding and a certain approach about the nature around it that would turn nature into a landscape.

The subsequent turn to humanism led to the creation of an artificial starting point for landscape theory in the 15th century, which was claimed by the early 20th century theorists under the influence of the historical events and the social context of the era (October Revolution, World War).

Closing this research we could say that the Byzantine civilization had a strong perception and view of nature as landscape. The way landscape is represented in the arts strengthens the argument that the landscape is perceived and defined as a background and parergon by the Byzantines choice and not by ignorance. Fighting the position of Georg Simmel, Joachim Ritter, Ernst H. Gombrich, we could say that not only there is a Byzantine landscape vision but also it is the basis and the starting point of the Western Landscape Theory.

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Introduction

In her manifesto *Sustaining Beauty: The Performance of Appearance* [1], Elizabeth Meyer calls for the reintegration of beauty as a primary concern in the constitution of sustainable landscapes, concluding that ‘The performance of a landscape’s appearance, and the experience of beauty, should have as much currency in debates about what a sustainable landscape might, and should, be as the performance of its ecological systems’ [2]. Later, in her article *Beyond “Sustaining Beauty”: Musings on a Manifesto* [3], Meyer nuances her position and incorporates the notion of social aesthetics, turning to theories of affect and calling to explore how ‘... everyday life in the designed landscape ... can contribute to a new social aesthetics, a new ethos of sustainable perception and living’. [4] Meyer places her exploration of aesthetics in continuity to a discourse originating in the eighteenth century, when ‘...[c]riticism of the landscape shifted from a focus on the creator to the audience, from theories of construction to theories of reception’ [5]. Accordingly, while stating that ‘... through the interventions of a designer, new configurations and calibrations of landscape forms and processes come into being’ [6], she does not dwell on the design process that preceded these interventions, simply stating that ‘[design] translates cultural values into memorable landscape forms and spaces that often challenge, expand, and alter our conceptions of beauty’ [7]. Indeed, Meyer focuses her treatment of aesthetics on the interaction between humans and the completed landscape intervention, where ‘[t]he haptic, somatic experience of beauty can inculcate environmental values’ [8]. Landscape designers, who Meyer seems to be mainly addressing in her call for action, are credited with the ability to ‘... contribute to our understanding of sustainability [...] by making places that are constructed performing ecosystems and constructed aesthetic experiences’ [9]. They are the professionals capable of translating environmental values into space and beauty, and she cites several examples of such designed...
Landscapes authored by prominent design firms in order to illustrate the potential of aesthetics and beauty to convey values. A linear path is therefore painted, where the landscape designer translates a set of values into landscapes, the form and aesthetics of which later convey these values to the public through experience and affect.

However, in an age where disciplinary boundaries between landscape designers and experts from other disciplines are blurring, where the designer, if present at all, is only one actor within an array of experts taking spatial decisions, and where the core values which guide landscape interventions are themselves contested, this linear path belies the complexity and unpredictability of conception and construction processes of landscape, and the determinant effect they may have on the spatial and aesthetic experience of the resulting landscape. We therefore argue that aesthetics cannot be forwarded as a performative factor in landscape without establishing a deeper and more nuanced understanding of the processes which engender them in the first place.

In order to illustrate this position, this paper presents the design process of a recent project within one of the major parks of Brussels, Belgium. We first explore the environmental strategy behind this project and the broad strokes of its creation. Then, through a concise review of several semi-structured interviews conducted with actors involved in the elaboration of the project, we look into the complexities of the design process, shedding light on the competing values, agendas and narratives expressed by the actors. Finally, we discuss the effect of the process on the outcome, reflect upon the hybrid aesthetics it presents and its possible implications on the future of aesthetics research.


Around the year 2000 the IBGE (Brussels’ environmental administration) integrated an ambitious strategy into official environmental
policy in Brussels – The restoration of the long-buried network of natural streams in the Region. This strategy, explained in a 2005 document entitled *The Program of the Blue Network*, pursues four major objectives: **Hydrology, ecology, landscape and recreation**, linked by one major narrative that serves as the opening statement of the document:

*The history of Brussels, built on the banks of the Senne River and its tributaries, is inscribed between city and water. The humid character of the region is therefore important from a historical-cultural perspective.*

This bears witness to the extent of ambitions projected onto the daylighted streams in the Brussels Region – not only are they meant to solve infrastructural problems; provide new functionalities and landscapes; and improve local ecosystems, but they are to play a part in the very constitution of Brussels’ historical-cultural identity. Correspondingly, the rehabilitation of the Molenbeek stream, a project stemming from the Blue Network strategy, would be no exception.
The natural richness of the Molenbeek valley (figure 1) was first officially recognized in the 1970s, when the Marshland of Ganshoren became the first in a succession of several sites to be declared a protected wildlife habitat. In the 1980s, the patchwork of fields, pastures and allotment gardens linking these natural reserves would be replaced by the new Roi Baudouin Park, eventually constructed in 3 phases between 1981 and 1989 (figure 2). The Molenbeek Stream, however, which once flowed through the valley, was drained into an underground culvert in the 1950s in an effort to improve sewage and rainwater drainage from adjacent neighbourhoods. Only a scant trickle flowing along the southern edge of Phase III (the park’s westernmost section) and the northern edge of Phase II (the central section) remained from its past course.

Around 2005, the IBGE decided to daylight the Molenbeek as part of the Blue Network strategy. Rehabilitated incrementally from west to east (figure 3), the stream was first diverted away from the drains which had been spilling it into the culvert. The next stretch, within the marshland of Ganshoren, required extensive restructuring for the water to reach the Roi Baudouin Park, and an external landscape architect was chosen to lead the design [16]. While the existing riverbed in Phase III of the park required very little modification in order to carry the water onwards, Phase II was in need of a much larger intervention [17], and external landscape architects were once again put in charge of the design (figures 4 & 5).

The Last Stretch - Restoring The Molenbeek In Phase I Of The Roi Baudouin Park

By 2012, as the Molenbeek restoration progressed eastwards on the traces of its historical riverbed, the IBGE began planning the extension of the Molenbeek within Phase I. Here, a new problem arose: Phase I presented no clear evidence of the stream’s historical position. In order to better understand the ensuing discussions, one must first take a look at the structure of this section
(figure 6): On the southern border lies a strip of protected natural forest reserve; the central open space, playing an important social role in the neighbouring communities, contains a wetland and one of the only large-scale accessible lawns in the neighbourhood; between these zones are the two main thoroughfares – a pedestrian walkway and a cycling path. The IBGE was considering three potential courses for the Molenbeek (Figure 7): (A) within the strip of inaccessible forest; (B) on the cycling path; (C) in the central space, crossing the wetland and lawn.

Option B was rather quickly abandoned, due to its restricted width and the expected outcry of cyclist organizations, yet several months of heated debates would pass before option A (the forest course) was finally selected. Crucially, since this area was hidden from the public eye, no exterior landscaping firm was selected. Instead, an engineering firm was hired, with punctual landscape design to be executed by in-house designers. This decision would prove to have substantial consequences: only after all contracts were already signed was the budget sent for approval within the Brussels Ministry of the Environment, yet their confidence backfired as the ministry, judging the project not visible enough, decided to shift the river into the central space (option C). With timelines and budgets to keep in check, and after having already engaged themselves with a contracting firm, the IBGE could hardly afford to restart the project from scratch. Rather, they retained the same design team, thus embarking on a very visible landscape project without any external landscape design expertise.

The Emergence Of A Stream – Unravelling A Messy Process

Through a series of 9 semi-structured interviews conducted with the main actors involved in designing the Molenbeek in Phase I of the Roi Baudouin Park[^18], we attempted to unravel the decision-making process which led to its current design. We strove to better understand the roles these actors had played in the
process; their positions regarding nature in
the urban space, aesthetics, and functionality;
and the beliefs they held during debates over
the positioning and design of the Molenbeek.
Considering the sustainable improvement of the
factors mentioned in *The Program of the Blue
Network* (hydrological, ecological, landscape and
recreation) as the core values behind this project
[19], our interviews have taught us that while they
are generally accepted by all actors, different
priorities are expressed when these values
collide (e.g. recreation vs. habitat protection), and
different landscape expressions of these values
are envisioned by each actor. It is also worth
noting that the disciplinary affiliations stated by
the interviewees were not as correlated to their
opinions as one would stereotypically imagine,
thus underlining the blurring of disciplinary
alliances and boundaries mentioned above. A
succinct selection of opinions expressed by these
actors helps illustrate the diversity of priorities
and beliefs uncovered:
When describing the preliminary debates held
within the IBGE, supporters of the forest course
(option A in figure 7) claimed that the forest floor
would absorb large amounts of water due to the
nature of its soil and vegetation, and therefore
act as an ideal retention basin during periods
of heavy rainfall. According to some, this option
would have also had a more positive ecological
impact, since the humid forest ecosystem is
slowly drying out. Finally, concerning recreational
and visual concerns, actors evoked the pleasure
that visitors would derive from entering into
a space within the woods dedicated to the
observation of nature, while allowing the wildlife
habitat relative refuge from human disturbance.
On the other hand, those in favour of placing the
stream within the central part of Phase I (option
C) stated that the forest would be inadequate as
a stormwater buffer: first of all, since the sewage
collector passes under the forest, surrounded
by a layer of draining gravel, water flowing there
would simply sink down enter the collector
instead of flowing on the surface; secondly, were
the Molenbeek to overflow, the lawn and wetland
would retain much more water than the smaller
forest area. It was also claimed that the central area, being more exposed to sunlight, would support greater biodiversity than the forest, and that the distance between the two habitats is small enough for wildlife to travel between them. Most importantly for some, the stream needed to be in direct contact with the largest amount of visitors if it were to fulfil its recreational role.

Some scepticism was expressed in hindsight concerning the supposed advantages of one course over another – For example, it was claimed that neither one of the proposed zones could sustainably function as a retention basin, since a flood would most probably cause the sewage collector to overflow into the stream, thus contaminating any flooded land. An ecologist within the IBGE even went as far as to claim that any ecological benefits of the stream would be limited either way, since none of these proposals actually forms a corridor between disconnected patches of habitat.

When it came to the ministry’s intervention, opinions also diverged. According to Antoine Crahay, former head of the Urban Renovation and Green Space team within the ministry, the proposed solution did not offer any social benefits, and environmentalists within the IBGE actually opposed placing ‘visiting spaces’ within the natural reserve. Crahay claimed that the ministry’s intervention was mere arbitration between opposing IBGE camps, but several IBGE interviewees disagree, claiming that a clear decision had already been taken and manifestly objecting to the ministry’s involvement in concrete design decisions. Crahay defends the decision, claiming that the minister, elected on the grounds of a socio-environmental campaign, held a responsibility towards her constituency. Describing the attitude of the ministry, he stated that ‘[n]ature must be able to return to the city. However, for it to do so efficiently, it must be seen, understood and felt by the inhabitants’ [20].
Conclusions – Towards The Integration Of The Design Process In Aesthetic Discourse

Despite this very condensed account of our interviews, it is clear that the messy and interdisciplinary design process has had a major influence on the constructed landscape, the appearance of which (Figures 8 and 9) seems to attest to its troubled birth: The completed Molenbeek passes in Phase I of the Roi Baudouin Park in an almost rectilinear trajectory, dug into a trench with steep banks, its water barely visible from the lawn. Despite the will of Laurent Costa (the IBGE landscape designer assigned to the project) to maintain visual and physical access to the water by attenuating the slopes of the banks, or to introduce a slightly more sinuous trajectory, his efforts met resistance due to the potentially unsafe water quality and the restricted lawn space. Consequently, the project does not offer visitors direct contact with the water, and instead of a walk along a pastoral stream they are greeted with an impassable moat sitting rather awkwardly some distance from the path, hidden by steep banks and tall grass. Even its stormwater-management capacity, a major concern in the design process, is limited due to the steep banks preventing any overflow.

In first glance, it might seems as though many original objectives have been missed, but this is not the entire picture. Biologically, the stream seems to be very active, and the presence of unexpected species inhabiting the water and its surroundings is considered by some actors as a great success. Visitors venturing to the edge of the banks are confronted with what seems like strange hybrid, an irrigation ditch of sorts taken over by nature and teeming with flora and fauna. Could this biological richness be attributed to the imposed distance between visitors and the stream? Could this lack of direct access, resulting primarily from engineering-related concerns rather than an explicit environmental decision (As opposed to Meyer’s example of Crissy Field Park in San Francisco) actually engender a similar aesthetic experience?

One fact can be established with relative certainty – the aesthetic experience of this project
has mostly been an afterthought, rather than a core theme around which consensus and action were built. In such cases, if we are to subscribe to Elizabeth Meyer’s claim that aesthetics can perform, we would have two options: Either accept the accidental, hybrid landscape aesthetics resulting from such processes as a new aesthetic category, communicating as much about the cultural landscapes of decision-making arenas as they do about sustainability and the environment; or find new ways of introducing aesthetics as a prime concern in circles larger than the landscape design community. Perhaps this would entail finding new conceptual models and new ways of discussing these aesthetics beyond established categories such as the pastoral, picturesque and the sublime. Maybe answers could be found by explicitly conceiving such projects as socio-biological experiments (An approach which public institution might have the means - though perhaps not the willingness - to endorse), or by exploring new instrumentalizations of visual quality assessments as decision-making guides. Whatever the answer, it is clear that the aesthetics of landscape are inextricably linked to the landscape’s design and production process, and that any call for the promotion of aesthetic considerations in landscape must take these complex realities into account.
Endnotes
2 Meyer 2008; p.21
4 Meyer 2015; p.37
5 Meyer 2008; p.8
6 Meyer 2015; p.34
7 Meyer 2008; p.15
8 Meyer 2008; p.15
9 Meyer 2008; p.21
12 Discussions of the spatial agency of different disciplines can be found, for instance, in: Bélanger, P., 2013. Landscape infrastructure: Urbanism beyond engineering. Wageningen University.
13 Much has been written about the colliding value conceptions between different disciplines and in landscape design in particular, such as:


15 Ibid. Translation by authors. Original text: ‘L’histoire de Bruxelles, construite sur les abords de la Senne et de ses affluents, s’est inscrite entre ville et eau. Le caractère humide de la Région est donc important d’un point de vue historico-cultural’.

16 Pierre Lorent, of the AGORA landscape and urban design agency


18 Actors interviewed, their stated disciplinary affiliation, their professional role in regards to the daylighting of the Molenbeek, and the interview date:

Tülin Barman, landscape designer, previous head of park management in the west of Brussels within the IBGE, Interview conducted on 18/04/2017.

Renaud Bocquet, biologist, head of the Hydrographic Network Service within the IBGE. Interview conducted on 09/05/2017.

Laurent Costa, landscape designer, IBGE, responsible for landscape maintenance and design in the Roi Baudouin Park. Interview conducted on 24/04/2017.
Antoine Crahay, Geographer and urban planner, former head of the Urban Renovation and Green Space Team within the Brussels Ministry of the Environment, Energy and Housing under Evelyne Huytebroeck. Interview conducted on 19/04/2017.

Catherine Fierens, landscape designer, former member of the Urban Renovation and Green Space Team within the Brussels Ministry of the Environment, Energy and Housing under Evelyne Huytebroeck. Interview conducted on 28/04/2017.

Serge Kempeneers, biologist, head of the Green Space Division within the IBGE. Interview conducted on 10/01/2017.

Joël Merlin, biologist, current head of park management in the west of Brussels within the IBGE, Interview conducted on 05/04/2017.

Jean-Cristophe Prignon, Biologist, head of biodiversity and natural reserve management within the IBGE. Interview conducted on 18/04/2017.

Robert Vanderhulst, Landscape designer, park management coordinator in the west of Brussels within the IBGE, Interview conducted 24/04/2017.

19 Although the definition of what constitutes values in general and environmental values in particular is highly debatable, we might refer here to Reser & Bentrupperbäumer’s (2005) broad definition, stating that “... ‘values’ are and represent important individual and collective investments and judgments about what in this world and in this life is truly important, worthwhile, and meaningful—indeed what ‘has value’ and what are ‘core values’ or guiding principles for human society.”

20 ‘La nature doit pouvoir revenir dans la ville, mais pour qu’elle puisse revenir de manière efficace il faut qu’elle puisse être vue, comprise et ressenties par les habitants’. Crahay, A. (April 19, 2017). Personal interview, Translation by authors.


22 Felson, A. & Pickett, S., 2005. Designed


Figure 1 – Shaded red: the extents of the Molenbeek valley within the borders of the Brussels Capital Region. Authors’ illustration, elevation data: AGIV
Figure 2 – In green: the 3 phases of the Roi Baudouin Park. In dark hatches: the natural reserves surrounding the park. In bold blue: the only remnants of the historical course of the Molenbeek stream. Authors’ illustration, data from CIRB and IBGE.

Figure 3 – The current course of the Molenbeek stream within the Brussels Region, and the 5 stages of its rehabilitation. The blue arrow indicates the direction of flow, originating within the Flemish Region. In this article we primarily discuss stage 5, passing through Phase I of the Roi Baudouin Park. Authors’ illustration, data from CIRB and IBGE.

Figure 4 and 5 - Studio 50 and Michel Delvosalle’s design for the Molenbeek stream in Phase II of the park (including a small stretch within Phase I) includes a transition from a picturesque, naturalistic aesthetic to a more overtly architectural one as the stream passes next to public playgrounds at the entrance to Phase I. Authors’ photographs.
Figure 6 - Phase I of the Roi Baudouin Park before the restoration of the Molenbeek. In red hatch: the lawn; Bottom: the forest reserve; Separating them are the main pedestrian and cycling paths crossing the park. Source: IBGE

Figure 7 - The 3 alternative courses discussed within the IBGE. The bottom course (A) passes through the forest, the middle one (B) replaces the cycling path, and the topmost one (C) passes through the wetland and the lawn. Source: IBGE, modified by authors.
Figure 8 - The Molenbeek as it passes next to the central lawn of Phase I. In late April, reeds are starting to grow and the vegetation on the slopes is slowly waking up. Authors’ photograph.
Figure 9 - a few weeks later, the reeds have surpassed the ditch banks, hinting at the existence of the stream. Authors’ photograph.
Questioning

Large public landscapes make a valuable contribution to good life in the city. In urban areas of growth, however, they are exposed to exploitative pressure, thereby deteriorating incrementally in coherence and quality. To thwart this loss means handling these spaces as distinct and valuable subsystems of the natural and built environment. The valuation of public landscapes is reached through measures of spatial and design qualification, whether it is through the creation of functional and aesthetic links and contexts between various used areas or those distant from each other (green space network), or whether certain subareas are highlighted through particular facilities and designs (qualification core).

An instrument of qualification is the landscape architectural design. At the same time, two problems overlap. (1) Large public landscapes are complicated. They generate ecosystem services as well as social, cultural, and infrastructural services for society (manifold tasks); the ownership structures vary from communal property like public parks through to private property such as an agricultural area (manifold uses); and they can be accessed for recreational purposes (common use). The range of actors and interests involves many complicated negotiation processes. (2) Designing is complicated. The design is abstract (notional construct); the design process focuses on shaping an object that initially does not exist. The actors involved in the design must deal with copious possible combinations and decision-making situations (various design options). Finally, the public perspective of planning has been damaged since expectations and promises associated with the designs and their realizations often go unfulfilled. The overlapping of both of these problem situations occasionally produces major differences between design and built reality (correspondence problem).

Thusly, the task is to link two differently disposed undertakings; a) the social and physical...
construction of a large public landscape, and b) the production and realization of a design. In doing so, the intention is also to minimize the difference between plan and built reality. In this context, the question arises: How does design get to landscape?

**Approach**

*Real-World Case Riemer Park*

In order to answer the investigative question, the genesis of the public landscape Riemer Park in Munich is analyzed. Riemer Park is one of several large green spaces in Munich. It was built as part of the public infrastructure of the Messestadt Riem, a district that has been developing on the former site of the Munich Riem Airport since 1992 in the course of one of the large land conversions in Munich. Before the park was handed over to the public in 2006, the Bundesgartenschau München 2005 (2005 National Garden Festival in Munich) took place. A special feature of Riemer Park is its location on the eastern boundary of the city and the associated transition into the open landscape. While fulfilling both the local and supralocal tasks of the green space supply, Riemer Park represents a key element of the public landscape in the east of Munich. The park’s form is based on the design of the French landscape architects Latitude Nord [fig. 1].

*Search hypothesis*

To explore the societal undertaking Riemer Park, more than 300 primary sources have been analyzed and the related design process reconstructed (1963 – 2035). The evaluation of the materials (texts, images, plans, models, the built object itself) follows the principle of discourse analysis and is directly linked to the explanatory approach.

As a tool for arranging the materials, concepts and interpretive patterns of the Actor-Network Theory (ANT) are used:

- By means of the “Metaphor of the
Heterogeneous Network” [1], the abstract (knowledge, design) and concrete (texts, images, plans, models, construction site, park) materials are located and structured, as are the actors concerned with the production of these materials.

- The concept of “Translating” [2] serves to analyze and represent the interplay of the abstract and concrete materials and actors.

The spatial and design qualification of a large public landscape is understood as a product of translating efforts by authorized and appropriately qualified actors. In terms of “translation,” this research searches for mechanisms and rules which could lead design (abstract construct) and landscape (physical object) to merge and at the same time keep the discrepancies between design and built reality to a minimum.

“It is about the exploration of a process often described as ‘translating,’ which generates order effects like devices, actors, institutions or organizations. ‘Translating’ thus denotes a verb which encompasses transformation and the possibility of equivalence – the possibility that an element (e.g., an actor) can stand for another (e.g., a network)” [3].

**Translating**

“Translating means shifting” [4]: People, machines, objects or the design itself are shifted from place to place, for example from the physical place of production (office) to the place of negotiation (city hall). Thereby knowledge is shifted from medium to medium, for example from the mental world (designer) into a drawing (sheet of paper) and from there, to the park (built object). The design or rather the design-immanent knowledge, is visualized (image, plan, model), verbalized (text, parts list) and reified (built object), meaning the design is translated into different languages (verbal, visual, artifactual).

The shifting of materials and knowledge represents the negotiation process of the actors:
orders of knowledge (systems, thought worlds),
types of knowledge (configuration knowledge,
operating knowledge), and states of knowledge
(knowledge, non-knowledge) are brought
together and linked with knowledge carriers
(people, texts, images, built object).

Transformation
The design-immanent knowledge thus underlies transformative procedures. In the case of Riemer
Park, specific knowledge components are compiled in various expert reports, configured in the form of the design and thusly, explicated in plans. A shift takes place from word-oriented articulations via drawn representations through to the built object. Finally, the physical object park is flanked by certain delegates of the design, the zoning plan and the park manual. Accordingly, the translation process underlies a methodic order [fig.2]: The social undertaking park is reduced to an abstract notion (design) so that it can be unfolded in the form of a physical object (park).

Equivalence
The concept of equivalence can be proved by using the example of Riemer Park. In the 1970s some Munich city councilors formulated two undertakings: The Munich Riem Airport was due to close down and they declared that a “park” should be built on the site. The topic of “design” was placed on the agenda, the conduct of an urban and landscape competition concerning the subsequent use of the territory was called for. Both of the projects were realized and indicative of the results, a park widely equivalent to the original design was opened to the public in 2006. This circumstance is remarkable because the development of the design and its implementation were carried out in a context of extensive political and planning procedures. Over several decades, the design was directly or indirectly the subject of social negotiation processes in an environment characterized by the diversity of the actors involved – institutions, committees, construction
companies, professionals, citizens, etc. And the park will continue to be. “A special feature of green spaces is that they are usually not finished with the construction, but they begin to develop over time due to natural growth and targeted care, and [thereby] attain their full functional capability” [5]. In end effect, the park stands for the design – this state of equivalence is backed by the above mentioned network of corresponding abstract and concrete materials.

As it turns out, the qualification of complex structures, like public landscapes, is based on numerous and variously influenced procedures of translating. So that the contents and connections do not drift apart during the translation process, they are brought together in one design.

As a tool for the analysis and representation of this process, concepts and interpretive patterns of the Actor-Network Theory are in turn used:

- The design is interpreted as a central “order effect” [cf.3] in the translation process of Riemer Park, therefore having a specific impact on the interplay of the multiple translations or rather the activities of the actors involved [fig.2].

- The concept of “equivalence” [cf.3] is used to grasp the theme of the consistency between the design and built reality. The translation-relevant states of correspondence are determined and related to one another: abstract construct and physical object, design and park, actors and park.

This viewpoint is important with regards to the approach during the social negotiation of the undertaking. Procedure (social and physical construction of the landscape) and counter procedure (production and realization of the design) are related by correlating the knowledge-imparting materials which serve as agents between conceptual and built reality. In the order of knowledge-imparting materials, the particular sequences of the translation process (preparation, determination, transmission of the
design) become apparent, as do priorities (design as order effect, shaped landscape as output) and the parties to be addressed (public landscape as arena). This means, in terms of the spatial and design qualification of complex structures like large public landscapes, integrated translation processes are required, which in themselves are – like the landscape architectural design – matters of conceptual acts.

Outcome

Order of relational effects

Procedures of translating generate connections. As mentioned before, the abstract construct design is transferred and inscribed into specific media (verbalization, visualization, reification). In doing so, design and actor become connected with one another. This collaborative act is then understood as a “relational effect” [6]. Finally, the result of the assembly of all of the design-related relational effects is, in this example, Riemer Park. Through the interpretation of the undertaking park as a heterogeneous network, an answer to the initial question can be given: The design gets to landscape by getting into multiple connections with the various actors and materials [fig.3].

The design has to become connected with its “speaker” (e.g., a department of urban planning or more specifically, the representatives of the department), so that it can associate with the actors involved (politicians, experts, manufacturers, users) and later with matters like site, knowledge and park. And all of these connections have to be repeatedly performed over the long implementation period. The aim of arranging relational effects is thus: to generate a stable, robust and ongoing negotiation framework which, moreover, is able to generate the complicated object public landscape. The presentation “Order of Relational Effects” stands for this new perspective on the design. The design is identified as a task which is deeply imbedded in society; beyond its function as a design tool, it evidently serves as an instrument
for communicating complex contents. What kinds of approaches and possibilities for acting open up when conceptualizing such an order?

Fields of Application
The spatial and design qualification of large public landscapes is based on manifold, complicated negotiation processes; therefore, the knowledge about design and landscape has to be perpetually generated, shared and maintained over long periods of time. In this case, large public landscapes act as science plants and knowledge mediators, thus combining different fields of activity [fig.4].

Epistemic fields
Based on the process-relevant epistemic objects, “park,” “design,” “knowledge” and “settlement reality” yield different perspectives for the actors involved when a translation process is conceptualized and sustained. A broad spectrum of application fields opens up:

• The “park” is considered, provided, used and thus the qualification of a piece of public landscape is achieved. “States” refers to the park and its specific nature; the object is identified as a dynamic property and co-product.

• The “design” is recruited and mobilized from the actors, and since it’s inscribed in the park, it’s anchored to the location. “Articulation” stands for the explication of the abstract matter of design by means of texts, images and a built object, the latter being the agents which mediate between the various abstract and concrete appearances of the design.

• The actions of the actors involved in the park and design are based on procedures of translating: “Knowledge” is gathered, configured and materialized in the form of material knowledge (including the park). In order to create an undertaking-specific knowledge stock, knowledge systems and types are linked to material and personal knowledge carriers.
“Enrichment” stands for the production and use of knowledge.

- The actors involved reduce, decide and unfold the undertaking park by means of these actions which are related to the park, design or knowledge, or which otherwise effect the transformation of the “settlement reality.” Thereby, whether it comes to a correspondence between plan and reality, it is not only a question of translation technology, but also of the attitude of the actors involved, which itself is motivated by the building culture. “Transformation” stands for the metamorphosis of a settlement reality into another.

Strategic fields
To stabilize a translation process generating a large public landscape, the strategic measures are intended to address the different features of this process as there are [7]: the scope of the order, the order in time, the order in space, the resilience of the order. Accordingly, the real-world case Riemer Park enabled the extraction of various strategic measures, which are clustered in four strategic fields [8]:

- “Predictability” (defining the scope): Is the project intended to be merely a functional green connection, or will it be an expression of a building culture? From the local participation to the internationally acclaimed competition: Depending on the focus, local or general or otherwise universal strategies of translating should be applied (defining the scope).

- “Durability” (embodying relations): Thoughts or spoken words are volatile, the epistemic objects design and knowledge abstract. They all have to be embodied in the form of texts, images, plans and the built object in order to realize a public landscape.

- “Mobility” (providing transfer possibilities): To mobilize the abstract objects, knowledge and design transfer possibilities have to be provided and institutionalized, as exemplified
in the case of Riemer Park: expert reports, city council resolutions, competition procedures, the construction site and the park itself.

• “Robustness” (stabilizing the relational effects): Robustness is achieved in various ways: by embedding the translation process into overarching implementation strategies, like citywide planning and maintaining strategies; by setting up the translation process as a coproduction as different competences and skills are needed; by taking into account the long-term necessities an object built with living plant material has (“relational designing” [9]).

Strategic actor
A precondition for the realization of a long-term and resilient translation process is the presence of an actor who is authorized and qualified to establish and maintain the fabric of procedures and connections. This “strategic actor” plays a dominant role in strategically establishing the translation process. The strategic actor’s task is to bolster the local actor network into generating the object to be designed. To do so, the strategic actor must first bolster himself: He provides the aforesaid “speaker” who has to have professional competence and expertise so that he can communicate with all of the actors involved in the translation process, including landscape architects. Concerning the design, he is the society-related translator and he activates the above-mentioned transfer possibilities so that the design or rather the design-immanent knowledge can be shifted and transformed. And the strategic actor establishes the “relational designer,” an institution that has to be capable of handling the necessities of acting throughout the long realization period and in regards to the order of relational effects. The relational designer is the design-related translator.

Conclusions
To cope with the problem situations that can arise when a complicated object (large public
landscape) encounters a complicated procedure (designing), the view of the publicly led discourse is expanded: The material-related acting of the actors involved, like speaking, writing, drawing, planting, maintaining and using, is understood as communicative acts and part of the design process. This means: Procedure (social and physical construction of the landscape) and counter procedure (production and realization of the design) are to be meshed by the strategic arrangement of the differently disposed materials (abstract, concrete, mobile, immobile). By doing so, this counteracts the identified correspondence problem.

Relevance
The generated discourse about the Riemer Park design process has proven profitable. Regarding the presentation of the translation process, the result appears to be successful, a first step with potential for scientific deepening as well as with practical and teaching relevance.

Connectivity Ability
Potential connectivity possibilities are assumed, such as:
• comparisons with other cases of design processes of large public landscapes,
• the further understanding of the translation procedure,
• the elaboration of action approaches based on the knowledge-imparting materials.

Improvement of Design Processes
The insights gained regarding the routines and strategies of translating provide clarification for the makers of large public landscapes (experts, institutions) in view of the practical implementation of design, such as when:
• programming landscape architectural objects (park) and non-objects (design) in the qualification of public landscapes,
• programming negotiation situations while taking into account heterogeneous actor networks (disciplines, knowledge cultures) which are typical for the design processes of public landscapes.
Combination of Research and Teaching

The knowledge presented with this work serves as a basis for the renewal of didactic approaches to the design theory in design-oriented disciplines (e.g., landscape architecture, architecture, city planning). In view of the field of teaching, the determination and differentiation of the following knowledge components contribute to explaining the procedure of designing – which is created from intuitive action and implicit knowledge – and to making this procedure transparent:

- epistemic objects that are relevant to the design (knowledge, design, built object, settlement reality),
- knowledge-imparting materials (texts, images, plans, models, built object),
- procedures of translating (assembling, moving, layering, configuring knowledge).

Students can be shown how the design process moves knowledge and what kind of relational effects are, on the one hand, generated directly by a sketch or plan drawing and which are generated in the long term. The great significance of a link between the idea and the pictorial representation and text (design as a thought, drawing and writing process) can be conveyed. All in all, students will thusly be prepared for the increasingly complex negotiating conditions which are connected with the change and formation of the natural and built environment.

Endnotes


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All of the quotes having been translated from German to English.

LIST OF FIGURES

[Fig. 1]: Design for a park, Site plan M 1 : 2 500 (Source: Rahmenplan Landschaftspark Riem, Latitude Nord (F) 1997)

[Fig. 2]: Design as central order effect (System drawing, Lezuo 2016)

[Fig. 3]: Order of relational effects (System drawing, Lezuo 2016)

[Fig. 4]: Fields of application (System drawing, Lezuo 2016)
Abstract
Urban trees will be exposed to severe drought stress as a result of climate change and need higher tolerance for these conditions in the coming years and decades. It is known that good quality sites increase the probability of maintaining healthy trees and survival, whereas low quality sites diminish a tree’s chance of health and survival. In fact; the characteristics of the soil, such as soil water content, soil mechanical composition, drainage and aeration; site characteristics and location, for example site size, air pollution, streets, sidewalks, parks, utility lines; and environmental factors, such as wind speeds, temperature or population stress, are all factors which affect tree survival. Not all trees can adapt to every site and some are more adequate for a given site than others. This study shows the results of extensive research and evaluates the reactions, parameters and characteristics of urban trees in relation to their drought tolerance. My research target is to use the successive steps of multiple correspondence analysis, whilst taking account of some missing attribute values for some of the data about the drought tolerance of urban trees. Possible parameters including leaf morphology, stomatal densities, wilting symptoms, wood anatomy and physiology were obtained. After detailed counter-checking, 7 parameters with the highest significance for urban trees could be selected, followed by a ranking according to their significance levels. This ranking also allows the evaluation of “new” species, i.e. uncommon tree species or native tree species with data about their drought tolerance. In the second part, we present an exploration of the association rules to determine planting sites considering urban tree characteristics. Item sets and rules are generated using the unsupervised algorithm Apriori. This enables rapid characterization in terms of tree planting sites.

Introduction
Trees and woody plants play a fundamental role in urban gardens and parks, along streets and in city forests. Sustainable urban green
space planning contributes to a pleasant and healthy environment (Nowak et al., 2006; James et al., 2009; Lafortezza et al., 2009). The climate characteristics in cities, and in the tree’s natural habitats, differ in several respects. A variety of site factors can cause stress to city trees and it is known that good quality sites increase the probability of maintaining healthy trees and survival, whereas low quality sites diminish tree health and survival. Restricted or limited rooting space, soil compaction (Watson et al., 2006) and other factors, such as alkaline soil and poor climatic conditions (e.g. the higher temperatures in cities) (Sæbø et al., 2003) are the reasons to carefully consider the siting of trees. These factors and a disadvantageous distribution of precipitation create a low water supply for street trees. Despite precipitation in cities being about 5–10% higher than in rural areas, in fact, soil characteristics (such as soil water content, soil mechanical composition, drainage and aeration), site characteristics and location (e.g. site size, air pollution, streets, sidewalks, parks, utility lines) and environment (including wind speed, temperature and population stress) seem to be the factors linked to tree survival. This means that while trees in urban areas are becoming ever more important, they also have to cope with increasingly extreme climatatic conditions, especially periods of heat and drought in summer. Not all trees adapt to any site and some are more adequate for a given site than others. Therefore planting guidelines for trees should include site selection criteria and good practice for site preparation and tree selection (Longman et al., 1993).

The aim of this study is to examine the possibility of assessing drought tolerance by using specific tree biological parameters — morphological, anatomical, ecological or physiological — describing the drought stress adaptation of the trees. In terms of climate change this question becomes especially important when assessing the applicability of new tree species, ecotypes and cultivars (with less experience in application of urban trees) in a changing environment. The likelihood of prolonged drought stress will
be the most striking effect of climate change for the utilization of trees in cities, which is already a well-known problem today. To prevent city trees from loss or damage, a knowledge of their drought tolerance will be necessary. The underlying hypothesis is that: specific characteristics and parameters of tree species (and provenances, and cultivars) can provide an indication of their drought tolerance or at least allow its estimation.

**Reaction and adaptation to drought stress**

After intensive examinations and evaluations in the field and in the laboratory, as well as on the basis of enquiries, species descriptions and vegetation mappings, 42 parameters / characteristics were considered to be potentially the most promising for assessment of drought stress tolerance. In the evaluation and ranking of landscape trees a ranking of the 7 most suitable parameters to assess drought tolerance were as follows:

1. natural occurrence on sites with temporary or permanent water shortage;
2. shiny and/or thick-leathery leaves;
3. leaves that are bluish/grey or silvery/white underneath;
4. pinnate or distinctly lobed leaves;
5. especially high frost tolerance (below -30° C);
6. small leaves (length < 10 cm); and
7. occurrence of thorns.

This ranking also allows the evaluation of “new”, i.e. uncommon tree species or cultivars including their drought tolerance. This leads to better anticipated tree usage in gardens, parks and streets in a changing climate. Using the evaluation index system, we evaluated the main tree species in northern China, and more than 153 species were identified as drought tolerant.

**Reasons for drought stress in the city**

Over the past few years, some cities in northern China have begun to realize the importance of urban tree species planning and have responded to the severe challenges of urban droughts. However, due to the varied site conditions in these cities, location, region and its large
population sizes, the rationalization of tree species selection is difficult to achieve. Urban trees often suffer from intensive drought stress due to:

1. warm-dry city climate;
2. intensive radiation, reflection, overheating;
3. free standing (less shade);
4. limited and disturbed root space;
5. soil compaction;
6. sealing of the soil surface, increased surface runoff;
7. de-icing salt; and
8. construction work, root damage.

More specifically, however, given the large number and variety of different site variables the task of choosing a site for a given tree species is far from easy. In the field, there is an urgent need for “ready out of the box rules” to select planting sites for one or more different species. Therefore, association rules are proposed to discover the relationship between plant-related characteristics and the planting site.

Urban tree planting site selection through association rules and Multiple Correspondence Analysis

1. Data set description and preparation
The data list consists of the 153 plants which can be over-wintered and cultivated in open field conditions in Beijing and Jinan Botanical Garden 2016. The biological characteristics of the plant is generated from the information from textbooks on botany and tree biology and other related publications: Landscape Dendrology, Flora of China. Some missing data is measured at the site. The variables are organized into five groups (Vázquez et al., 2016):

- **Group 1**: Species name, family and genus.
- **Group 2**: Evergreen arbor (ev-arbor), evergreen shrub (ev-shrub), deciduous arbors (dec-arbor), deciduous shrub (dec-shrub).
- **Group 3**: Fast growth rate (f gr-rate), medium growth rate (m gr-rate), slow growth rate (s gr-rate), deep root (d-root), shallow root (s-root).
- **Group 4**: Heliophile (hel), slight shade tolerance (sli shade-t), medium shade tolerance (m shade-t), strong shade tolerance (str shade-t),
strong heat tolerance (str heat-t), medium heat tolerance (m heat-t), slight cold tolerance (sli col-t), medium cold tolerance (m col-t), strong cold tolerance (str col-t), strong acid (str-ac), weak-acid (weak ac), neutral (ne), weak-base (weak-bas), strong-base (str-bas), least salinity (least sal), strong drought tolerance (str dr-t), slight drought tolerance (sli dr-t), moisture (mois), slight waterlogging tolerance (sli wat-t), strong waterlogging tolerance (str wat-t), least waterlogging tolerance (least wat-t).

Group 5: Recommended planting sites: urban street, road green belt, building side, lawn center, shade tree, urban forest, lawn side, river side, shelter forest.

The 153 species include 30 different families and 73 different genera: 69.4% are arbors, 30.6% are shrubs, 77.1% are evergreen, 22.9% are deciduous, 49.0% are fast growth rate, 24.8% are medium growth rate, 15.0% are slow growth rate, 11.2% are unknown, 50.3% are deep root, 18.3% are shallow root, 31.4% are unknown.

2. Methods

The association rule (AR) reflects the relevance of a thing to something else. If there is a relationship between two or more things, then one of the things can be predicted by the other thing; Association rules are used to determine the likelihood that if a consumer buys one product, which other products will have a good probability of being bought by the same consumer at the same time. Multiple Correspondence Analysis (MCA) is used in market segmentation, product positioning, geological research, computer engineering and other fields. The reason for this is that it is a visual data analysis method, can be used with only a few groups, uses no contact data, and data is displayed visually on a map usefully indicating location. The selection of urban tree species includes both the botanical information about tree species and a more in depth and more concise information with a summary of the scientific records. Hundreds of urban tree species are distributed on every corner of the city, and the rationality of their distribution is inherently logical. However, the
rules used seem unclear and very complex. Generating the appropriate transactions is a prerequisite for association rule analysis, in the case of commercial transactions. In the AR and MCA, each shopper’s transaction is an item that represents a piece of data, so that in this analysis, each tree species represents an item. In this work, association rules, are proposed to discover relevant characteristics and their relation with the planting site.

3. Results
We carried out an exploratory analysis considering the attributes from Group1,2,3,4 and 5. From the transactions record we obtained the set of transactions as an item matrix in a distributed format with 153 rows and 116 columns. The Apriori algorithm association rules can be generated (see Figure 1). In terms of the biological characteristics of plants, the top five rules were mainly focused on heliophile, soil neutral, strong drought tolerance, strong cold tolerance and deciduous arbor. From a consideration of planting sites: these were mainly lawn side, building side, lawn center, shade tree and on urban streets. In the case of tree species, the top five rules were mainly focused on the species: Pinus, Juniperus, Prunus, Tilia and Acer.

Matrix-based visualization can only effectively handle visualizations with fewer rules because large rule sets often have a large number of LHS / RHS (left set / right set) restrictions. Here, we introduce a new visualization technique that groups the rules by using clustering methods to improve matrix-based visualization. In the visualization diagram, the LHS is a column that represents the different biological characteristics of the tree species; the RHS is the line, representing the tree species, the lift is the color depth of the circle and the size of the circle after polymerization support. The number of LHSs and the most important (frequent) item sets in the group are shown in the column’s label. (see Figure 2).

In the LHS Group, the most rules are generated by the least deep root and fast growth rate, the
most support rules are generated by strong drought tolerance, strong cold tolerance and deciduous arbors, deep root. The most lift rules appear in deciduous shrub and weak acid. Because our data mainly analyzes the planting sites of drought-tolerant tree species in the city, we also consider riverside areas apart, in order to preserve the integrity of urban planting sites. From the analysis of the RHS Group, we found that the city has both drought-tolerant and cold-tolerant tree species that can be planted in almost all sites. This rule also shows that our research is of great significance.

**Evaluation and ranking of the drought-stress-tolerance-parameters**

Examples of tree species with more than 3 of the listed characteristics are *Phellodendron amurense* (Amur corktree) and *Sophora japonica* (Pagoda-tree), both with pinnate and shiny leaves that are bluish underneath, *Acer rubrum* (Red maple, Figure 5) with small, lobed and shiny leaves that are bluish underneath together with an especially high frost tolerance. Therefore, the above three plants have strong drought tolerance and cold tolerance and can be planted in urban forest, lawn center, building side and lawn side (see Figure 2). This method is suitable for the existing tree species of the planting sites. If there is a need to choose the appropriate site for the plants, this can be explained on a flow chart. For example, in the future, for the arid cities of northern China, such as Jinan in Shandong province, if we want to grow new species tree, through the association rules, we find that we can choose the basic plant with the following biological characteristics: moisture tolerance, strong drought and cold tolerance and deciduous deep root fast-growing tree species. If there are a number of new plants for a designer to choose from, first of all, use the 7 most important morphological parameters to determine whether the plant is suitable for planting in each city as an urban street tree.
Conclusions
These results provide a method for assessing the drought stress tolerance of tree species more easily. Due to the non-existence of a single parameter, neither morphological, nor anatomical, nor physiological, this new level of information is regarded as a major step forward. Using these 7 parameters, which now have the highest validity, 42 possible parameters were produced and the drought tolerance also of “new” tree species can now easily be assessed. Thus, a facility for predicting tree usage for single tree species in urban areas, will better ensure tolerance for the trees in terms of climate change. Through the implementation of physiological methods, these parameters are additionally confirmed and further characteristics for rapid tests can be evaluated. This research provides a better method of anticipating appropriate tree usage for gardens, parks and streets and takes into account changing climatic conditions, especially in urban areas.

References


Figure 1. relative frequency distribution
Figure 2. Grouped Matrix for 970 Rules
Abstract
Several landscape architecture undergraduate programs in the United States recently reduced the time to completing a bachelor’s degree from five to four years. The movement was primarily because of the mandate from the higher administration in most universities. Such mandate was attributed to most programs’ respective state, that is, a college degree should be four years and 120 credit hours. This movement results from the 2008-09 global economic crisis that led to the demand for greater accountability and efficiency on higher education. Current five-year programs in the United States are facing greater challenges specifically on student recruitment. This paper provides a summary of five US landscape architecture programs’ transition results in terms of curriculum arrangement for the major, university core curriculum requirement, internship requirement, etc. The paper also includes perspectives shared by the US Landscape Architectural Accreditation Board on the transition.

Background
Several landscape architecture undergraduate programs in the United States reduce the time to completing a bachelor’s degree from five to four years recently (Williams, 2015). Most programs made this change because of the pressure from their higher administration (Li et al., 2016). Such mandate was attributed to most programs’ respective state, where a college degree shall be four years and 120 credit hours. The cause of such movement came from the 2008-09 global economic downturn that resulted in the demand for greater accountability and efficiency on higher education. As a result, lowered enrollment has occurred since the economic downturn and several programs have not fully recovered. According to the Landscape Architectural Accreditation Board (LAAB, 2016) in the US, there were 44 accredited undergraduate programs in the US in 2016. Among the 44 programs, 25 were four years while 19 were five years. Within the past three years from 2013 to
2015, five programs transitioned from five to four years, in which one happened in 2013, two in 2014 and another two in 2015, respectively. No program moved from four to five years. This trend may continue based on the discussion from the panel entitled “Four Years Or Five Years? Discussions on the Recent Movement of Several Undergraduate Landscape Architecture Programs from Five to Four Years in the United States” at the 2016 CELA Annual Conference (Li et al., 2016).

This paper provides a summary of five US landscape architecture programs’ change in terms of curriculum arrangement for the major (required and elective), university core curriculum requirement, internship requirement, study abroad option, etc. The five universities were Clemson University, Philadelphia University, Texas A&M University, University of Georgia and University of Kentucky. Differences and similarities of all programs were presented.

Comparison of Five Landscape Architecture Programs in the United States

Summary of the five landscape architecture programs that changed from five to four years in recent years is presented in Table 1 (Li et al., 2017). Major advantages and disadvantages are listed below (Li et al., 2017).

Advantages or gains from the transition:
· Reduced time to graduation; therefore reduced cost to students
· Early engagement with the freshman students
· Enhanced competitiveness against other majors in recruiting

Disadvantages or losses from the transition:
· Slightly increased course load per semester but not a consistent outcome
· Reduced credit hours for electives but not a consistent outcome

There are also general observations summarized below.
· Three out of five programs are able to keep their design studio courses.
· Four out of five programs still have required internship either during summer or long semester.
· Each university requires approximately 30%± of the total credit hours for university core
curriculum. If a program can strategically make some of its program courses the university core, delivering a four-year BLA curriculum will become much easier.

Discussion
An important question we as educators either in the US, Europe, Asia, etc. shall ask ourselves is what students should learn about landscape architecture? What should we deliver in college and how many years would be enough to earn the degree? As the first and second questions are too big to address and are beyond the scope of this paper, the authors chose to share their common view on the last question: how many years to complete a landscape architecture degree will be sufficient. The authors used Texas A&M University as an example. The BLA program at Texas A&M University was the only five year degree program out of 148 undergraduate majors in the university. Note that Texas A&M University is one of the largest universities in the US, with a student population of more than 60,000 and more than ten colleges. One can probably find any possible majors or disciplines from those 148 choices at Texas A&M University. If producing a landscape architecture college graduate takes 20% more time than any other majors, how can landscape architecture exist in a society, especially one that is becoming more competitive? We ought to make our decisions wisely.

References

Table 1. Summary of Transition by the Five Programs. Adopted from Li et al. (2017).

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<tr>
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<tr>
<td>Total credit hours required for the degree</td>
<td>128</td>
<td>120</td>
<td>129</td>
<td>137</td>
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<td>Average credit hours per semester and range</td>
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<td>15 (12 - 16)</td>
<td>16 (14 - 17)</td>
<td>17 (16 - 18)</td>
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<td>Total number of design studio courses</td>
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<td>8</td>
<td>7</td>
<td>8</td>
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<td>Total number of university core curriculum courses</td>
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<td>42 (35%)</td>
<td>30 (23%)</td>
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<td>79 (61%)</td>
<td>91 (66%)</td>
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<tr>
<td>Extended internship or study abroad</td>
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<td>Common freshman introductory course</td>
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Abstract
Collaborative events; as has been experienced in the ERASMUS Strategic Partnership project “Meetingplace Music Theatre Landscape”; enacted by scholars and practitioners within landscape architecture (LA) and performance arts (PA); can open up a new room for knowledge building, in using actual landscapes (with their history, facilities, materialities, ethics and aesthetics) with different attitudes and demands. While the PA has imbued, into the used site, their specific acts, creating different experiences and memories for all participants, the LA has been able to make visible features and characteristics of the sites used as materiality and space. Together, the conditions and context have been differently expressed; historically and in contemporary economy and politics. From the LA point of view, this “making visible” could directly feed into LA theory, pointing at the PA collaborators contributing with new meanings to landscape conceptualizations. These kinds of landscape conceptualizations can feed into the discourses on urban transition, urban planning and urban transformation. Within planning theory, “communicative planning” and “participatory planning” have been dominating concepts for several decades, but with little problematization of what is actually communicated in such planning situations. Seldom (or never) are the materialities, spatialities, embodied experiences and enactments shown or discussed in the formation of visions, perspectives and arguments around citizen participation. It is mostly taken for granted that the communication between planners and citizens is an ideological and an organizational problem; not problematizing either the language (that we have different meanings when we use the same words) or the different conceptualizations (from different mindsets and different bodily experiences) we make out of the same actual situations which are discussed. For LA in urban planning this could be a way to contribute to participative situations by ‘charging’ the sites and situations discussed with meanings and arguments less fixed and more inclusive.
Introduction
In the very centre of the project has always been “the participative artistic landscape event”, which has evolved over the years from strong individual ideas, that from a collaboration between landscape design and performative arts (music and theatre i. a.) could grow both deepening and broadening of the part-taking disciplines. Connected to the history of landscape architecture, discoveries of more or less “forgotten” connections between the disciplines were inspiring. There are many historical gardens designed directly for performances of different kinds, not least theatre and music together. Amphitheaters had multiple and ‘cross-disciplinary’ purposes and were often located with extraordinary views over the surrounding landscape. Rather early the collaboration also brought new knowledge connected to the relationship between designers/users and actors/spectators respectively. This became a common interdisciplinary point of departure, to merge knowledge and ideas from both cultures, and also the different approaches for how to facilitate users’/spectators’ participating in projects formed throughout history by professional standards and mindsets.

This project, or rather projects in the plural, has been an explorative journey for more than 10 years, with participants from SLU/Swedish University of Agricultural Sciences (LA) and SADA/Stockholm Academy of Dramatic Arts (PA) and also often with teachers and students from the Music Academy of Malmö as well as local practitioners and artists. It was initially financed from the participating institutions, but also from regional foundations (Sparbanksstiftelsen, Lund municipality, The County Administrative Board of Skåne), different aspects of the collaboration, in genres, scales and settings, were tried out and investigated, and with a growing connection to urban and regional planning. From 2014, the work took on an international direction, with a European grant (ERASMUS Intensive Programme), in which new collaborators entered; Winchester University (UK) with programmes in performance arts.
(including street arts) and theory, and ESMAE (P) with programmes in music arts, scenography and theory. 2015-2016 this collaboration could continue, thanks to a ERASMUS + Strategic Programme, which allowed for the first time not only experiments and workshops, but also the beginning of a theoretical foundation, with interdisciplinary seminars and written reports and articles (see https://www.researchcatalogue.net/view/304677/321667), SADA with support from SLU arranged a new master course for collaboration between performance artists and landscape architects (inviting experienced practitioners, qualifying for the course with an own project), with teachers from both SADA and SLU; taking the step from the academies out in the practices.

The landscapes investigated over the years, in SLU and SADA courses, in regional projects and in European courses and projects, have varied between gardens, parks, urban public space, urban development areas, rural agricultural land and peri-urban nature reserves. The concept of landscape has been continuously contested, but has also, over the years, gained a kind of “evidentness”, that landscape as a label for surroundings/living environment, acts both as material/spatial/sensual ground for specific performances and actions, and as an inclusive way of understanding the full event, with all its human aspects; historical, cultural, social, common and individual layers and dynamics...; and its non-human aspects; geophysical, biological, technical and structural...

**Examples of music-theatre-landscape events, performances and workshops**

On the website “Meeting Place – Performing Arts and Landscape”, director and senior lecturer Sara Erlingsdotter has collected both examples and from some of the different workshops and labs, and reflective texts from scholars from participating academies (https://www.researchcatalogue.net/view/304677/316395) which both interpret the events and take the project further, building collaborative knowledge. - Lab Action Participation Acoustics, Botani-
Students from performance arts and landscape architecture from Sweden, Portugal and England, their teachers and the gardeners of the botanical garden in collaboration.

“The Heaven Choir strings have different red, pink and beige nuances; the Sea Choir strings are blue, light-blue and green. More and more people get involved, and strings of different colours mix together. The choirs bring the audience, and together we constitute a net between heaven and sea, between red and blue-green nuances, between those who wanted to help Odysseus and those who refused.” (Erlingsdotter, 2016)

Wish and Act for the Future – transformation and changing for Praça Roosevelt, Sao Paulo, Brazil 2014

An investigation of urban public space, by Sara Erlingsdotter & Claes-Peter Hellwig, SADA, together with the Architecture School and the Theatre Academy in Sao Paulo, was made by means of performances and participatory workshops with students, visitors and inhabitants in the neighborhood of Praça Roosevelt. This is a square undergoing transformation (and gentrification) from a place of crime and violence, “to a place for co-existence and tolerance” (according to the municipal programme). This was an important eye-opener, for the “window of experiments” opened in many urban transformation projects, including both
creative cross-disciplinary knowledge building (sometimes contradicting the projects) and an unintended support for gentrification of urban space and commodifying of spatial qualities.

“At these sites, there is a web of events and people, a web of what has happened, what is happening and what will happen, and a web of living and non-living matters. How can we create an artistic event based on this web, in relation to it? Have we not all become co-creators and participants when we are included in the same web?” (Erlingsdotter, 2016)

- Lab Norra Sorgenfri, Sweden 2016 (https://www.researchcatalogue.net/view/304677/321667 )

A baroque project at the Malmö Musical Academy where teachers and students from string, flute and song classes collaborate with landscape design and planning scholars at SLU and director and dramaturg from SADA, making an event in direct relation to the economic activities on a development site in Malmö, the former industrial area Norra Sorgenfri. The laboratory included individual and collaborative explorations of space and acoustics, distances/experiences; interdisciplinary discussions on the spatial properties and use through history, the inhabitation/population of the sites, private/public/corporative use of space. These disparate activities were brought together to two “participatory events”, one song-walk along an important landscape line (former railway) and one cake party in an abandoned garden, inviting the workers and managers of the nearby car workshop and grocery, as well as passers-by.

“Maybe if we, in the field of performing arts meeting landscape architecture, examine how the audience, the spectators, can become participants and co-creators of an artistic event, the teaching situation requires a correspondence of this in teaching. We must consider and treat each other as co-creators. This is true between students and between teachers, and also between teachers and students. We are all co-investigators,
co-creators of a learning situation, in a joint exploratory process. The dialogue becomes an action and a reflection towards a changing world.” (Erlingsdotter 2016)

**Pedagogic Development – Collaborative Teaching-Learning**

The experiences from the master course (main teachers: Sara Erlingsdotter, Susan Paget, Claes-Peter Hellwig and Gunilla Lindholm) for practicing landscape architects and performance artists, are at this moment quite recent and in need of follow-up reflections and discussions. We, the teachers, are all very eager to do so, since we found the participating projects a veritable treasure of threads for development. The following excerpts can just give a snap shot of the included ideas and challenges; showing courage, skills as well as ambitions to influence; both within the own discipline and surrounding societal actions. At the same time, due to necessity, most of the projects are tested in economic, socially and spatially realistic situations. The presentations and discussions of the final projects were mature, generous and creative.

*Landscape as actant.*

This was studied both in theory (Greimas and Latour) and as experience; both like one student said “the landscape can be the actor in me”, and as a possibility to reflect on “equal terms” between actions and surroundings; as something else than “a consumers perspective”.

*Time perspectives*

While LA are trained in long time perspectives (including to foresee changes in purpose and an interdependence between dynamics and use), PA are trained in short time “pockets”, where a performance is extraordinary, with no direct effect on its environment.

*Do landscape architects and scenographers have different mindsets?*

One suggestion was that landscape architects seem to “listen” more openly to what the
landscape “wants”, while scenographers in a more independent way “uses” the landscape for appointed purposes.

Changing roles and identities
Trying to be “what you are not” worked as an eye-opener for seeing what the participants had hitherto taken for granted, which thereby was made possible to adjust or play with. Also – this seemed to be a condition for the possibility to learn and renew ideas and practicalities.

Pivotal moments
To register, comment and reflect upon moments of crucial perspectival, methodical or ideological change was discovered as critical for the “skill of nuancing”, for both categories. We have seen that this can deepen and/or broaden an earlier understanding of both the own discipline and the other part. Hence, these moments also works as “nodes for collaboration”, and bind together new insights with digging from common experiences.

Examples from projects:
- Bodily empowerment by using challenges in all layers of a landscape; develop trust between artist and participants, finding balances between breath-taking and safety. Climbing trees and canyons with circus equipment; demonstrating, inviting, trying and supporting. Participants were enabled to climb high trees and were rewarded with coffee or a fruit basket at the top! (from student project report)

- Suriashi; a Japanese art of slow walking, originally among other things a means of protective armour from spectators and surroundings for the artist; was tried out as a way to enter a forest in the dark. “My surprise when testing it out in the landscape, in the dense springwood of Sunnertan ridge. How this slow walk made me relax, and dared to enter the dark forest, using the slender tree-trunks as support for my passage – I became part of the landscape!” (from student project report)

- Naming landscapes and the significance of the landscape – a reciprocal relationship: “The ‘Zombie forest’- it was just co-incidentally named by a couple walking their dog and then put on Google maps for some weeks. This name has stayed for decades, to label and “charge” the loca-
tion, but also to collect memories, experiences and events connected to the place. From being “something in between the houses”, the forested land is understood as loaded with values. The location which could be described as “loose fit and found” emerged as a place through being named.” (from student project report)

Discussion
The collaboration between landscape architecture and performing arts has neither had the purpose to serve new or classic music and theatre pieces with beautiful settings, nor to increase the land value by highlighting a site by means of high quality performances. The deep ambition is both to articulate and to investigate a variety of relationships between humans and their surroundings, the landscape. When embedded in music and theatre, these relationships are creatively “found” in the moment; they are loaded by meanings during performance; and they are lingeringly reflected upon, by actors and participants, after the performances.

The basic argument for the European Landscape Convention is that the notion of any “landscape”, is embedded in what this “landscape’s” inhabitants choose to put forward as its specifics and character, based on their experiences of this particular target. It seems however, as if neither the “individual” nor “the common” experiences is enough to define a landscape. We also seem to ask for its boundaries. The landscape in question has to be located, in order to be communicated, in planning, design and management issues. This is a very tricky question indeed, since landscapes are hardly experienced as coming to an end, but instead to continue, albeit with changes to character and properties. Limits, boundaries and definitions are instead what characterize real estates as well as administrative domains.

A project by a landscape architect is situated in the paradox that it is not commissioned to change a landscape (but a part of a property), but will certainly affect the landscape as experienced by anyone accessing or perceiving the result of the project. These experienced landscapes will be differently affected by the project. On the
one hand this could be argued to support the ELC, pointing to the importance of landscape for everyone’s surroundings. On the other hand it points at something more or less impossible. While it is certainly doable to conserve (parts of) a landscape, all changes of it according to the ELC have to undergo a meticulous and continuous participation process, despite all signs of that people engage (if anything) less and less in their landscape.

Place attachment has always been characterized by humans’ active engagement in their landscape, either by circular dependence (like agriculture and gardening), by communizing activities (like children playing, using surrounding space, material and features, or recurring neighbourhood activities, like parties, maintenance or political activities) or at an individual level (memories of childhood, family or great events). There are strong trends counteracting the significance of landscape in all of these ways. Their frequent appearance in scholarly writing is if anything supporting the notion of their disappearance in people’s actual life. Migration patterns, sustained urbanization and densification of housing areas, increased engagement in digital devices and services, all talk in the same direction: While the virtual landscapes are increasingly widening, the actual landscapes loose in significance. If the lower perceived interest and significance of ones surrounding is per se of significance is a question that could certainly be discussed. But IF we believe that engagement in landscape and environment is needed so as not to jeopardize the very basic conditions for human life; then it might be of importance to actively run counter to the trends. If we see the collaboration between performance arts and landscape architecture in this light, we might understand the events as vicarious landscape engagement. It does not replace political engagement in urban planning, re-structuring of neighborhoods, over-densification or simplification and commodifying of surroundings. Rather, we can see those events, and the research connected to them, as eye-openers; reminders of landscape significances which seem to be more and more hidden by
everyday habits of life.

References


*Lindholm G.* 2016. “Landscape dramaturgy and landscape change; parallel and intertwined stories” and “Translating ‘event-specific site’ to ‘transferrable site-specifics’; to facilitate understanding and open for appropriate urban landscape changes.”

*These texts reflect the events, seminars and debates within the ERASMUS Strategic Partnership “Meetingplace Music Theatre Landscape”, and can be found at:* https://media.researchcatalogue.net/rclive/master/32_322518_01483003156_0000.pdf?key=2321aa72582604caaff0866479e1bdd3&timeout=1483016400


Abstract
This paper examines issues pertinent to post-graduate Landscape Architectural education today in order to initiate a local transformation of a programme structure and its associated learning curricula. The paper explores the underlying knowledge of students coming into a post-graduate programme of Landscape Architecture and examines the advanced skills necessary to produce a Landscape Strategy. The Landscape Strategy and its formulation as a representation is analysed specifically as
1. Strategic planning of the landscape is an imperative skill within the disciplinary remit of landscape architects 2. Through an enquiry as to the place and value of the landscape strategy in an educational context it is possible to draw more general inferences about how and what we teach and the significance of knowledge attainment to the future of the discipline.

Introduction
This paper seeks to explore the changing context of post-graduate Landscape Architectural Education in the UK and identify challenges currently faced by academic staff in the development of their own curriculum. The author seeks to identify and acknowledge the increasing diversity of the student cohort and address the complex interplay of issues that impact upon the successful delivery of the programme. Underpinning this enquiry is an interest in determining the difference in applicable knowledge and skills between students who have a background in Landscape Architectural Education, or a related field and those who do not. The paper questions why students with a background in Landscape Architecture who possess good domain knowledge, often, at the early stage of formulating a landscape strategy appear passive in demonstrating skills that would support critical thinking.

The paper has come about after many students in the second year of the programme identified to the author difficulties in understanding the implications of producing, translating and...
representing a Landscape Strategy in the early development of their own work. The author believes that this question is of interest because a) strategic planning of the landscape is an imperative skill within the disciplinary remit of landscape architects b) strategic landscape planning requires a range of knowledge capabilities in students but deficiencies in this knowledge only appear to surface when they are asked to formulate strategic thought independently.

The work considers the thinking and drawing skills required by students to create meaningful landscape strategies and the problems encountered in translating critical thought into communicable representations. The meaning of the term landscape strategy and its value to the discipline today is considered in the educational context outlined above.

**Background**

In the Spring of 2017, the author, frustrated that her attempts to adapt and transform the structure of her own design studio appeared to be having little impact, began to critically examine and question the efficacy of the learning environment that she herself had devised. The paper contextualises her reflections in the hope that she might respond more meaningfully to current demands and challenges of teaching post-graduate students within the disciplinary context of Landscape Architecture. The paper relies upon integrated scholarship and explorative analysis where research is situated through careful observation within the studio environment and further contextualised through looking back upon the practices and procedures of teaching.

Analysis is reliant upon semi-structured interviews, informal and formal conversations between colleagues, through dialogue with External Examiners and through dialogue with professionals responsible for the accreditation of the programme. Understanding the wider educational corollaries of the issues has been sought through engagement with literature related to, critical thinking and teaching practice in the context of cultural competency. The long
term goal of the work is to contribute upstream to the discipline of Landscape Architecture by actively seeking to improve the learning trajectory and potential of post-graduate students.

Educational Context
The Post-Graduate programme of Landscape Architecture at the University of Edinburgh (MLA) was originally designed as a conversion programme for students from a range of academic backgrounds outside the discipline of Landscape Architecture. The programme, sought to equip students with core disciplinary knowledge. Learning strategies were developed in response to this objective consistent with an outcomes based approach. Although staff were aware of the diverse educational and experiential backgrounds of students, moves to explore the integration of this knowledge were not a priority in the development of the programme.

In recent years the structure of the cohort has changed to include a high percentage of Chinese students who already hold an undergraduate degree in Landscape Architecture and a small number of Chinese students who hold degrees in Garden Design and/or Horticulture. Nationality is relevant in this context as Chinese students, in the main, have already undertaken a first degree in Landscape Architecture in a University based in China and yet are enrolling on a conversion programme. In semi structured interview sessions, there were two key themes in the response as to why they are selecting to enrol in this programme; firstly, they consider that they are coming to the University of Edinburgh to advance their thinking skills, and secondly, staff in Chinese Universities often recommend a course of further study in the UK. As a consequence of Chinese students educational background, inevitable areas of duplication exist in their attainment of (what teaching staff consider to be) core knowledge. This duplication, arguably, wastes valuable
learning time which could be put to better use. Reflecting on the current educational situation within the post-graduate programme, specifically at the University of Edinburgh, two dominant and divergent challenges face teaching staff who share a desire to develop the programme.

1. Students entering the programme without a background in Landscape Architecture have an array of educational and practical backgrounds potentially applicable to their learning journey but the useful capture of this information is highly varied and difficult to obtain. 2. Students who have studied landscape architecture, regardless of their nationality, tend to have core disciplinary knowledge but in some cases, particularly in relation to undertaking activities that require critical thinking, knowledge gaps exist that need to be addressed.

Lack of information makes it impossible to interpret the knowledge histories (experiential, practice based, subject relevant) of the incoming cohort. If this information were available in an interpretable form, then this paper contends that better and more effective strategies could be deployed in the delivery of the programme.

This paper asserts that a wide and illuminating array of knowledge and experience exists in learners studying at post-graduate level in Landscape Architecture, and yet, often lays dormant and underutilised in the learning environment of the studio. This knowledge, if activated and shared, could contribute positively to the experience of students and hold significant value for our disciplinary sphere. Of contextual note, for contributory potential in addressing problems outlined in this paper are institutional moves to use data analytics to interface better with and even become ‘hyper-connected’ to our students. Through technological advancements such as The University of Edinburgh’s ‘Digital Transformation Programme’ or similar initiatives in other institutions it is imagined that teachers could be enabled to make more effective decisions about teaching strategies. Mclachlan, G. Digital Transformation Programme

In Landscape Architecture, this move, could potentially contribute to the underpinnings of
post-graduate curricular design by giving staff more information about the learning histories and practical experiences of our students. In this way the paper asserts that such technologies could, if used effectively, contribute to the successful flow of Landscape Architectural students through further education programmes simply by giving teaching staff more information about them.

**An explorative analysis of our own teaching**

In very general terms, for the purposes of this short paper, the first year of the post-graduate programme puts in place core knowledge and attempts to support the synthesis of that knowledge through the mechanism of the design studio. The second year of the programme requires students to make a significant transition in their own learning and operate more independently. In the first semester of year 2 they are issued with a brief, in the second semester the set brief is dissolved and the learning environment is dependent upon students managing their own learning and thinking independently. Reflecting on the capability of students in making that transition is at the heart of this enquiry.

Although students studying at post-graduate level with a background in landscape architecture have a good grasp of the fundamentals of the discipline and the capability to communicate their work graphically, they often demonstrate a lack of confidence in employing critical analysis related to the ‘problem context’ of a particular site. This is not a new observation and in relation to identifying difficulties for designers more generally Kevin Lynch states:

> The first step – the most difficult and often most bungled step- is to ask what the problem is. Defining the problem means making a whole cluster of decisions. Kevin Lynch, *Site Planning* ²

Through observation and discussion it is evident that post-graduate students without a background in Landscape Architecture, perhaps freed from expected procedures of enquiry often raise more reasoned and probing questions towards making decisions at a strategic scale.
For students with Landscape Architectural disciplinary underpinnings, they appear, in many cases to be hesitant to question the strategic forces operating on a site or raise critical enquiries that may allow them to surface an alternative approach. As a consequence of these observations the paper surfaces the following questions; Do we have a detectable gap in undergraduate Landscape Architectural education, both at home and in International contexts, concerning our ability to support critical thinking? Or does the gap exist in a student’s ability to translate that teaching towards design? Are we, so focused on teaching the necessary and vast array of core knowledge in Landscape Architecture that we are forgetting the significance of the thinking that exists around, between and beyond it?

In response to these questions an instructional input to the design studio, namely a lecture on working at the strategic scale is of note. The lecture covered a range of representations communicating different disciplinary themes and offered thoughts on the techniques employed by designers to signify their thoughts. It was imagined that by situating the lecture within the first trimester of the project it would encourage the practical implementation of new or refreshed knowledge through the student’s own individual projects. Although some students demonstrated a response to the lecture in studio tutorials the evidence of resultant impact in the majority of student projects was difficult to detect. In speculating on the reasons for this scarcity it would seem that without shared and discursive opportunities around the lecture, particularly in direct relation to the task of making the strategy, the knowledge was left at the surface of their learning. Reflecting on this, the author also realised, that her approach, devised to support all students, was too general in its inception to address different knowledge backgrounds.

In an article entitled Critical Thinking: Why is it so
Daniel Willingham, a professor of cognitive psychology at The University of Virginia addresses whether it is actually possible to teach critical thinking skills. His article draws the following assertions

1. **Critical thinking (as well as scientific thinking and other domain-based thinking) is not a skill, but is context-dependent**; 2. **Certain metacognitive strategies may be learned that make critical thinking more likely**; and 3. **Ability to think critically depends on domain knowledge and practice**. Daniel Willingham, *Critical Thinking, Why is it so hard to teach?*

If we follow Willingham’s contentions, certainly in the author’s own institutional context, teaching of content knowledge and the practice of practice, is central to the curricular design. If questioned about the ‘place’ in that curricular for students to deploy a ‘metacognitive’ approach then this would be in the early stages of project development and somewhere within the messy entanglement of discover, analysis and conceptual development – the threads of which eventually untangle to become The Landscape Strategy.

In questioning students with high attainment levels in the MLA programme who have come to Landscape Architecture from different disciplinary fields they felt that their own levels of critical thinking were often more honed in relation to students with a landscape architectural background. They evidenced group working situations as an example of where their superior grasp of critical thinking was deployed and reflected that in the early stages of project conception they were often able to take a leading role. In interviews they discussed that their own relationship with critical thinking was a skill that they had either been taught or had to learn in their previous educational background.

Reflecting on these observations in the context of Willingham’s findings raises an interesting contradiction in that his first assertion seems surprising for our own ‘outside’ students who’s core knowledge is new and arguably unpractised.

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In his article *Critical Thinking, Why is it so hard to teach*, Daniel Willingham defines what psychologists describe as ‘metacognition’ as a person’s ability to regulate their own thoughts by seeking out particular approaches to problems.
Perhaps for students who are highly motivated and already demonstrating disciplinary competence previously ‘learned’ metacognitive approaches provide a perfect knowledge base from which to think strategically about the landscape.

The Landscape Strategy and its inclusion as a central theme in this paper
Finding a way to represent thinking effectively at the strategic scale in the landscape is very challenging. Within the bounds of this early and limited study it appears that post-graduate students with a degree in the social sciences (outside Landscape Architecture) tend to be able to describe and pull together strands of complex argument to articulate their response to a site confidently. Human relations with landscape often appeared to be central to their thinking and teaching staff could detect a move away from reading the landscape as a surface construct valued for scenic, spatial and scientific credentials towards reading a landscape more thickly to involve its often invisible socio-cultural dimensions. Critical thinking can be detected in the way that these students consider and situate their own argument, often turning the problem on its head to test unfolding judgements. In general they were able to unite lines of enquiry into a holistically considered response to the site, a highly relevant skill in the making of a landscape strategy. For these students the difficulty related to the representation of thought that they would normally convey in words.

Students with a background in landscape architecture, generally sure footed in techniques of representation, appeared to rely more on the quality of their graphic to unite thoughts on the paper than the strength of their underpinning theory. In questioning these students in tutorials and critiques on strategic judgements made towards design their application of ‘critical thought’ was less detectable. When observed in a variety of learning environments (group tutorials, individual tutorials, critiques) teaching staff within the school often detected that
student knowledge existed at the surface of the problems posed. These students, however, command a different skill that is more practiced, namely, their ability to ‘draw’ their intentions. Through observation the research asserts that in representing their own thoughts differently (not vocally or in writing) students who ‘draw’ their problems can decipher them in a different way. Although their use of critical thinking was not always evident their use of drawing to test ideas, and examine alternative routes towards a solution was, in the main, perceptible and useful to the design process.

**Conclusion**
The short term goal of this paper was twofold 1) to examine the specificity of a single task (the making of a landscape strategy) in a Postgraduate Landscape Architectural design studio to initiate a local transformation of teaching 2) to set in motion a more sustained and strategic frame of thought that recognises and can capitalise on the diversity of knowledge entering the discipline with post-graduate students. The paper represents a speculative starting point in what is imagined to be a more ambitious enquiry critical to the discipline: *What do we need to understand to teach post-graduate students better? What are the knowledge requirements of post graduate students in Landscape Architecture? and How do we prepare post-graduate students for entry into the professional world?* Perhaps, in advancing Landscape Architecture as a discipline, it is simply pragmatic to think about how we recruit well trained, capable inspired and inspiring students into and out into the field. In this paper considering the Landscape Strategy independently but in relation to post-graduate students has allowed the author to consider particular forms of knowledge that she considers to be highly relevant to our disciplinary future. The research has found that in general terms, two streams of students exist in the postgraduate Landscape Architectural programme at the University of Edinburgh, those who have a disciplinary specific background and those
who do not. When required to engage with a particular stage of design enquiry, namely, the making of a Landscape Strategy students do not behave as one might expect. Students with a disciplinary specific background to Landscape Architecture often have good core knowledge and are able to represent this knowledge through drawing but are less capable of questioning and advancing their own knowledge through critical thinking. Students entering the programme from a different disciplinary backgrounds (often from the social sciences) appear to have good critical thinking skills but are often less sure about how to apply their domain knowledge to the communication of this thought through drawing. This finding implies that we need to develop different curricular in our post-graduate programme in order to remain responsive and address knowledge gaps. In commencing this transformation the consideration of how to share knowledge across student streams would also appear to be a valuable opportunity for further investigation.

The necessary back and forth of creating a Landscape Strategy and its inherent demand for inbuilt feedback makes this representation particularly relevant in discussion about how we educate Landscape Architects now. Its generation as a form of drawing demands core disciplinary knowledge, and complex analytical skills. Its production is inter-related to how we, as educators in Landscape Architecture can encourage the sensitive formulation of proposals for sites, encourage personal responsibility in shaping a project and contribute to a student’s disciplinary responsiveness though making strategies that are legible to everyone. For those who teach Landscape Architecture, and for those who are learning, it calls on us all to recognise the deep structure of problems, harness thought processes to solve them and ultimately to penetrate the surface of our own knowledge. The gap in critical thinking skills in students who have good Landscape Architectural domain knowledge needs to be addressed.

In consideration of post-graduate education in Landscape Architecture the paper asserts
that working on the creation of the Landscape Strategy can encourage students to work together on common questions and awaken shared knowledge. In doing so, perhaps we can encourage a move away from superficial engagements of site to support both the stimulation of new ideas and the sharing of common issues. Promoting shared knowledge is understood to be of fundamental significance to the future of the discipline. If technology and innovations in learning analytics can support educators in harnessing individual knowledge and understand more about a student’s own experience before they come into the programme then maybe and quite simply, we can teach better.

Endnotes
1 Mclachlan, G. ‘Digital Transformation Programme’ The University of Edinburgh. Accessed 30.05.2017. https://media.ed.ac.uk/media/1_1ii8vl1w


Abstract
This paper analyzes the close connections between map, territory and landscape in order to create a theoretical framework for landscape studies. Thanks to various technical and conceptual advances, the ideas of map and cartography have been expanded and refined during the last decades. Although this development has been motivated by a wide array of professional disciplines, geography appears to be the one that has focused the most in theorizing about the concept and application of maps. As a result, recent notions have emerged from this discipline that allow us to construct a rich theoretical framework that provides a means to re-examine landscape practice, theory and research. The aim of this section is to analyze how the relationship between space and representation has changed over the course of the 20th century.

To do that, we will examine three quotes about the map-territory relation:

- A map is not the territory (Alfred Korzybski, 1931)
- Maps are territories (David Turnbull, 1989)
- Maps and mappings precede the territory (John Pickles, 2004)

From here, the second section of this paper aims to set a theoretical framework for landscape studies. The third quote brings forth a conceptual shift from cartography as a finished object (map) to cartography as a process (mapping). Recent theories (Pickles, Crampton, Kitchin and Dodge) define ‘mappings’ as a set of spatial practices ad hoc that reciprocally evolve with the territory they represent. This way, we can enrich our understanding of historic landscapes by approaching their morphogenesis as inseparable from its successive ‘mappings’.

Finally, the paper concludes that if territory is a system of relations, then mappings actively participate in constructing this system as performatrice practices. Furthermore, if landscape is the physical form that derives from the way mankind relates to the environment, mappings have played and continue to play a fundamental part in the creation of that landscape. In this way,
we can enrich our understanding of historical landscapes by approaching their morphogenesis as being inseparable from its successive ‘mappings.’

The three territories
Thanks to various technical and conceptual advances, the ideas of map and cartography have been expanded and refined during the last decades. Although this development has been motivated by a wide array of professional disciplines, geography appears to be the one that has focused the most in theorizing about the concept and application of maps. As a result, recent notions have emerged from this discipline that allow us to construct a rich theoretical framework that provides a means to re-examine landscape practice, theory and research. The aim of this section is to analyze how the relationship between space and representation has changed over the course of the 20th century. To do that, we will examine three quotes about the map-territory relation.

A map is not the territory
This expression was first formulated in 1931 by Alfred Korzybski, a Polish-American scientist and philosopher who developed a field called General Semantics. Although it was used as an analogy to describe the shortcomings of language and the human brain, it took on a life of its own, becoming one of the most referenced quotes by the author. In 1933, he included the idea in his vast work Science and Sanity. The complete citation is as follows:

A map is not the territory it represents, but, if correct, it has a similar structure to the territory, which accounts for its usefulness. If the map could be ideally correct, it would include, in a reduced scale, the map of the map; map of the map, of the map; and so on, endlessly. [1]

That is to say, an abstraction derived from something is not the thing itself. For the author, the concept of ‘territory’ is identified with reality, while that of ‘map’ is associated with its image. Thus, if there is an objective reality, the
correctness of that image would reside in its scientific precision. His objective vision of the concepts of ‘territory’ and ‘map’ represented a well-established positivistic stance in mapmaking that would not be contested until the last quarter of the 20th century.

For the sake of this paper, we can summarize his position as follows: the territory (an objective reality) precedes the map (its unbiased representation).

Maps are territories
The next quote is the title of a book published in 1989 by scholar David Turnbull. It was the result of a two year ‘systematic review of cross-cultural content in the History, Philosophy and Social Studies of Science’ [2] through the idea of a map. In his review of the book, Denis Wood praised the fact that maps that would be rejected as inaccurate by western scientific community were studied at the same level as those taken as a canon [3]. This is precisely the foundation of Turnbull’s thesis: the questioning of western objectivity by showing, through maps of other cultures, that:

What actually counts as the relative location of particular objects may not be quite so basic and may constitute one of the variables that differentiate the way cultures experience the world. That is to say, in any culture, what counts as a natural object and its spatial relations, rather than being an invariant characteristic of the world, may instead form part of that culture’s world view. [4]

Here, we can see a clear opposition to Korzybski’s ideas. ‘Territory’ and ‘map’ are not objective notions anymore, but complex constructs highly dependent on each culture. Furthermore, Turnbull also questions the relation between the two concepts: for him, maps play such a central role in our understanding of space that they cannot be separated. There is no such thing as a ‘territory’ from which we derive ‘maps’, but rather a situation of mutual dependence. Thus, maps are territories.

This book and its author can be placed
together with other geographers like Wood, Harley or Woodward, that belong to a school of thought in which the map is seen as a tool for power and control. If maps have the ability to determine our understanding of space, deliberate representations could be imposed on a culture so that a biased idea of territory could prevail. In Turnbull’s work, this isaccentuated by his Australian origins and his knowledge of aboriginal cartography, which in many occasions is contrasted with western maps of the same land.

Maps and mappings precede the territory
Already in the 21st century, John Pickles formulates this idea in his book A History of Spaces: Cartographic Reason, Mapping, and the Geo-coded World. In it, he provides an insight into how maps and map-making have shaped the spaces in which we live. His theoretical position is presented as an evolution from the ideas of both Korzybski and Turnbull. As he writes:

Early empiricist readings of maps (where maps were seen to be the unproblematic representation of an external reality) have thus increasingly been replaced by reductionist readings of the powers of and in maps. These have been productive in the ways in which they have challenged empiricist and technicist readings of maps, but limiting in their tendency to reduce theories of mapping to theories of power. [5]

He instead derives from the ideas of Jean Baudrillard and, especially, Geoff King, to whom he quotes: ‘Map and territory cannot ultimately be separated. Cultural mappings play a central role in establishing the territories we inhabit and experience as real’ [6]. From this, he presents his stance:

Instead of thinking of the map as the product of a territory or a passive representation of it, King (with Baudrillard) suggest a strategic reversal; it is the map that engenders territory. The notion of the real as something existing in its own right is no longer tenable. The real is not only what can be produced, but that which is already reproduced. [7]
That is to say, previously known images take precedent in our notion of the real. This allows us to sum-up this section of the paper by saying that the map-territory relation has evolved throughout the 20th century. Departing from ‘A map is not the territory’, a clear distinction between a symbol-map and a pretend reality-territory that sustains a position of objective scientific representation; we have moved to ‘Maps are territories’, the idea of a joint understanding that gives way to ideologically laden representations, and, finally, to ‘Maps and mappings precede the territory’ an understanding of territory that builds up from its successive imaging.

**Maps. Mappings. Territories. Landscapes.**

The work of Turnbull brings forth an interesting question when he equates all forms of map-making. As Wood noted, his work puts together the ‘marginal’ maps with those at the ‘core’ [8]. This tendency already had an important precedent in 1987, when Harley and Woodward started publishing their ambitious opus *The History of Cartography*. In it, as in the work of Turnbull, we find a collection of maps that indistinctly gathers together the works of western mapmakers with indigenous mapping, narrative traditions of space and other forms of unconventional cartography.

For Pickles, this change highlighted the limit of traditional cartography:

> Indigenous mappings do not necessarily have the same kinds of materiality and reproducibility as do western maps, and what constitutes a map and a mapping practice is not necessarily the same across cultures. [...] Thus, in the latest volume in the *History of Cartography*, ‘mapping’ instead of ‘map-making’ has been used to determine what counts as a map. [9]

Making all forms of cartography equal has diminished the domain of illustrated empiricism in favor of performative practices through which cultures structure and represent their world spatially. A conceptual shift has been established in the last decade: from cartography as a finished object (map) to cartography as a process
Recent theories define ‘mappings’ as a set of spatial practices ad hoc that change together with our performance in space:

Maps are never fully formed and their work is never complete. Maps are of-the-moment, beckoned into being through practices; they are always mapping. [...] This theoretical turn has led us to suggest that cartography is processual, not representational, in nature. [...] Cartography becomes understood as the pursuit of representational solutions to solve relational, spatial problems. [10]

‘Map’ and ‘territory’ cannot be understood as pre-existing conditions without the other. Both are cultural constructions that reciprocally determine our relation to space. As Professor Laura Kurgan has put it, maps ‘function somehow like extensions of ourselves [...] they have become infrastructures and systems and we are located, however insecurely, within them’. [11]

Having established the role that maps and mappings play, a closer look at the concept of ‘territory’ is necessary. As we have seen, geographers have established that it is a cultural construct in which both the physicality of space and its representation participate. But, some authors like Painter [12], have gone a bit further than that, defining territory as an effect arising from various practices that result in a delimited space. Territory ‘is better conceived as an art or practice rather than an object or physical space’ [13].

These ideas are along the same lines of those of Spanish geographer Eduardo Martínez de Pisón. To him, territory can be defined as a relational space, in other words, as the relations that mankind establishes with its environment in a given moment, with the intention of surviving or prospering. The aspect that differentiates his ideas from the rest is that he then proceeds to link this notion of ‘territory’ with that of ‘landscape’. Whereas territory is the operative space reserved to strategy, landscape is the physical and emotional result of those operations. It is the accumulation of events translated into a physical form that allows us to relate to our past. As Martínez de Pisón states: ‘in a territory people undoubtedly survive,
prosper or fight; in a landscape people find its identity’ [14].

Conclusion: Towards a Possible Theoretical Framework for Landscape Studies

From the previous section, we can draw correspondences between the ideas posed. First, we can now look at cartography not only as a producer of ‘maps’, or immutable repositories of information, but also ‘mappings’, processual key elements of change. Second, we can understand the notion of territory as a system of relations between man and its surroundings. Third, mappings actively participate in the construction of territories to the point that our idea of a place and the way we relate to it is influenced both by the phenomena that surround us and its representation. In other words, we can derive that mappings actively participate in construing as performative practices the system of relation between us and the environment. Furthermore, if landscape is the physical form that derives from the way mankind relates to its environment, mappings have played and continue to play a fundamental part in the creation of that landscape. In this way, we can enrich our understanding of historical landscapes by approaching their morphogenesis as being inseparable from its successive ‘mappings’.

article. *Cartographica*, vol 28, n° 2, p76.
Abstract
As landscape architectural design practice becomes increasingly focused on the dynamic and ephemeral qualities of landscape processes there is a demand for new methods of landscape representation that use a range of graphic techniques to explore the juxtaposition of existing and designed landscape processes. Building upon conventional drawing typologies of orthographic projections, and the potential of compositionally overlaying several drawing typologies with highly scripted annotations to capture the landscape's dynamic fluctuations of events and evolutionary changes.

Using a variety of tools from the fine arts and other disciplines, landscape architects can begin to map change in the landscape including growth theories of accumulation, acceleration, depletion, erosion, succession, and natural phenomena of the elements (wind, water, heat, air, and light). The problem of representing dynamic landscape processes with conventionally static orthographic drawings opens up opportunities to explore other art forms, media and mediums for representing the landscape and its dynamic processes. The meshing of influences allows the images to be more dynamic, through compositional techniques of overlapping layers and episodic arrangements. The drawings create prose, themes, and timing, similar to dance and storytelling which are thematic in nature and break the tension between the image of landscape and the reality of landscape a tension that Perea-Gomez, Bryson, Corner and others criticize.

Introduction
Traditional representation of built landscapes, such as those associated with the teaching methods of Ecole des Beaux-Arts in Paris, are now overlooked by the digital age’s rendered drawings that do not express the transformative processes of the landscape. Architectural drawings and orthographic projections are used to represent objects, spaces, or landscapes at a particular moment, usually right after
construction. These methods of drawing tell specific information about form, orientation, materiality, and spatial relationships of proposed designs. Digital renderings of a landscape’s transformative character are dulled by tiling, paint buckets, cameras, and lighting, producing flat images without depth and essence of time. Artistic techniques can be applied to these static drawings, adding layers of information and spatial depth. Yet even with evocative drawing’s composition, the landscape’s transformative processes are not being represented. There is a need for visual methods to help describe how transformative processes alter the landscape. Drawing and mapping change in the landscape includes topics of; growth theories of accumulation, acceleration, depletion, erosion, succession, and natural phenomena of the elements (wind, water, heat, air, and light).

In his article, “Representation and the Landscape. Drawing and Making”, James Corner states that the problem of representing landscapes is that landscapes are alive and are radically dissimilar to paintings or sculptures and that ‘landscapes cannot be seen as a single point of view, or a single moment in time’[1]. The landscape drawing’s link to the reality it designates is both complex and changeable in relation to time, growth and phenomena [2]. Landscape Architects study and record how a landscape functions unto itself and as a part of a larger context collating the landscapes’ systems and natural processes using architectural drawing conventions that are meant to represent fixed objects, not experiential variables or conditions. Therefore, designers have many problems of representing transformative processes of a landscape.

Landscape architects need to learn to represent sequential landscape transformations in their drawings so that the studied or designed landscape’s processes become evident to the viewer. They should address the gap between representation of the landscape or the act of drawing itself, and the reality of landscape
which includes an understanding that landscape phenomena includes growth, change and multiple viewpoints, a disconnect that Perea-Gomez, Bryson, Corner and others criticize [3],[4]. In his edited book Recovering Landscape, Essays in Contemporary Landscape Architecture, James Corner states that techniques of representation are central to any critical act in making and design: “if it is true that there can be no concept of landscape without prior imaging (and not just perspective but also maps, plans, and other modes of representation), then innovations in image projection are necessary for the virtual to be both conceived and actualized... any recovery of landscape in contemporary culture is ultimately dependent on the development on new images and techniques of conceptualization.” [5]

**Velocity**

Within the field of landscape architecture and, specifically, the specialty, representation, there is little research related to representing the transformative character of landscapes. At the end of the 19th Century new landscape representational theories and methods developed with the emergence of the imitation of motion in two dimensional art and in painting. Representation of motion was clearly articulated in the early 20th Century by Germany’s Dada movement and the Bauhaus school’s theory of photographic montage. Critic Dawn Ades [6] discussed the importance of the two schools in using the camera (a relatively ‘modern’ invention) to capture and distort motion through both photomontage and time-lapse images. Theorists and critics (Yves-Alain Bois [7] and Benjamin Buchloh [8]) pointed out the successful uses of film and photomontage in the 21st Century design.

One the most successful illustrative studies of capturing change and time is Marcel Duchamp’s photographic study for the painting “Nude Descending a Staircase no 2,” (1912). It was a study in the newly developed medium of cinema that grew from photographic studies of the body in motion as seen in Edward Muybridge’s
film, “Women descending stair” (1887). Edward Muybridge’s cinematic studies of physiological motion in the 19th Century investigated how our physical being moved through the camera lens. Muybridge’s work captured a single image for every movement the subject took. Composed into linear compositions that investigated human kinesiology, one step at a time. The photographic studies of physical motion recorded factual data that could be empirically quantified as to how the human body moves. The work, “Women descending stair” shows the women from one viewpoint at multiple points in time or moments, giving vitality to the series of separate photographs similar to a film reel or photographic contact sheet. The linear arrangement of the composition, the fixed staircase and repeated framing of each still image, grant the work constant variables to record and measure the body movements. The work implies a rhythmic sense of motion which occurs only in the mind of the viewer due to the work’s compositional arrangement.

Duchamp’s study uses the technique of superimposing several images into one photographic work to be analyzed into cubist form. One film negative exposed several times as Duchamp’s physical movement down the staircase is juxtaposed against the solid and constant structure of the staircase itself. The superimposed image’s compositional arrangement documents physical motion through transparency and layering. Duchamp uses the camera to show the relationship of serial images and the distortion of the subject thereby creating movement in the image through the overlaying of subtle adjustments arranged in rapid succession to create the illusion of motion, through the image’s velocity. Velocity is the visualized rate of change from one point in relation to time. Velocity offers a pace or tempo to render transformation.

Transformative landscape processes can be drawn through serial diagramming similar to Muybridge and Duchamp’s photographic investigations of physical movement. Both
Muybridge’s and Duchamp’s photographic studies were diagrammatic in nature, part of a larger work about movement, and offer compositional strategies to chart growth processes in the landscape. Constant references including measurements, structures, and image framing give organization to the rendered landscape processes or objects in flux. Compositionally arranged in linear progression, as in Muybridge’s work or Duchamp’s superimposed images, they illustrate the fluid transformation of movement or time. Both artists’ works were composed in film, yet the compositional theory can be applied to content and composition in diagrammatic drawings about movement, change, or time in the landscape.

DIAGRAMMING Seriality, Repetition, and Transformation

Thematic diagrams can break down complex information and visually explain the relationships of complicated systems. Thematic changes can be simulated by overlapping a repeated constant variable against the phenomena of change through the methods of diagramming. Such diagrams, once the architect’s notes, make transformative processes visually accessible by demonstrating or explaining how the landscape works and by clarifying complex relationships among the parts of a whole. In the article, “Mapping the Unmappable on Notations,” Stan Allen describes that there are both visible and invisible systems and network of flows in the environment and that “representation needs to engage time, and change, shifting scales, mobile points of view; in order to map complexity, some measure of control must be relinquished.”[9]

Bernard Tchumi and Derek Revington’s transformative planting strategy diagrams for the Downsview Park Competition in 1999 visually charts complex information and explains the transformative relationships of complicated planting systems. Bold and lively, the images portray the essence of designed episodic succession through the use of simplified serial
plan view diagrammatic graphics, repetition of symbol styles and text to clearly visualize a designed transformative process through thematic time intervals of years and decades. Intervals in the landscape can be understood as the intervening time between successional periods, a pause in events, or experiences such as tidal shifts.

The growth transformation of Tschumi and Revington’s Downsview Park proposed a variety of plant communities including meadow and mixed wood, grass savannah, and meadows. The three communities are drawn separately and read in a linear fashion beginning at the initial planting and repeated at pivotal growth intervals. The overlapping of serial self-seeding with succession are drawn. The theory of seriality and repetitive compositional arrangements grant the diagrams the ability to express the landscape’s transformative growth, sequential processes, and events that define the proposal.

**Image Assemblage**

When drawing the subtle adjustments of natural processes or systemic transformation in the existing or designed landscape the designer should compare them to a constant variable, similar to experiments in a laboratory. The work should culminate in a series of drawings that individually record measurements and are a part of a larger speculative work, and not be a static representation.

Assemblage of the hybrid images interpret the data that was recorded over time into a multilayered drawing that documents the landscape’s spatial variations and transformative qualities. Anuradha Mathur’s Mississippi River illustrations visualize the power of the Mississippi River’s natural system through overlaid images and text. The artistic explorations combine static diagrams with evocative compositions that describe a series of moments through a sequence of drawings. The overlapping of drawn information helps visualize the landscape transformation. Overlaying the imagery and
adjusting opacity speculates on the acceleration and accumulation of landscape experience.

Since the relationship of drawing to a landscape’s processes is obscure, like James Corner suggests [1], Mathur’s artistic imagery in *Mississippi Floods, Designing a Shifting Landscape* carefully captures the character of a landscape through prominent imagery and legible text. The information is layered in compositions that use serial diagrammatic images in various orientations which are overlaid repeatedly to demonstrate transformative relationships within the Mississippi Delta landscape.

The drawing’s overlapping layers juxtapose reality and the image in an aim to create prose, themes, and timing. Drawings are assembled into compositions that mimic time and motion and describe velocity, which allow transformative processes to enter the image as well as permit the viewer to translate the landscape’s change.

**Time Intervals**

Our understanding of time and transformation is similar to how time is explored in episodic storytelling. Since our perceptions are not seen in the rules of Cartesian reality (mathematical equations and parameters), Homer’s theory of the retarding element as analyzed by Auerbach [10] uses narrative techniques to go back and forward in time, allowing the reader to sense time as it is experienced. It is an iterative process that builds upon past and present experiences and conditions. A compositional theory of episodic timing for drawing should include repetition of a constant variable, the use of spatial intervals and compositional gaps or arrangements and allows the images to express the landscape’s transformative experience, similar to Shintoism’s interval of time and space. Used in dance, storytelling and painting, *Ma* is the pause in the rhythms; the empty space that is used to enhance the whole experience. *Ma* is created through image assemblage and compositional arrangements of gaps. Compositional gaps reinforce the drawing’s interval of measuring time.
and distance. Filmmakers Sergei Eisenstein and Stan Brakhage both used gaps and emptiness to create a deeper understanding about episodic time in response to transformative development of both characters and scenic settings. The gaps were created through methods of splicing images and through the distortion of camera movement, using rhythms that focus on multiple pieces of the environment and replicating human sight and the landscape’s phenomenon of motion.

Splicing gaps is a photographic method that can be applied to drawing. Drawing details are combined in overlapping sequences and the build-up of the drawing becomes dynamic in nature, dark and complex. The image’s gaps can be composed through the density of overlapping drawings, causing the drawing to become blurred and darkened. Gaps can also be created through the removal of marks to create a-spatial compositions. The serial and repeated images can include, but are not limited to, abstraction, diagramming, and drawings that illustrate specific details to construct visual narratives of landscape change.

The time scale can be drawn by charting intervals, in particular timeline measurements, against a constant datum line to help understand the variety of changes happening in one aspect of the site. This marks progression of geological shifts, ecological succession, on littoral edges. The subtle adjustments of natural processes in the landscape, compared to a constant variable similar to experiments in a laboratory. A sequence of images illustrating intervals of the same object, space, or context can provide a deeper understanding of these multi-scalar moments and the motion and accumulation of landscape experience.

Tools & Methods
Tools used to record existing landscape processes on site include both low and high technological tools (the pencil and sketchbook catalogs, measuring tape, weather stations, the camera and video lenses capture moments, GPS
coordinates mark points and scribe lines between positions in the landscape). As an entry point to diagramming landscape transformation, historical landscape conditions are traced through various cartographic and orthographic projections as a means to understand future processes.

Historic aerial photographs of the landscape can be traced and abstracted to chart change in landmass, water lines, development, land cover, et cetera. Figure 1, a figure-ground diagram illustrates a plat of *Louisiana’s Sugarcane field* and renders the land cover’s **linear** transformation through the use of repetitive image framing and the abstraction of the plan view into black and white, allowing the visual translation of land and water to be read. The figure-ground image is built from collected aerial photographs. Image adjustments delete color saturation, heighten brightness and contrast of negative and positive space in the compositions to show the relationship between the two time periods. The grey fill on the left of the image is an older agricultural pattern than the black figure-ground fill on the right of the image.

Figure 2, titled *False River Cut Off* **superimposes** multiple historic mappings and aerial photographs of the waterway, one on top of the other. Each historical image is traced as digital line weight on its own layer, the older river edges are drawn in lighter line weights and strokes. The final diagram overlays all past river alignments, choreographing the river’s positions and movement that created the False River cut off.

Figure 3 is an **assembled** collection of the hydrological narratives for the *Louisiana Gulf Coast Prairie* through drawing created by Elizabeth Anne Williams and **traces** littoral edges of land and water as the prairie erodes and subsides. An overlapping view superimposes several diagrammatic sections that represent the volume of land loss due to accelerated erosion from coastal storm events in the 2005 Hurricane season. The hybrid assemblage mixes speculative watercolor mappings and vector...
line work sections that are digitally printed on the original illustration. The layering of color and tonal watercolor washes in plan-view map land loss due to inland channelized waterways that have accelerated salinity and erosion of the prairie. The use of color is in contrast to the mapping’s background—the white negative space which represents the current fragmentation of the prairie landscape to open water.

Figure 4 displays a series of hybrid media drawings spliced together in plan-view (the spatial intervals of moving along the bayou). The interval is reiterated in vertical gaps that stitch the illustrations of traditional quadrant aerial images. Gaps are built through intensity of overlaid imagery that is transformed in scale, opacity, and tone.

Annotations
Figure 5 is part of a larger series of drawings created by Matt Reylea. The images trace his movement in the rural Erinville, Louisiana’s Alford Cemetery. Drawings combine time lapse photography with hand sketches translated from GPS data into drawings similar to notational dance charts (top). Walking the site after dark, equipped with a tripod, remote timer, with two small LED lights pinned to clothing, or holding a flashlight in each hand, Reylea toured the cemetery. The camera’s long exposure and Reylea’s walking path in the landscape are traced by the ribbons of light, drawing on the landscape itself. The photography was then combined with annotations about his movement in the landscape (bottom). The use of annotation in the image helps to describe his performance, a nearly invisible event. This technique can be used to describe landscape change.

Stan Allen describes the ability to clarify abstract ideas through the inclusion of notations in drawings. Architecture and landscape architecture diagrams are not concerned with imitating reality but with describing a proposed design and anticipating new relationships to be realized. Once built, the landscape is
a collaboration of time, growth, flora, fauna, and use. Allen suggests that thematic design diagramming can be compared to music and writing since the built landscape is a consequence of ephemerality like music disconnected from the author. To expand the representation, complex landscapes processes, annotation techniques established in other fields, such as film, music and performance, can help to describe nearly invisible events that unfold in the landscape. Notation techniques from the arts grant the designer the ability to draw transformative events and processes on architectural terms [2].

Conclusion

Landscapes are dynamic and constantly growing, never in the same way ever again due to its changing state. Landscapes should not be represented by a single conventional architectural drawing, lacking the dynamic complexity of time and growth. Conventional orthographic projections record objects and fixed points and can only document one moment and cannot express the landscape in change. The diagram should shift from static image into a diagram of processes. The representation needs to engage time, change, shifting scales, and multiple points of view. In order to render complexity, some measure of control must be relinquished.

To have drawings express a landscape’s growth processes, the method of transformative diagramming (which explores the theories of seriality, repetition and velocity) can create richly informative landscape drawings. Transformative diagrammatic images investigate the landscape in episodic motion and are successful at documenting the changing qualities of the landscape more so than static, orthographic views. The overlaying of various orthographic projections allows sequential landscape processes and events that shaped the place to be revealed.

The dynamic compositions document change through their serial use of images, rapid
organization, intervals, and gaps. The use of opacity and compositional arrangements enables visually expressive formats to narrate the landscape’s transformative experience and allows the viewer to gain a deeper understanding about the landscape transformation in time.

References


Special thanks to graduate student Matt Reylea and Elizabeth Anne Williams, my undergraduate student and peer, for their original work created in my advanced seminars on representation of cultural landscapes in Louisiana and to my undergraduate students, John Prevost, Emma Bahm, Elizabeth Boudreaux-Gentry, for contributions to the base material research for the graphics.
Figure 1: (top) LINEAR mapping of sugarcane fields is compositionally arranged to translate the linear progression of agricultural patterns on the Louisiana landscape.

Figure 2: (bottom) SUPERIMPOSED diagram that illustrates the transformative creation of the False River on the Mississippi River in Louisiana.
Figure 3: ASSEMBLAGES Hybrid watercolor mapping and digital drawing assemblage of hydrological processes.
Figure 4: INTERVAL maps the bayou in Louisiana with overlaid images and gaps

Figure 5: ANNOTATIONS hybrid assemblage documents movement with notational system.
Abstract
Drawing is core to understanding ‘site’ in the field of landscape architecture offering opportunities to design and re-describe the world. The purpose of learning to read the landscape is to be able to recognize and build upon the landscape’s character and processes that shaped the landscape. Traditional site drawing in landscape architecture is inventory of past and existing conditions, but drawing can be a projection of a designer’s understanding of landscape. The notational drawing process describes past, present and what is yet to be [1] and can affect our perception of the landscape, leading the designer to explore new methods that might further the creative process of making and drawing. This paper will discuss the transformative process of drawing as a projection of the designer’s understanding of the landscape and will include visuals from a case study conducted by Sheryl Fishel.

Sheryl Fishel’s drawings mapped particular environmental topics that make the landscape unique. Working back and forth between cartographic mapping and orthographic projection Fishel created drawings that document the changing density patterns of tomb placement. Walking the site repeatedly over the course of sixteen weeks with pencil, sketchbook, string and camera enabled her work to question landscape complexity, ecological edges and atmospheric conditions. The drawings traced her movement through the cemeteries topography, weather and the fluctuations of wet and dry surfaces. Site experiences allowed Fishel to question conventional inventory drawings and to attune her design eye to what is already on site constructing a new drawing typology from the fields of design and art. Fishel then reorganized the cemeteries structure both ecologically and culturally by overlaying past and present conditions re-cataloging the tombs into new typologies. She diagrammed the transformation of the cemetery’s burial tombs, drainage systems and pedestrian movement as a reaction to site conditions.
Fishel’s exploration of drawing techniques and visualization of the site contribute to the design field through the implementation of atypical drawing methods to transcribe landscape inventory and guide the design process. This metaphoric drawing process enhances our understanding and interpretation of the landscape and begins to uncover new questions and design solutions that will evolve landscape design.

**Main Text**

When documenting a landscape in the design process, it is important to investigate the landscape’s prose and the designer’s personal experience of the site using exploratory and creative techniques. Guided by the idea of parallax, narrative themes and the theory of overlapping compositions, the onsite and hybrid design exploration drawings augment the designer’s insight with an invitation to discover and examine. The drawings are built over time with methods such as overlaying, palimpsest, retention, obscurity and deletion of information over several site visits. The active process of drawing is as important as the end composition and design.

Drawing reconstructs not only physical elements, but experiences. The act of creating a drawing stimulates the interconnectivity of vision, mind, and hand to construct the image, granting a deeper understanding of self and place. Perception and sight enables the whole body to become memory; it is an experiential way of seeing [2]. Greek atomists, circa 129 AD, believed sight was created by touch. Objects sent replicas of themselves, called eidola, where a thin film composed of atoms impacted the eye. Physically this is now understood to not be true, however, the concept embodies the importance of sight being understood by other senses. Exploratory drawing of the environment reveals the nuances of the landscape and enhances conceptual and physical understanding of the landscape.
The act of walking, specifically walking repeatedly in the same location, synchronizes the body to the environment and empowers us to feel a sense of place. Memory is also bound to the senses, and landscape experience is tied to place through geographical assimilation and complex sensuous information [3]. Walking helps visualize space and create personal interaction with the land [4]. The more we can physically experience a landscape, the more profoundly we see its value. This is the reason the following site survey and exploratory works are rooted in a link between place and physical experience. They culminate in a design solution about site, meaning and physical interactions.

In 2014 Sheryl Fishel translated her weekly site visit walking experiences at Sweet Olive Cemetery into series of traditional site inventory and nontraditional hybrid drawings. Sweet Olive Cemetery holds historical significance as the first African American cemetery in Baton Rouge, Louisiana, established in 1898 [5]. Speculated to have its beginnings as a slave cemetery, Sweet Olive first appeared on the Battle of Baton Rouge map in 1862. However, documentation for burials is not available to confirm the early history [6]. The five-acre site forms two city blocks divided by America Street. Burial types consist of subsurface interments, above-ground crypts, columbarium, and a potter’s field.

The irregular layout of Sweet Olive Cemetery stems from the site’s changes in ownership and parcel division among the parishes. After the American Civil War, the site was purchased for development as an African American housing sub division. However, no building occurred on the cemetery property and it was sold to two Baton Rouge churches in 1898. In addition to the location’s use for parish burials, the northeast corner of the site became a potter’s field [6].

In the 1920s, shotgun homes were built on the eastern and northeastern sides of the cemetery blocks. Reports of shallow burials lead to the
closing of the cemetery due to overcrowding and health concerns. The 1930s brought the introduction of the above grade concrete vault which enabled the cemetery to reopen for interments. Minor improvements were made to the site in 1976, including the addition of a brick fence on the north and west sides and a chain link fence around the south and east sides of the property. Currently, the site is maintained by the Sweet Olive Cemetery Board [6], a Baton Rouge community organization.

The site is located in an African American neighborhood and the two parishes that previously owned the site now reside in downtown Baton Rouge. The site's ethnographic relevance to the community make it a sacred place, however lack of visibility and defined pathways play a major role in the community's inability to access and interact with Sweet Olive Cemetery. Lack of accessibility prevent maintenance and has reduced public interest for the site.

The collapse of below ground tombs and subsidence of soil at grade has created sharp surface indentations between thirty to sixty centimeters in depth. While the majority of tombs are arranged from east to west, the site uses several dissipating orthogonal grids for tomb placement. A larger number of tombs were assembled more densely along America Street and the surrounding, defined pathways. The organization of tombs is not grouped in a logical arrangement of burial typologies (i.e., in-ground, above-ground crypts, and columbarium) and makes maneuvering around the property unpredictable and unsafe. (figure 01)

Initial inventory mapping efforts explored the relationship of tomb density and pedestrian access allowing for understanding and interpretation of the site. Overlapping traditional site inventory (i.e., planting, topography, hydrogeology, soil, site materials etc.) with nontraditional inventory of tomb typologies, burial dates and family plots documented the irregular
circulation patterns. The patterns correlated with existing degraded surficial pathways, topography, site elements, and tomb placement. On site exploratory drawing synthesized artistic and conventional recording methods to understand where the circulation of the cemetery is forced or obstructed due to the irregular circulation patterns, topography, hydrology and broken tombs. On each weekly visit to Sweet Olive Cemetery, Fishel would begin by sitting still, resting against a crypt, or sitting in the grass for ten to thirty minutes to awaken the sensory system to become more observant to site details. Following the time of still observation, she would begin her weekly surveying.

WALKING & DRAWING
Circulation maps were overlaid onto an inverted aerial photograph. White spaces in the mapping represents vacancies, vegetation and areas of subgrade burials. Above ground crypts are shown as dark rectangles. Movement within the white areas of the map is restricted by surface runoff during storm events and standing pools of water that are unable to permeate compacted soils. Visiting the site following a rainstorm, Fishel documented the collapsed tombs pooling with water. In these areas, the concrete edges of the crypts have shifted and collapsed over time due to inundation. Age and settling soil over the graves has broken coffin lids. Throughout the site water becomes trapped without sufficient drainage which impedes visitor access.
Fishel’s hybrid mapping technique was used over multiple walking routes across the span of several weeks. This activity involved drawing a physical line on the landscape with a rope coupled with GPS points to create a series of circulation mappings. A four-hundred foot length of rope is represented as a golden line. (figure 02) The overlaid mapping of differing movement patterns, tombs, and water are color coded using the following organized system of notations:

(A) Maroon line work translates her original sketches about the forced maneuvering patterns through the site following no defined pathway. Included in the mapping is the tracing of Fishel’s physical experience of walking through the cemetery. The physical intensity associated with maneuvering around obstacles obstructing access into and through the site.

(B) Gold pathway line work represents a response to the physical demands of walking the site. The denser the line development of the path the more intense the exertion and physical breath is needed to move. To draw the changes in breath occurring from walking or climbing over obstructions the pathway lines duplicate to the right or left notating breath. The strongest inhalations and exhalations are represented by overlapping marks of watercolor which interpret varying characteristics of exertion.

(C) Darker teal shapes represent spaces of deep inhalation occurring prior to stepping up onto the tombs and around pools of water.
Four categories of movement through the cemetery are also identified: 1) circular, 2) crosshatch, 3) zigzag, and 4) sporadic. The circulation line work examines the forced directional movements determined by current crypt layout, the remnants of shifted interments, and water inundation. The circular pattern on the lower left corner of the drawing traces Fishel’s path as she circles a centralized tomb stone. Following rainstorms, when the site holds water, Fishel had to walk in short, back-and-forth motions, zig-zagging across the site.

The repeated walking of the site in all-weather-events altered any presumed assumptions about access and revealed the nuisances of gentle topographic changes not mapped in the city surveys. Topographic changes that cause dramatic pooling of water lead to the beginning of design explorations to reorganize and design pathways that implement accessibility and maintain the structural integrity of the tombs.

VIDEO
Fishel’s walking routes are also documented by camera and composed into a stop animation video. It depicts the site in a brief linear format with one frame and view point per image, acquired at the rate of one image per second. As Fishel traversed the site, the horizon line remains constant as she moves from background into the foreground in a northerly direction.

The video shows the relationship between tomb density across the site and the lack of pedestrian access. It also documents movement in relationship to the irregular circulation patterns across the cemetery, the undulating topography and tomb placement. At the beginning of the video, Fishel enters the cemetery at the entrance gate stair, negotiating one meter of elevation change between the street and the cemetery. Her survey walk is from the south entrance gate to the cemetery’s north wall border (figure 03). No pathway exists across the site from north to south. After crossing American Street, the east/west road dividing the site, Fishel begins to diverge from a straight line due to raised crypts and debris. The changes in tomb density, size and pattern require adjustments to the camera orientation.

In combination with the photographic study, Fishel cataloged field observations of the site’s tombs in her sketchbook with density of paint, tone and color. Layers were constructed that mimic topograph-
ic changes in elevation and texture as a means to identify vacant space. The site's vacancy is represented as follows: White paint expresses the large groupings of organized, above-ground crypts, gray depicts the changes in stacking height, green symbolizes the grass covering the subgrade interments with tombstones and dark green swaths imply the unmarked graves in the potter’s field. The painting was layered with aerial photography to determine vacancies and tomb locations. (figure 04) The hybrid diagram confirmed massing of tombs along the edges of the site. The diagram was translated into a larger multi-media relief drawing (figure 05) for the purpose 3-D scanning and building of a 3d model (figure 06). The relief drawing mapped subtle changes in the ground plane by layering thin strips of paper to build the site’s undulating topography. Plaster formed the extruded crypt reliefs to the drawing’s surface. Paths, known entrances, and narrow trenched grass foot-paths within the site were drawn in pencil.

The topographic surface of the relief drawings’ 3d digital scan was projected into eighteen sections cut from east to west, facing north (figure 07). These sections revealed areas of open space, subgrade burials and massing located within subsurface tones. To visualize the site scale, the section lines were abstracted from the model and overlaid onto a photo collage (figure 08). Lines drape the massing of the tombs and the ground plane.
PHOTOGRAPHY

The use of photography has become a traditional tool for documenting a site. The combination of artistic photographic and compositional theories of layering images and altering opacity in the montage permits the drawings to be both objective in documentation and speculative in its potential to reveal design ideas.

Building upon the photographic stop animation conceptualization of the tombs, Fishel used the camera and montage techniques to expose the site’s degradation. She documented the natural elements (water and planting) that slowly alter the integrity and location of permanent elements, such as, crypts shifting and degrading, due to water inundation and unstable soil. (figure 09)

The montage shows the appearance of movement in the site’s vegetation in response to the effect of light and wind, within the spaces’ horizontal layers of sky and tree line, concrete burial features, and ground. (figure 10) On a fixed tripod the camera recorded light variations and weather changes over the course of a two minutes. The camera was set with a lower aperture speed and light filter. The camera captured an image every thirty seconds. This time period was chosen because it is a length of time that captures movement in greater detail rather than using the standard shutter speed, which leaves the subject clear and static. Changing the aperture during the day required the use of a set of light filters to prevent overexposure. Minor lighting issues were adjusted in the post editing of the photos. The finished images were printed onto transparencies and arranged into a triptych composition to emphasize the layering of ground, tombs, tree line and sky. The tree line and foreground are blurred due to the continuous movement during the long exposure of the image. The crypts and concrete headstones are inverted to black and white in the post-editing process. One single crypt crosses the neutral space of the triptych to emphasize its prominence within the ground plain as they subside and degrade.

Building upon the pathway movement diagrams, Fishel used the camera and montage techniques to speculate on the variety of visual experiences created by walking through the cemetery. The result was a sequence of images superimposed into one frame. (figure 11) The base photo shows the stillness of the landscape, captured with a quick shutter speed. The second photograph
traces movement of the figure and obstacles within a path. The image is taken from the same viewpoint, with a lower aperture setting and light filter. The final step in the construction of the image was to splice the photographs of the movement into the photograph of the cemetery. The montage illustrates change and rest through the use of opacity, heightening the compositions oxymoron of movement and stillness. The photographic montage superimposes many moments into one image.

**Awareness**

The speculative approach to Fishel’s drawing investigations circumvented the traditional orthographic conventions tied to collecting site inventory due to the curtail in design possibilities. Instead, Fishel’s approach used the act of drawing to generate innovative design solutions. The drawing and creation processes mimic the atmospheric qualities of site. She developed free hand notations in her sketchbook and converted the images into analog mixed-media pieces and digital-hybrid representations that revealed the site’s hidden character. A pivotal step in her inspiration for a design solution was the formation of a steadfast design strategy with relevance and social investment by the local community to maintain the stability of the cemetery over time.

The Sweet Olive Cemetery drawing investigations are essential to understanding the site’s design value and opportunity. The act of observation enhances and leads to awareness [7], which allows the making process to expose underlying issues (including meaning and narratives). Fishel’s speculative drawing techniques contributed to her discoveries about the ephemeral obstacles for site accessibility due to the existing storm-water problems. Her drawing practice defies the traditional inventory collection of exclusively downloading data to populate inventory and analysis maps.

Geographic Information, system topography, and meta-data vaguely depict the water movement on site. The meta-data delineates water draining into a swale along the east boundary and America Street. However, it ignores the ponding water
held in the interment depressions.

To visualize the complexity of hydrological pooling on site, Fishel folded paper to represent the creases in the landscape. Ink and water are introduced onto the paper which flows into the folds and absorbs in the depressions. (figure 12) The interpretive images examine the effects of hydrology and pooling water. This experimental approach documented that the site retains water and would benefit from the introduction of small swales to prevent further degradation. The physical act of folding the paper clarifies that the landscape is slowly rolling, physically shifting the internments, soil, and planting.

The outcome from the drawing investigation identified opportunities for design improvements to pedestrian access, tomb placement (the cemetery is currently at full capacity with inadequate space for new internments), and landscape elements. The design solution has four components including: access, stabilization of existing burials, new internments and the development of a spiritually functioning landscape.

Fishels’ design examination superimposes her movement (figure 02) and burial typologies diagrams (figure 01) in order to understand sensitive relationships between the existing broken elements. Inaccurate burial records of who and when people were buried and tomb degradation presents challenges for Sweet Olive Cemetery. One reason the cemetery is in a dilapidated state is the lack of income from selling any new burial plots. In the design, 2500 columbarium spaces are rented to provide a continuous income for future site maintenance and preservation of existing tombs.

The design applies a cohesive approach that interweaves pedestrian access and stormwater solutions with internments. Fishel’s maps of existing inundation and walking experiences guided her understanding of how site hydrology needs to function with tombs in the watershed and how pathways could interact with the natural and structural elements. The proposed surface drainage system channelizes storm-water runoff through a series of branching tributaries into meadow clearings that slow, store, and infiltrate water before entering the cities storm drain in the northeast corner and the access road. In the Southern Baptist faith, water represents the Baptismal dedication to the belief in Christ. In the Kongo Cosmogram, water separates the dead from the living. The site contains spiritual icons from Christianity, Judaism and Haitian Vodou and combines burial traditions influenced by New Orleans, Haiti.
and Africa. Therefore, the proposed primary paths represent the Christian Cross connecting east to west and north to south. The Kongo Cosmogram is also a cross linking the dead, the living and God at its intersection. A secondary pathway encircles the crossroads intersection, an endless path representing the immortal soul [8]. The proposed tertiary pathway traces the 1912 boundary line between the two Baptist churches burying in Sweet Olive Cemetery and interconnects the historic cemetery blocks and stacked tombs.

The prominent burial tradition in Sweet Olive Cemetery arranges tombs by stacking crypts aboveground. Realignment of the crypts provides opportunities for evaluation and repairs to structures and identification of the unknown tombs enhances discovery of ancestral connections within Baton Rouge’s African American Community. Columbarium are introduced and built into the embankments of American Street and replace the existing brick wall along the site’s western boundary. The existing topographic change from the road into the cemetery is reimagined as a set of columbarium retaining walls to maximize available space while preserving the other existing burial types. (figure 13 A-C) The new columbiums include shelving areas and alcoves to place objects including: coins, shiny metals, clock engravings, hand painted signs, artificial flowers, small stones on the tombs, watches, hats, American flags, tin cans, roosters, shells, crosses, books and magazines in plastic bags.

The stacking and relocation of internments creates a necessary ordering system for family plots that has not been in place. It also provides space for accessible pathways and retention areas for storm-water inundation as a means to prevent further damage to the tombs. Site elements, conditions, and experience would not have been understood without Fishel walking, observing and visualizing the site’s nuances.

CONCLUSION
The drawing techniques, exploration approach, and hybrid visualization of traditional and nontraditional drawing methods enhanced Fishel’s understanding of the site. Traditional landscape inventory and speculative drawing studies of the site’s conditions and cycles that shaped its degraded conditions guided the conceptual design process. Site specific questions could have been overlooked if Fishel was not physically exploring the site numerous times over several weeks. The weekly survey walks allowed for the drawing of movement, ecological edges and atmospheric conditions throughout the site. An attentive mapping process attuned her design eye to what exists on site. The subtleties of the warmth of a crypt’s
lid, the lingering smell of decomposition closer to the ground plain, and the height of plant material while crouching behind a tombstone contributed impressions that allowed for completion of the final design.

The final hybrid drawing compositions are more similar to drawing typologies from the fine arts by using mixed media, the theory of montage, transparency, and overlapping images in the iterative making process of working back and forth in the construction of the drawing over a length of time. The construction of varying investigative techniques (sketching, hybrid diagrammatic drawing, three dimensional relief drawing, digital modeling, and photographic montage) granted Fishel the ability to document the site and speculate on its potential. The intensity of interacting within the site’s built environment lead to a design solution that interpreted the cemeteries traditional forms, spatial experience and the landscape’s natural processes.

i Muscle memory is a “muscle sense” or “kinaesthetic sense,” a form of long-term procedural memory, similar to remembering how to ride a bike. But with practice the difference between memory storage and memory retrieval strengthens as the muscle brain action develops. One can remember how to draw, but may not be able to without repeated (retrieval) practice (Levitin 2002).

ii Emphasis should be on the process of creation not the end product, “when an artist produces work, his awareness expands in every direction and is amplified” (Awakara 1970 pp.30).

REFERENCES


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Figure 01. Tombs typologies inventory. A mapping of the burial dates, family plots, artifacts, burial typologies and inundation.
Figure 02. Walking hybrid map. The drawing applies unconventional representation techniques overlaid on a base map to understand the forced and irregular circulation patterns of visitors.
Figure 03. Stop Motion Video Stills. The video depicts the relationship of the tomb density across the site and the lack of pedestrian access.
Figure 04. (left) Vacancy drawing. The painting illustrates the balance between the massing of crypts and the voids of the subgrade burials (left). A map transparency is overlaid onto the painting (2nd from left).

Figure 05. (3rd from left) Relief drawings. As an enlargement and reinterpretation of the vacancy painting, the relief forms a traceable surface for 3d scanning.

Figure 06. (right) 3d model. A 3d scan of the relief drawing translated into a digital model.

Figure 07. (top right) Sections of 3d model. Section cuts from the 3d model reveal areas of open space, subgrade burials, and massing inscribed with tonal values below the surface.
Figure 08. Sections montage of tombs. Sections lines from the model are abstracted and overlaid onto a photo collage.

Figure 09. Panoramic Montage. Exposing the site’s degradation through the documentation of natural elements slowly altering the integrity and location of permanent site features.
Figure 10. Triptych. The montage shows the appearance of movement in the site’s vegetation in response to the effect of light and wind, within the spaces’ horizontal layers of sky and tree line, concrete burial features, and ground.
Figure 11. Time lapse montage. The montage shows the appearance of movement in the site’s vegetation in response to the effect of light and wind, within the spaces’ horizontal layers of sky and tree line, concrete burial features, and ground.
Figure 12. Paper model. The model uses folding, water and ink to examine the effects of hydrology and pooling water.
Figure 13A (left) Site design: Damaged graves and new circulation paths.
Figure 13B. Grave relocation and water channel development
Figure 13C. Site design. New interments, tree planting, and paving.
The Temporal Problem Of Landscape Representation

This article will discuss ways to understand spaces in the landscape that are intangible and that change over time. It will focus on scales of time and environmental change that occur over the course of a day or season, and discuss how microclimates created within the built environment are measurable, have spatial dimension, and often influence how humans engage the landscape. The issues of landscape representation have been discussed at length by theorists and practitioners within and adjacent to the field, and many have increasingly offered new modes of drawing (some of which incorporate new digital tools). This article will attempt to bring some of those discussions together while also identifying one gap that exists within the larger issues of landscape drawing: which is, how to draw space that is volumetric, but defined by both solid and invisible elements. The ultimate goal is to expand architectural drawing conventions that focus on static, solid form, in order to address phenomenal aspects of landscape space that are largely discussed, but not easily depicted or understood.

Intangible Space

Landscape architecture has long enjoyed the broad context of a field that is multifaceted in its approaches to designing the built world. As designers of the juncture between human, environmental and ecological systems, our discipline deals with the complexity of inserting physical space into a completely animate context, one that is defined by dynamic flows, shifting ground, changing climate, and human actions. As an architectural discipline, landscape architecture considers the composition of space; we do this through the manipulation of ground, vegetation, water, and structure. But the definition of space in the landscape does not begin and end with the solid frame, and it is here that the discipline moves beyond a bias towards the solid that exists for the architectures. In the landscape, spatial enclosure is rarely simply defined by a series of solid edges that meet to create walled-
in space. Spatial frames are more often layered, defined by a series of thresholds between a body, a place, and the horizon. Volumes of space may begin with the solid framework of ground, structure, and vegetation, but solid form is activated by a dynamic environment, whether it be by the movement of the sun across the sky, water over the surface of the ground, or the changes of climate that cycle across seasons. This activation creates figures of space that are intangible and dynamic, but are also volumetric and dimensional. Environmental phenomena create thickened spaces that we perceive, respond to, and occupy. Phenomenal space can be defined by climatic phenomena: pockets where we perceive shifts or gradients in the light, temperature, humidity, wind, or sound. These spaces have edges, but they are processed by our senses, and as such are understood as complex, or atmospheric. Because of this, some of the dynamic spatial matter that is at the core of defining landscape space is omitted from the drawings we use to define and portray the spatial dimensions of the landscape.

This paper will examine the discussion of temporal phenomena in the field of landscape architecture and our ability to represent it. Modes of representation have been evolving away from architectural conventions for the last twenty years, with a recent acceleration due to new tools for computational drawing, sensory monitoring, and dynamic simulation. The focus here will be on how theorists and practitioners have discussed the limitations of architectural modes of representation when it comes to representing landscape space, how new modes of experimentation seek to reveal hidden aspects of the landscape, and finally, how some of these hidden phenomena should be expanded to understand the relationship between the body and intangible space in the landscape.

The Representation of Temporality
The complexities of landscape space and the representational difficulties that follow have been discussed from multiple perspectives
within the field, many of which have focused on the elusiveness of describing something that changes over scale, over time, and that is often understood through personal values and individual experience. Theorists such as James Corner have discussed the role of temporality, spatiality and materiality in defining the unique character of landscape space, and in making it difficult to comprehend. As discussed by Jackie Bowring and Simon Swaffield ‘landscape architecture is a profoundly phenomenological enterprise, and its most compelling and significant achievements are often intangible, experiential and multi-sensory, though they add that the ‘emotive components of landscape architecture’ evade our capacities to diagram or represent the landscape. Dynamic phenomena in the environment interact with built form and influence how humans move through space and play a significant role in shaping the public realm. And though we sense and are affected by changes in light, shadow, wind, and humidity, as designers we are equipped with a limited tool set when it comes to drawing these elements with the same consideration we give to solid forms: with shape and dimension, and with material thickness and quality. This is largely because our methods for orthographic and perspectival drawing come from architectural conventions, where preference is given to the static building frame, and where the interaction of built form with the environment is less important. Without the ability to draw microclimatic space, we are limited in our capacity as designers to shape and communicate the essential spatial qualities of the landscape.

Traditional methods of representation are insufficient for describing the core relationships in landscape: between form, material, and process, between frame, phenomena, and multi-dimensional space. The limitations of techniques in representation have been largely discussed in the writings of James Corner, Julia Czerniak, Christoph Girot, Stan Alen and others, and have been cited as limiting our ability to broaden and diversify the modes of landscape practice. In her
essay, *Challenging the Pictorial: Recent Landscape Practice*, Czerniak sites the dominance of the pictorial images as relegating landscape to the scenographic, and states that ‘pictorial versions of landscape practice compose the landscape as an autonomous object intended to stimulate the eye’ and ‘to view landscape as a picture neglects the temporal, experiential, material as well as scientific aspects of a project.’ This emphasis on the visual, and exclusion of temporal and experiential, is true of our most fundamental tools of practice. Orthographic drawings, while acting as our most comprehensive tool set, as well as the vehicle for translating landscape works from conception to construction, work most effectively at the scale of architecture. Further, orthographic drawings depict the physical reality of solid form at one given moment in time. The experiential phenomena of material and environments, when included, are rendered as textural and atmospheric, rather than as dimensional or spatial. As a result, these too become considerations for ‘stimulating the eye.’ Non-orthographic methods of representation go further to address the dimensions of experience and time. Alen points out that notational methods, such as those used by Lawrence Halprin, Kevin Lynch and Donald Appleyard ‘go beyond the visible to engage the invisible aspects of architecture…and include time as a variable…interval, duration, and tempo, acceleration and accumulations are the key variables in notational schema.’ Notational drawings such as these provide a compositional and syntactic structure of temporal sequence through space, and replace a visual reading of spatial depth and dimension with qualitative spatial readings that mark space as a product of time, sequence and movement. However, these notational drawings, while creating a methodology for being specific about the composition of experience, omit the volumetric qualities of space, and here then we lose the synergy between temporal and spatial understanding. Representational methods such as montage, photographic sequences or collages begin to link spatial volume and time by conveying both depth and rhythm through
overlap, contrast and transparency, and have the ability to depict a duration, unit or episode of time.

James Corner, in *Eidetic Operations and New Landscapes*, calls designers to redefine modes of representation as they are not only our means for communicating and defining landscape, but for generating new understandings of the spatial, material, and temporal qualities of the landscape. As he states: ‘how one “images” the world literally conditions how reality is both conceptualized and shaped.’ There are examples of work that begins to do this: Corner’s work with aerial photographer Alex MacLean, or the analytical drawings of Dilip Da Cunha and Anuradha Mathur. These designers have pioneered methods of composite drawing that pair orthographic, measured, and expansive projections of landscape with material, textural, or cultural images of landscapes. These drawings are largely successful because they refuse to represent landscape as a singularity, whether it be through a pictorial impression that positions landscape as a scene, or setting, or through orthographic dissections that cannot resolve landscape spatiality with landscape scale. Their common technique is the pairing and overlapping of multiple drawing types and measures in order to create a more comprehensive ‘image’ of landscape. As Corner states in his essay: “Imaging has a metaphoric agency in that the bringing together of two or more elements fosters a host of associative possibilities.” These composite drawings link the relationship between ‘human economy’ as Corner puts it, and landscape process, form and scale. But these drawings, in emphasizing the systematic and the regional, tend to lose specific measures of volumetric space. There is a tendency now in landscape education and practice, partially due to the availability of programs such as ArcGIS that make vector information of regional systems immediately available as a drawing input, to create a beautiful systems-based image, and to use the magnitude of scale as a substitute for spatial depth. These drawings remove landscape from a scale that
is cognitive, and understood through human experience, immediately rendering it as abstract, or as a conceptual framework. Landscape cannot be understood completely as a diagram, or as a metaphor for human and environmental relationships, that is to say, it is not only defined by notions of system, process and culture; it is also the physical space in which these relationships are realized. It is both described by and acted upon by environmental dynamics, but it also has materiality, depth, thickness, volume, all of which can be detected at the scale of the human body.

The Body Observing Space
If we are to continue to unpack the complexity of landscape space, we will need to find a language for the intangible, invisible, and dynamic sensory phenomena that not only animate the landscape, but create volumes of space that move and mutate as the solid environment responds to its climatic context. Understanding the space that lands not just within, but immediately beyond the solid frame, is incredibly important. A sense of interiority in outside spaces comes not only from planted frame, wall, landform and ground plane, but also from projected volumes of shade, pockets of protection from the wind, gradients in temperature of the air or on the surface of materials, and other transitions our body can sense in the invisible void of space. As we engage space, our bodies act as a datum to register these changes, to recognize climatic volumes, gradients, and edges. Through memory, we are able not only to sense these changes, but to form impressions of these spaces as they transform over time. As noted by Kevin Lynch, landscape space is understood through multiple readings taken by the body over time, and change in the environment is recorded through the layering of contrasting images and impressions in our memory. Lynch goes on to note that perceiving contrast in space and form is a ‘primitive way of sensing time’11. In this way our perceptions of both time and of microclimatic phenomena are linked to our bodies ability to sense change as we move through space,
and as space changes around us. In his book, *Eyes of the Skin, Architecture and the Senses*, Juhani Pallasmaa discusses in great detail the relationship between the body and spatial perception. As Pallasmaa states, ‘our bodies and movements are in constant interaction with the environment; the world and the self inform and redefine each other constantly. The percept of the body and the image of the world turn into one single continuous existential experience.’ The emphasis here on a synergy between the body and the environment, heightens the need to establish measures that can depict not only the dimensions of phenomenal space, but also the dimensions created by our perception-of-and-movement through landscape space.

New drawing practices can begin by understanding that the human body both receives and translates sensory inputs from the physical environment into spatial understanding. And here we get back to a few of the underlying issues with landscape representation: many of our drawing conventions are based on fixed dimensions, which preference the interrelationship of solid objects in an objectively ordered and measured world. New practices for landscape representation that unpack what we understand of the world through sensory (visual and non-visual) perception are necessary if we are to express the understanding we have, as designers, of landscape complexity, and if we are to unbind it from ambiguity, or from being narrowly defined by those who do not understand the breadth and dimension of landscape space. To be certain, methods for experiential mapping (such as the afore mentioned methods of Kevin Lynch and David Applebaum), exist and provide a basis for systematically recording observations in the landscape. What is missing, or where the potential remains, is in adding an understanding of the *volumetric* and the *dimensional* to these recordings of space.

The way we define dimension is a starting point for breaking open our understanding of invisible space. In developing new measures to
describe landscape phenomena, it is important to understand that landscape architecture is defined by both universal (Cartesian) and relative (perceptual and individual) dimensions. Through fixed, proportional, or unit-based dimensions, we understand the measure of space, and have a system for ordering the relationship between physical objects as they are distributed horizontally and vertically through the world. Through relative dimensions, we add the comprehension of the body and mind as it moves through the physical world, experiences changes in the environment, and registers the active and dynamic forces that are constantly shifting the world over time. These relative spatial dimensions move beyond our physical perception, and are defined by our sensory and temporal perception. Through these dimensions, landscape is not only objectively defined by a physical armature, but by environmental process, phenomena, time, bodily movement, and memory. Further, the dimensions of invisible space are created both by solid boundaries and by invisible boundaries that can be perceived and marked through our senses. Sensory edges are created by the rapid transitions that mark the boundaries of microclimatic volumes. These are the visible and also palpable edges of volumes of shade, of pockets of air protected from wind, or from direct sunlight. Sensory gradients mark the gradual attenuations in phenomena such as temperature, light, and humidity, that give invisible spatial volumes a thickness, and that our bodies react to more slowly as we acclimate to slight changes in the quality of air. This ephemeral matter works alongside material qualities such as texture, transparency, and color, as well as dimensional qualities of scale and distance, to create the feeling of a space. This sense of space, however complex, and however dynamic, does not need to be treated as ambiguous or atmospheric. It should be further explored if we are to fully represent how space is created in the landscape, and how temporality and change over time is embedded in the way we perceive it.

Architects and designers such as Sean Lally
and Michelle Addington have explored the relationship between the sensory capacity of the human body and the potential for rethinking the architectural definition of space. For both Lally and Addington, the limitation of architectural space is that it relies on solid surfaces, and not thermodynamic or energy-based envelopes to define spatial enclosure. In this, their desire to expand the definition of architectural space aligns with fundamental qualities of landscape space. That is to say, it is defined both by solid surfaces and by phenomenal envelopes that can be perceived by the human body. As noted by Lally, ‘the sensory perception of the human body creates a type of interiority that the body resides in, lodged among the surrounding context, because the select amount of information it is capable of detecting is only part of a much larger spectrum.’ Both Lally and Addington acknowledge the ability of the body to sense rapid changes in phenomena such as light, temperature, and humidity, and that with this ability, bodies are able to detect and mark envelopes of space that are not solely defined by the solid surface. As Addington mentions in her essay *The Phenomena of the Non-Visual*, ‘our sensory systems activate only in the presence of change, and our cognitive awareness of heat, light or sound is not of the environment at all, but of the manner in which our own bodies are reacting to the environment.’ There is a great deal of potential here in understanding how the body perceives changes in the environment that mark the boundaries of microclimatic spatial envelopes. In the landscape, it opens up the possibility of then studying how these envelopes change over the course of the day, observed through the ability of the human body to perceive these changes using our senses.

**New Techniques for Revealing Change**

Increasingly there are examples of landscape designers and theorists beginning to explore responsive and sensory based technologies as a way of studying and revealing the hidden dynamics of the landscape. The recent publication *Responsive Landscapes* by Bradley
Cantrell and Justine Holzman catalogues a range of applications for computational technologies, from simulating the behaviors of large scale landscape systems, to sensing small scale changes in microclimatic environments and translating them into a visual and spatial output. These technologies have the potential to serve as tools to observe and visualize the volumetric phenomena that defines space in the landscape, but as discussed above, these phenomena mark space that is then processed and understood by the human body. In this way, our observation and visualization of the microclimatic envelope should not be disconnected from our own bodily tools of experiential observation. The exciting question here then is whether combining the empirical, the technological, and the experiential can lead us not only to new methods for observing landscape dynamics, but new understandings of how the complex interactions of environmental systems, solid form, and the human body create space in the landscape.

Endnotes
5 For examples see: Appleyard, D., K. Lynch, and J. R. Myer. 1964. The View From the Road. MIT press Cambridge, MA.
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For examples see:

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The mountain ranges, the valleys, and the great waters of America, all trend north and south, not east and west. An arbitrary political line may divide the north part from the south part, but there is no such line in nature: there can be none, socially. [1]

Deciphering the origins of cities and unraveling their evolution and life-processes are not only legitimate and attractive inquiries, but indispensable ones for every student of civics. [2]

Hindsight discerns a common theme, astonishingly consistent. [3]

Abstract
This paper flows from two propositions: that sites and settings are interdependent, and understanding how and why is inspiring and empowering. It draws on the work of Glasgow native and landscape architect Ian McHarg and
Scottish biologist and town planner Patrick Geddes. Although separated in age by nearly half a century, their shared belief in the importance of regional knowledge to local design and planning led to parallels in their work relative to subject matter and approach. Rooted in previous research by the author, who like McHarg and Geddes views cities as complex ecologies interwoven with their larger landscape contexts, the paper presents the preliminary groundwork for a comparative study of Glasgow and Philadelphia using a regionalist lens. The scope and timing of the study is especially significant given the forthcoming semi-centennial of *Design with Nature* in 2019, which set forth the foundational method for contemporary GIS and geodesign. Intended outcomes include enhanced understandings of the pioneering contributions of McHarg and Geddes to visualization in landscape architecture.

**Introduction**

In the reading room of Rutgers University Special Collections, there is a small yet magnificent representation of the Colonial New Jersey landscape in the form of a manuscript map (Figure 1). Compiled from various sources by Edinburgh native John Reid [4], the map depicts the extent of settlement in the estuary of the Raritan River in 1695, around the time the lands passed into the possession of its original English proprietors [5]. The map view, up river with north to the right, stretches westward roughly thirty miles (48 kilometers), sufficient to capture the ‘rarachon,’ or fork of tributaries, from which the river derives its name. Visible in the upper left corner is a portion of a longer line, the northwest running Keith Line, which nine years earlier divided the original Province of New Jersey into two smaller ones. Below and along the river’s length, an open geometry of riparian plots secures opposing banks. Channel relief, where known and critical, is indicated in the style of representation characteristic of the day -- with soundings in fathoms.

Onward from the early seventeenth century, transformations to the American landscape
were organized and recorded in maps, written records, and drawings, as well as in the structure of the land itself. Relief representations, such as the Reid map, provide for us not only potent datums for understanding regional landscape evolution and change, but useful instruments in its heuristic deconstruction.

My own journey of discovery with period relief maps and the Reid map specifically, began where journeys often do — by way of a detour. The detour was through an earlier study, which explored a contemporary reformulation of John Wesley Powell’s commonwealth approach [6]. In the late nineteenth century while serving as director of the United States Geological Survey, Powell authored his now famous “Report on the Lands of the Arid Region,” which assesses the quality of lands west of the 100th meridian [7]. In the United States, the 100th meridian demarcates the east-west boundary between humid and arid lands; that is, those that receive sufficient moisture from rainfall and those which irrigation for agriculture. Powell’s revolutionary approach to landscape management for arid lands urged the creation of a system of self-governing hydrographic districts— or commonwealths — empowered to make water resource decisions.

Using Powell’s call to action as a starting point, my study involved the development of a series of speculative maps, which realigned the political landscape of the United States co-extensive with its water resource base. This mapping entailed ‘erasing’ the boundaries of the existing fifty states and redistricting the land into a network of eighty-six smaller territories corresponding to the natural drainage areas of major rivers. In addition to illuminating conflicts between the resource geography of water and human settlement at the national scale, this exercise invited both archival work and personal reflection at the watershed scale; activities which brought with them different rewards. Chief among these was the opportunity to return to the rivers of my youth and to study their distinctive settlement histories more closely.
I’ve been thinking about landscapes for nearly all of my life and skillfully, perhaps, for about the last thirty years. My earliest landscapes were those of coastal New Jersey, and the ones I knew most intimately were borne of necessity and made by hand. The first landscapes that I studied, in any formal way, were painted ones. Yet, it was through their study that I recognized something that I perceived much earlier: that a region could gain a certain coherence through the simple presence of a river.

That river, my river, was the Shrewsbury, an eight-mile (13 km) northward-running estuary, protected on its eastern side from the Atlantic Ocean by a barrier peninsula, which joins the larger eastward draining Raritan River south of Staten Island at Sandy Hook Bay. In the mid-1950s, my father moved our family from an inland town to a hillside cottage overlooking the Shrewsbury. It was there, on and around the river’s highlands, situated within a larger system of bays, inlets, and other coastal landforms, that I was provided the resources to develop certain geographical understandings, which impressed upon me, in time and space, a world in context. Fundamental to these understandings was the relationship between a town, a brow of land -- the highest along the eastern seaboard -- and a larger, visible metropolitan region; an appreciation of the interdependence of place and landscape.

The Raritan estuary played an important role in the development of this regional thinking and wondering. Situated mid-way between New York and Philadelphia, and draining more than 1,100 square-miles (2,850 k²) the Raritan is rich in ecological variety and historic incident. Accessible to Atlantic coastline at Lower New York Bay, the river formed the backbone an elaborate network of water, rail, and highway routes, which both enabled and epitomized the region’s natural and cultural evolution [8]. It was an evolution I learned first-hand. Nearly thirty years ago as a Manhattan-bound commuter, I
crossed the mouth of the Raritan twice each day, from and to my home in New Jersey and, for as many years, remained curious of its progress eastward across the state and the stories of its settlement westward, in the opposite direction. In effect, reading the same river twice. The legacy of Reid’s representation of city and countryside, like those of fellow Scotsmen Ian McHarg and Patrick Geddes, remain today invaluable for understanding and visualizing both these narratives.

Retrospect
Individuals from the Scottish Highlands have profoundly influenced how humans perceive and understand their surroundings. James Hutton and Charles Lyell largely established modern geology; David Hume and Adam Smith the underpinnings of contemporary economics. The Scottish-Americans John Muir and Ian McHarg loom large in the environmental movement. So too does Perth native Patrick Geddes who, among other things, helped to establish the profession of town planning and, in doing so, brought considerable attention to the importance of both ecology and the arts in everyday life.

A renowned writer on regional planning using natural systems, Ian McHarg was the founder of the department of landscape architecture at the University of Pennsylvania in Philadelphia. From his home in Clydebank (Greater Glasgow), McHarg explored the surrounding Scottish countryside; discovering its restorative powers as a remedy to the effects of late nineteenth and early twentieth century urban industrialization. McHarg drew on these formative experiences to produce his seminal Design with Nature [9], which pioneered the concept of ecological planning, and later documented the inspiration of the larger Clyde Valley Region in his autobiography A Quest for Life [10]. Ecological planning theory contends that the actions of designers and planners should be guided by knowledge generated from a thorough biophysical and sociocultural analysis of a place. Reasoning that places—cities, towns, estuaries,
woodlands—-are best appreciated through knowledge of their physical evolution, McHarg utilized a bottom-up, oldest-to-youngest system of landscape inventory and analysis. By focusing on interactions among sequentially occurring layers of landscape phenomena (e.g., climate, geology, hydrology, soils, vegetation, wildlife, human settlement, current land use, politics), ecological analysis illuminates not only how places came to be, but how they function and evolve.

Writing fifty years before McHarg, Patrick Geddes too saw the realities of city and countryside as intertwined. His distinctive contribution to the development of regional planning theory not only stressed the interaction between the environment, economic activity, and community (bioregionalism), but the importance of first-hand landscape observation in the education of citizens. Bioregionalism focuses on the construction of sustainable relationships with the environment, building awareness of the ecology, economy, and culture of the place where one lives (bioregion), and committing to processes of decision-making that conserve and enhance them. Often, bioregions are organized around catchments (also called drainage basins and watersheds). “Deciphering the origins of cities and unraveling their evolution and life-processes,” wrote Geddes, “are not only legitimate and attractive inquiries, but indispensable ones for every student of civics” [11]. In addition to his numerous works and plans, Geddes materialized his conviction to citizen empowerment in the architecture of Edinburgh’s Outlook Tower; a life-size aperture that contextualized ‘the civic-self’ within a series of increasingly scaled spatial relationships, from the local to the global.

Both McHarg and Geddes believed culture revealed itself in the configurations of landscape, and that understanding the order and evolution inherent in these configurations was fundamental knowledge for designers and citizens alike. In turn, each endeavored to reveal the complexities of landscapes through various media, including
maps, drawings, text, found objects and, in the case of McHarg, through photography. McHarg and Geddes’ formative years exploring the Scottish countryside -- and particularly the catchments of the Clyde and the Tay Rivers -- foreshadowed their respective contributions and their fascination with the use of transects to understanding landscape change (Figure 2). McHarg’s later studies within the watershed of the Delaware River also proved seminal in this regard. Encompassing more than 13,500 square-miles (34,965 k$^2$) in four states (Delaware, New Jersey, New York and Pennsylvania), the watershed of the Delaware River is a complex, ecologically diverse natural system, which includes the longest undammed river east of the Mississippi. More than five percent of the current U.S. population (nearly 15 million people) obtain their drinking water from the basin, including residents of Philadelphia and half the population of New York City [12].

Rutgers Special Collections is a vast repository for documents, maps and ephemera depicting the state throughout its history. The Sinclair Collection, the university’s largest and most comprehensive, contains items of rare, unique, and specialized nature including an archive of original and printed manuscript maps, which are kept in two large vaults off a special reading room. My recent detour through the Sinclair Collection in the name of Powell was actually my second visit in the context of river research. The earlier visit, in the fall of 2000, followed a year-long fellowship studying landscape transformations within Italy’s Sarno basin, and focused on a desire to undertake a transect study of the Raritan basin.

Transect mapping is a traditional means of scientific sampling used to study landscapes in flux and to detect patterns and change along environmental gradients. Guided by a fixed path, observers collect samples at select intervals or count the occurrence of specific phenomena. The interdisciplinary usefulness of transect-based inventory and analysis extends broadly
and includes biology, ecology, and archaeology, to name a few. The evolution of transect mapping and its application in contemporary design and planning has been extensively discussed by Duany and Talen [13]. Contemporary landscape architects, architects, and city planners all use tactical variations on the transect or section to reveal patterns or array changes in density or type. By illustrating the division between air and ground, transects can serve as organizational datums for understanding landscape phenomena vertically as well as horizontally; enabling the analysis of prepositional relationships among elements and conditions above, along and below surfaces. Landscape historian J.B. Jackson used a modified version of the transect to juxtapose his insights with the generic components of a Western town [14]. English architect Gordon Cullen advocated the value of serial vision as an organizing device for exploring settlement patterns [15]. Journalist Grady Clay described the value of the cross-section method to his study of American cities [16]. Transect studies have a deep Scottish heritage, tracing back to Geddes’ iconic ‘Valley Section,’ which illuminated human adaptations relative to landscape change: situating a series of behaviors, such as fishing and mining, in response to the opportunities afforded by a region’s natural components and conditions [17] (Figure 3).

While in Italy, I developed and deployed an adapted version of transect mapping to read and represent city/countryside interdependencies. The approach, which I call field walking, utilizes a fixed reference, such as a line or a topographic contour, as a datum against which variations in environmental conditions can be perceived [18]. In the intervening years, I have engaged in modified versions of field walking, both alone and with teams of students, through neighborhoods, urban districts, and watersheds/catchments, and exhibited the results in several venues across the United States. These walks, which engaged the use of datums such as lines of latitude and topographic contours, included the Sarno Valley; metropolitan Phoenix, Arizona; the San Pedro
Basin on the US/Mexico border; the City of Columbus, Ohio; the District of Columbia, and within the watershed of New Jersey’s Raritan River. The application and value of field walking to landscape interpretation, and particularly the usefulness of the method to the study of time-transgressive surfaces — one where age varies across horizontal space — was the subject of two recent publications [19] [20]. By juxtaposing the ordered with the unknown, line walking encourages me to set aside usual habits of reading a landscape — landform, vegetation, structure — and to wonder instead about connections between events and conditions; between the creators, inhabitants and custodians that previously I would have considered as disconnected or unrelated [21].

Within the Raritan watershed, my process of field walking was also inspired by the art of memory. In antiquity, memory was an art practiced by orators as an aid in remembering speeches with accuracy. Thinking of myself as a student of memory, moving in geographical imagination, my Raritan study entailed reading the watershed in a sequence of stages — along a single line of latitude — and recording the river as seen through the eyes of geographically separate landscape observers/custodians. Five points provided the loci for the work: a bayside subdivision, an urban schoolyard, a floodplain forest, an upland meadow, and a highland plateau. By superimposing a collective horizontal plot across five vertical ones, the work dramatized the often strange but imperative interdependence of people and conditions in a regional landscape (Figure 4).

Patrick Geddes cultivated a deep knowledge and appreciation of landscape in a youth spent equally in library and field; settings which together proved foundational to his views about biology, sociology, and town and regional planning. Macdonald [22] links Geddes’ worldview and his subsequent town and regional planning theories to Scottish generalist traditions; a distinctive intellectual context, which
emphasized direct observation in the appreciation of interdependencies between art and science. His boyhood home overlooking the River Tay, provided a prospect and datum for observing the natural and constructed systems of countryside and city [23]. These same surroundings, in time, provoked questions of identity, and heritage, and civic responsibility, which Geddes provisionally answered and summarized in his own life motto: vivendo discimus, “by living we learn.”

Like Geddes, McHarg’s worldview was largely shaped by boyhood journeys within the Scottish countryside and what he observed of the interplay between the tangibility of cities and the endowments of their regions. For McHarg, that formative region was that of the Clyde Valley. Its river, the third longest in Scotland, flows over one hundred miles through the country’s most populous area, draining roughly 1,300 square-miles (3367 k²) of wild, cultivated, and urban land, across four counties, and eight council districts; dropping 2,000 feet (609 m) from upland to estuary. Similarly, McHarg’s sensibilities might well owe themselves to Scottish generalist traditions, and particularly his embrace of ecology as both source and guide for planning and design. Like Geddes, McHarg was also influenced by the writings of Charles Darwin, but perhaps even more by Harvard scientist and philosopher Lawrence Henderson, whose theory of mutual adaptation inspired McHarg’s belief in the methodical reading of a place as a means to reveal what he called its “intrinsic suitabilities.”

Prospect
One of my goals as an educator is to encourage students to appreciate the role of landscape architecture relative to broader environmental and social contexts. Within the design studio, as well as my academic practice, I address this agenda by probing analogous cultural artifacts as a means to develop the language and processes that aid in the generation of landscape architectural expression. Useful artifacts have included cemeteries and memorials. My current vehicle to address this agenda is
through techniques of landscape visualization. By visualizations, I mean representations of landscape objects and processes—past, present, and future; in other words, what was, what is, and what could be. Since the actions of disciplines and professions concerned with the design and planning of the physical environment (architecture, landscape architecture, planning), reconfigure the environment using both physical and conceptual means, incumbent upon us is understanding and visualizing the web of interrelationships that exist between sites and their larger physical, cultural, and environmental settings [24].

Within the Zimmerli Collection of American Art at Rutgers, another work of landscape representation helps me to order events in space and time (Figure 5). The work, a painting by nineteenth century American luminist John Frederick Kensett, depicts the calm, flat estuary landscape of the Shrewsbury River juxtaposed by the wooded promontory of the Navesink Highlands. Influenced by Thomas Cole’s Hudson River School, luminists were a fraternity of city-based landscape painters distinct in their interest in quietism and the poetic experience of nature [25]. Best known for upstate New York landscapes and seascapes of coastal New Jersey and Long Island, Kensett explored the transcendental qualities of nature present in radiant light, serene surfaces and less dramatic topography.

Deciphering the pioneering contributions of McHarg and Geddes to landscape visualization raises potentially interesting questions about the nature of the circumstances — the places — that inspired their work. Among these are the importance of field study to environmental awareness, and a belief in the power of our senses to connect us with our surroundings, and of art to help us see and appreciate what is already there. Kensett’s spare composition of the ordinary and extraordinary landscape of my youth provides another touchstone in my journey.
Conclusion

Back in Special Collections, an exhibition of early drawings by Richard Serra. The drawings — as much products as heuristics — explore weight and gravity, space and scale, shape and form, and evoke other images of what Serra and fellow arts of his era were questioning: the essence of the material they were working with — its limits and its potentials (Figure 6). Although no longer radical, letting the nature of a material in some way dictate the form of the work remains for me a powerful idea.

Endnotes


References


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**Illustrations**

Figure 1: 1685. “A Mapp of Rariton River, Milstone River, South River, Boundbrook, Greenbrook & Cedar brook with Plantations thereupon.” J. Reid, delineator; R. Simson, sculptor. United States Library of Congress, Geography and Map Division. (http://www.loc.gov/)

Figure 2: 1888. Plan & Section of the River Clyde and Firth. W. J. Millar’s *The Clyde from Its Source to the Sea, Its Development as a Navigable River, the Rise and Progress of Marine Engineering and Shipbuilding on Its Banks, and the Leading Historical, Geological, and Meteorological Features of the Valley*. London: Blackie & Son.


Figure 4: 2000. Same River Twice (photograph of installation). American Academy in Rome. L. McSherry.

Figure 5: 1853. “View of the Shrewsbury River, New Jersey.” J. Kensett, painter. Rutgers University Zimmerli Museum. (http://www.zimmerlimuseum.rutgers.edu/big-ten-art#)

Introduction
In many post-industrial cities economic, technological, social and industrial reforms have resulted in the decline of their waterfronts \cite{1} \cite{2} \cite{3} and consequently left these spaces unused and forming eyesores \cite{4} \cite{5}. In the 1960's the concept of urban waterfront development began and became popular through the 1980s \cite{6} and up to today.
The urban renaissance in post-industrial waterfront cities has produced many successful regeneration examples and has transformed many derelict brownfield and contaminated inner-city waterfront areas globally \cite{7} \cite{8}. These also provide high quality urban open spaces that can promote health and wellbeing and prevent disease \cite{9} \cite{10}. Nowadays termed ‘urban blue spaces’ or ‘urban blue infrastructure’ as a complement to green space/green infrastructure within the broad spectrum of landscape architecture, they have gained importance because of their environmental health and wellbeing benefits and high restorative potential \cite{11} \cite{12} \cite{13}.

Urban blue spaces take various forms and scales with different biophysical settings and offering a range of functions (Figure 1). Here we define blue spaces as outdoor environments - either natural or manmade - that prominently feature water and are accessible to people either proximally (being in, on, or near water) or distally/virtually (being able to see, hear or otherwise sense water). Waterfront blue spaces are a unique in that here the land, water, air, sun, and green interact \cite{14}. Waterfront development has been proved to be successful in restoring civic attributes by reconnecting the city to the water edge \cite{15}. Moreover, urban waterfronts create a sense of place with therapeutic effects in congested urban areas \cite{16}.

1. Successful place-making in urban blue space settings
According to Garcia et al. \cite{17} the success of an ‘urban blue place’ can be determined through its spatial, social and visual aspects but it is...
also influenced by the context of the socio-political and economic condition, local and global pressures, physical and spatial qualities as well as planning and design approaches towards place-making. Successful place-making, based on normative theories, is addressed through two approaches: physical characteristics with relevance to urban design and the process of social interaction with relevance to planning. It can be assumed that physical characteristics of the place significantly influence the users depending on the way they interact with it and certain collective social characteristics concerning cultural values embedded within the place.

2. Justification and Research Gaps
This paper presents a systematically-undertaken review of waterfront development projects as a preliminary step towards addressing a number of research gaps: 1) there is a lack of evidence of how to identify the precise factors that promote health benefits and prevent disease associated with specific blue infrastructure; 2) there is no evidence of the influence of blue space factors such as environment type, scale, form of waterbody, impact of geographical location, effect of climate, type of exposure, views and interaction within the blue space on mental health benefits. For the purpose of this research, and based on the classification of human exposure to natural environment i.e. intentional, indirect and incidental, we assume that people need to be able to get close to the water to obtain all of the proximal and distal benefits of blue space.

Methods
The project review looked for the key elements of a successful blue space intervention in terms of the landscape and urban design qualities, potential for physical activities and mental health and well-being, universal accessibility, means of interaction with water, place affordances for social and physical activities, microclimate effects, and thermal comfort, maintenance and safety and security within the blue space. These domains were selected from several
urban public green/blue place evaluation tools. A large number and wide range of relatively recent projects (n=172) which had the aim of redeveloping or rejuvenating blue spaces for improved public use and become established and well-used spaces within their local or regional urban setting were reviewed.

1. The concept of the project review and search method
For the assessment we used an informed criticism method \[20\] to perform the equivalent of peer-review similar to other scientific disciplines. It included expert evaluated design competition entries, annual award schemes and projects assessed by juries and peer review. Professional (and some scientific) landscape architecture journals were searched for suitable projects. These included those of the professional organisations in the USA, UK, Canada, Australia, China, and Denmark as well as several specialised magazines published for the profession and which feature critical reviews of projects from around the world. In addition, some recently published books (in English and German) were used where some projects were also critically reviewed.

2. Classification and review of projects
After the selection of the projects, an initial classification was carried according to a number of key features, then each was reviewed by an expert panel of landscape architects and academic staff at the department of Landscape Architecture at the Estonian University of Life Sciences. The key project features included: 1) the location (country) 2) type of owner, 3) year of completion, 4) blue space types, 5) type(s) of water-land interface, 6) type of built environment, 7) scale of impact, 8) scale or size of the project, 9) type of intervention, 10) location in rural-urban gradient, 11) visibility and openness, 12) perception and meaning, 13) health and well-being, and 14) type of interaction with water. The main characteristics of the projects reviewed were summarised and presented as a set of bar charts.
Results
The location of the projects (Figure 2) shows a focus in the USA, Australia, Canada and some European countries but also a very wide range of countries. It shows a representative pattern of projects which already received critical acclaim and tend to be located in countries with strong planning and landscape architecture professions where high quality work is the norm. The pattern of ownership shows that the vast majority are under public ownership and very few privately owned. This suggests that public investment is especially common in the case of waterfront projects. Regarding the number of projects built in the last three decades, there has been a steady increase in projects built since 2004. It is clear that waterfronts have become high on the policy and planning agendas.

Figure 3 shows that redevelopment of former harbours on rivers or at the coast stands out as being the most common, followed by those developed on natural lakes, along with ornamental water features in urban areas. This shows that revitalisation projects for inner city brownfield sites, restoration of abandoned urban blue spaces for recreation sites and ornamental water features as city beautification projects have been providing urban dwellers with the opportunity of closer access to water.

Figure 4 shows that half of all projects reviewed are in heavily built-up parts of the city where improved accessibility to water can be considered as an extremely valuable addition to the public space infrastructure. The review also found that many projects have more than one land-water interface types (Figure 5). Promenades, riprap edging, harbours and piers were found to be common land-water interface types preventing direct access to water – but often the water was not safe to enter in any case. Other interface types such as beaches, terraces, steps and promenades offer direct access to the water but were much less common. Such interventions can also be linked to the water quality and aim to create a closer connection to the water, if not
physically then at least visually.

Many of the projects reviewed were found to have impact at the micro and meso-scale, being targeted at very local places and neighbourhoods. Others were large projects where the impact could be beyond the city and a number had become a destination for tourists (the international scale of impact). In terms of the scale and size of the projects, the review shows that projects ranged from single unique water features or a small single object to promenades several kilometres in length and large wetland parks of several hectares in area.

When looking at climatic zones (Figure 6) of the project sites, using the Köppen-Geiger classification, two zones in particular stand out: Cfb (temperate oceanic climate covering large part of Western Europe and the coastal USA) and Dfb (warm-summer humid continental climate covering continental Europe, parts of China and the USA). A vast majority of the projects were found to be located within inner urban areas reflecting the prevalence of dockland development, coastal towns and rivers running through cities.

Based on a set of categories of intervention types, (Figure 7) there were sometimes several for a single project, so they were ranked in order of importance in terms of the main type. The frequency distribution of types clearly suggested that the projects were built primarily for outdoor recreation and public green/open space regeneration, while other secondary objectives such as urban waterfront restoration, urban design, and habitat restoration also played a crucial role. This results suggest that the planners and designers had a good vision for the area and wanted to include many objectives and to obtain a good synergy between the different interests involved.

The general health and wellbeing possibilities (Figure 8) within the projects were assessed based on the character, atmosphere and
possibilities for increased physical exercise, mental wellbeing, stress reduction and mental restoration. It was found that the projects were often designed so that new activities could be incorporated and places were left free of specific elements allow this. Increased physical activity, aesthetic experience and increased social interaction and restorativeness were found to be other important health and well-being benefits the projects provided.

The ways in which people can interact with water varied with location, type of project, water quality and the structure of the water-land interface; direct access to water was not always possible. Figure 9 shows how in a majority projects water is only visually accessible, while lesser number also allow some physical interaction such as dipping a hand or foot in the water or feeling spray from a fountain. A little under half actually allow full immersion in the water.

**Design guidance for successful waterfront place-making based on detailed project assessment**

Based on the assessment of the factors contributing to the success of the blue space projects a number of criteria for delivering high quality and successful blue spaces were identified:

**General landscape and urban design aspects leading to spatial quality**

- View to the water, the land-water interface, how the design incorporates the presence of water, suitability of the design (i.e. elements, materials) to the place context, and the place affordances;
- Use of specific features or set of features as a major part of the design concept;
- Use of the unique character of the place eg. elements salvaged from the site including cranes, railway tracks, bollards etc.;
- New or restored identity of the place;
- Contemporary “look” if required i.e. by introducing new colours, materials, textures etc. ;
- High quality construction;
- Sub-division of the place into different
functional and aesthetic zones;
- Potential for increasing physical activity and opportunities for improving mental health and well-being
- Opportunity for walking, running and juggling etc.;
- Opportunity for formal and informal sports activities;
- Opportunity to gaze at views, sit alone and contemplate, and spaces for water edge solitude;
- Places for solitude away from the water’s edge;
- Presence of vegetation to screen views with an urban character, if present within dense urban areas;
- Maximising the view of the horizon (if possible);
- Accessibility for all to and within the project site
- A well-thought out accessibility strategy;
- Easy access on foot, by bicycle, by public transport and improved accessibility to the site from the water, car parking;
- Use of terrain, ramps and steps for access down to the water;
- Make the place universally accessible;
- Internal circulation and choice of routes i.e. connecting different areas or zones within the site;
- Entrance locations and connectivity and use key focal point for improved way finding;
- Linkage from one site to another feature or site i.e. coastal promenades, long distance paths etc.;
- Ways of providing interaction with water
- Improve possibilities to gain physical access and descent down towards the water;
- Provide interaction through installation of water features i.e. jets or fountains, spaces to enjoy splashing;
- Water installations as focal points;
- Capture the dynamic quality of the water and design accordingly i.e. winter condition etc.;
- Providing closer access by siting piers or other decking structure;
- Provision of beach;
- Provision of easier access for disabled people to get into the water;

- Provision of affordances for sitting and engaging in social interaction
  - Special attention to seating provision;
  - Provision for picnics and barbeque space;
  - Bench designs may be off-the-shelf units i.e. cost effective and easy to maintain etc.;
  - The use of recycled material - often directly from the site;
  - Seats fixed in place or used flexibly depending on the circumstances;
  - Seating spaces built into the design;
  - Use of step to lead down to the water;
  - Fixed or movable sun-bathing bed with a sloping section for sitting, lying and reclining etc.;
  - Provision to sit on grass, sand, rock etc.;
  - Microclimate amelioration and enhancing thermal comfort
  - Maximising vegetation and improving soil and drainage to improve tree growth;
  - Using weather shelters while trees and bushes grow to the required size;
  - Semi-permeable shelter walls places with wind turbulence;
  - Cosy, comfortable and warm niches for people to take shelter in cooler weather;
  - Reduce concrete surfacing and promote use of brick and other surfaces with low albedo.
  - Application of micro-climate sensitive design;
  - Enough and appropriate shading and use climbing plants and semi-mature trees to frame the place;
  - Protection of vegetation on the site, especially in the case of coastal areas;
  - Planting and protecting evergreen trees for year around benefits;
  - Celebrate and emphasis the seasonal differences;
  - Use of temporary installations with dual functions i.e, summer and winter use;
- **Ensuring good site management/maintenance**
  - Use of appropriate and good quality material and high quality of construction to ensure durability and ease of management and maintenance;
  - Provision of informal self-policing or supervision by users;
  - Use of durable and local material suitable for the climate and weather condition;
- **Ensuring safe and secure sites**
  - Use of safety design features i.e. railing along the edge;
  - Balanced approach while considering risk i.e. do not make places too safe;
  - Provision of water safety equipment i.e. life rings, lifeguards and boats etc.;
  - Careful vegetation design to avoid hidden spaces;

**Conclusions**

From the analysis presented a clear pattern can be seen emerging. Waterfront projects are currently a very important part of urban regeneration and include a wide range of types which all have a positive impact on urban life at a range of scales. Planners and policy makers have clearly recognised that, whether the motivations are economic regeneration, flood management, water quality improvement, cultural enhancement, provision of recreation and access or restoration of nature (and usually most of these go together in some way) blue space is a critical feature of many urban areas.

The importance given to public access, the creation of waterfront parks, of offering visual and physical access to water and enhancing the quality of the landscape by investing in good design has led to the vast majority of projects being given a big role in enhancing quality of life, of neighbourhood liveability and in enhancing the attractiveness of inner urban areas as places to live. The brand identity of many cities has been significantly strengthened by the design of iconic waterfront redevelopments including public spaces and this attracts inward investment and
builds tourism and popular places for people to live and work.

The climatic zone has no specific impact on whether water is attractive to people – it just affects how much people can use it directly for swimming and recreation and what the degree of seasonality offers for different activities. Small-scale interventions can have as big an impact on people as large projects and if they are all that is possible then they should take place.

Finally, it can be seen that waterfront developments and water-accessibility projects form a major part of landscape architecture and urban design practice at the moment and this has been a rising trend since the initial projects were started following de-industrialisation and new port technologies for example, in the 1980s onwards, as well as the need to introduce better means of dealing with storm water and other factors. Planners and designers are clearly aware of the need to make such places attractive, iconic, accessible, safe, easy to maintain and offering as close a contact to water as possible given practical and other constraints. All the sites we reviewed aimed to increase the potential for physical and mental health and well-being improvement by offering opportunities for physical activity, for socialising, relaxing, getting closer to nature, soaking up the sun and de-stressing. It is also clear from the evidence that the vast majority of the sites are extremely well-used wherever they are located and that in dense cities with little green space, blue space offers an additional or substitute environment.

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Endnotes


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Figure 1: A selection of different types of urban blue space (Source: http://www.landezine.com)

Figure 2: Countries where reviewed projects are located
Figure 3: The blue space types of the reviewed projects

Figure 4: The variety of built environment types of the reviewed projects
Figure 5: the range of land to water interface types found in the reviewed projects

Figure 6: Distribution of projects according to climatic zones

Figure 7: The range of intervention types and their objectives (includes primary and secondary)
Figure 8: The health and wellbeing possibilities offered by the reviewed projects

Figure 9: The distribution of means of interacting with water
Introduction
The lack of opportunities and low generation of income in the rural areas encourage people to migrate to Metro Manila and look for a better future. Las Pinas is one of the destination cities for people coming in from the southern provinces. The continued population growth and increased density of Las Pinas is one of the major driving factors of pollution, poverty, criminality, and traffic.
The trend of migration to Metro Manila shows consistent numbers from Ilocos, Bicol and Eastern or Western Visayas. These regions are considered to be depressed regions which show the correlation between poverty and migration to Metro Manila. The Central and Southern Tagalog regions are the primary receivers of these migrants because of their proximity to the migrant regions.
With the very high number of migrants and lack of affordable housing, these people resort to live in slum areas where they are able to lodge at very low prices. It is found that most migrants gravitate towards these slums areas which in turn continue to grow without any restraint or control, therefore, fueling the population explosion of Metro Manila.¹

According to various studies, Metro Manila has been undergoing intense urban agglomeration leading to the expansion of urbanized areas. This has led to diminishing existing green spaces inside and around the cities and leading to the need for establishment of policies to promote conservation and creation of urban green spaces.²
The varying land-use situations call for planning policies that can be applied to heavily built-up areas to residential areas to urban-rural mixtures. Environmental improvement needs to be promoted in the built-up areas, such as creation of urban green spaces. At the same time, strategic landscape planning for yet

to be urbanized areas is needed to coincide development with the preservation and improvement of existing environmental values. Certain studies recommend policies driven to encourage work and living opportunities in the CALABARZON area to serve as a buffer of immigration to Metro Manila to absorb surplus labor and alleviate poverty spots. With this, a report by the Japan International Cooperation Agency (JICA) & National Economic Development Authority (NEDA) expounds on plans for expansion of Metro Manila into the Greater Manila Region, integrating Region III and IV-A. It laid out plans for infrastructure improvements for transportation. With the plan moving ahead is towards the improvement of Region III and Region IV-A, it strengthens rationale of developing Las Pinas as TOD that would influence economic growth, and workforce and household migration to Region IV-A. However, the study lacks concrete planning methodology, might come out fragmented and lacking in cohesion once implemented.  

Problem Setting

A. Statement of the Problem
How can urban design and landscape planning develop the Southern Las Pinas District as an area with more public transportation and pedestrian access and increased inter-city and inter-regional connection?

- What elements of the urban landscape can be developed to promote Las Pinas as a transit-oriented development?
- What modes of transportation can be used to connect different PUS together?
- How can Las Pinas start integrating connectivity between Metro Manila and the CALABARZON area?

B. Definition of Terms
- Southern Las Pinas District (SLPD) – Primarily, the 2nd district of Las Pinas prominently char-
acterized in this study as located south of the Alabang-Zapote Road as its northern edge. Barangays included are Talon Dos, Talon Cuatro, Talon Singko, Almanza Uno, and Almanza Dos.

- Public Urban Space (PUS) – These are spaces such as, empty residential lots, parks, commercial areas, and institutional areas that are publicly accessible, with possibility of connection to streetscapes and to other selected spaces.

- Local Public Transportation (LPT) – This refers to public transportation that covers areas within the barangays and nearby PUS. Currently, this can be compared to tricycles and can be further improved to be more environmentally-friendly electric jeeps and multi-cabs. This type of public transportation will bring users, giving priority to those who have a hard time to walk (elderly, PWDs, and children), from PUS to PUS.

- Inter-city Public Transportation (ICPT) – This refers to public transportation that is used to travel from within Las Pinas to outside of the city whether north or southbound. Currently, this can be in the form of bus and jeepneys but can be further expanded into using railways.

- Transport Hubs – These refer to commercial areas and other PUS that will be centers of public transportation. They might be in the form of major terminals with commercial centers, bus stops or jeepney stops, and possibly railway terminals.

C. Hypothesis
The promotion of public transportation usage and pedestrianization will encourage SLPD’s development as a TOD that will relieve the congested roadways, improve quality of life within the city, and encourage better opportunities outside of the existing highly urbanized areas.

D. Goals & Objectives
The goal of the study is that the SLPD as a TOD that will provide spaces and connections to promote the development and improvement of inter-modal transportation infrastructures, and various local and regional connections. To achieve this
goal the following objectives must be met:

- To identify existing elements and connections of the urban area that can be improved in the development of the SLPD as TOD.
- To propose additional spaces, if necessary, to connect public urban spaces.
- To apply urban landscape design to unify and integrate the existing and proposed PUS.

E. Scope and Limitations
The scope of the project will be the SLPD as defined above. The reason behind the inclusion of these barangays is its proximity to Cavite via crossing the Zapote River, Ayala Alabang and Filinvest (commercial and business hubs), and access to the newly constructed Muntinlupa-Cavite Expressway (MCX) connected directly to the South Luzon Expressway. The scope of the design process will only deal with the schematic master planning of the different identified areas. This includes the space programming and connections of various selected PUS. The exact detailing and design concepts of each area will not be included in the study. The study primarily focuses on the usage of idle land for new developments as PUS. The mode of acquisition of these lands will not be included in the study. The exact implementation and assessment of effectiveness of existing and proposed transportation scheme will not be discussed in this study.

F. Review of Related Literature
Forecasting the Interaction System Between Urban Expansion and Motorization, by Masanobu Kii and Kenji Doi
The study indicates the relationship of household income with that to the maximum distance of spatial interaction. The household income determines the possibility of car ownership and spending on suburban housing locations. This allows the higher income households to be located away from the crowded locations but still maintain work options in the central core that will cause them to bring private transportation
and contribute to the traffic conditions. For the case of the lower income families, the lack of potential to purchase their own vehicles will force them to maintain residence near the city center. The travel time and distance of current public transportation schemes discourage them from locating elsewhere.

With this in mind, policies, regulations and planning agenda must be towards the promotion of wider public transportation use to reduce both traffic and population concentration to the city center without encouraging urban sprawl. Improvements can include addition of train systems and more efficient bus schemes. After the improvement of public transportation methods, private car usage can be discouraged through higher entry rates to prime areas, such as business districts, for private car owners. Green spaces can be reclaimed from the very large vehicular infrastructures that were deemed necessary because of the high usage of private vehicles.

Southeast Asian High-Density Habitation and the Formation of a Comfortable Outdoor Thermal Environment, by Akira Hoyano, Seonghwan Yoon and Akinaru Iino

Integrating green spaces into housing districts and their possible positive effects based on comfortable outdoor thermal environment.

If It’s Not Mixed-Income, It Won’t Be Transit-Oriented: Ensuring Our Future Developments Are Equitable & Promote Transit, by M. Tanner Clagett

The taking into consideration of mixed-income households is necessary in the development of a true TOD. TODs have to address the needs of mixed-income households because the intended ridership does not only encompass a single income class. The connections that TODs provide reduce the effect of displacement of low-income populations and encourage a more transit-reliant approach to transportation rather than a heavily car-dependent one.
Analysis of Travel Patterns Between Road and Transit-Oriented Development Areas, by Sengjae Lee, Shinhae Lee, Dongjoo Park and Chungwon Lee

Public transportation is described as road-invested (public bus) and transit-invested (train systems). The complimenting the routes of both road-invested and transit-invested approaches help in traffic decongestion. Policies can be made to discourage private transportation by reducing the amount of parking spaces available for commercial establishments that are easily accessible by public transportation.

Urban Walkability in the Subtropical City: Some Intemperate Considerations from South East Queensland (SEQ), by Daniel O’Hare

The study discusses 400 meters as the optimal range of catchment for public transport stops. Urban design and different land uses are seen to be critical to make places more walkable. TODs seek to develop compact neighborhoods with housing, parks, shops, offices, jobs, and civic and community facilities that are all accessible within a 5-10 minute direct walk to public transport stops. The urban design component can be incorporated in making the walk a better experience by promoting comfort and security. It also affects the permeability and the connectivity of the pedestrian routes.

In tropical to subtropical climates, heat, humidity, strong sunshine, and rain are main factors in determining walkability. Additionally, hilly topography, security and vehicle interaction adds to these factors.

How to Make Transit-Oriented Developments Work, by Jeffrey Tumlin and Adam Millard-Ball

The study focuses of the three-Ds (3Ds), density, design, diversity, of achieving a successful TOD. Density deals with the concentration of users within the immediate vicinity of a transit station. Diversity deals with the users being not only encompassing residential areas or households, because it may also include work places, commercial areas, or institutional areas. Lastly, design includes the design of urban block
sizes, street patterns, parking areas, streetscape, greenways and parkways, and other elements that would help add to the walkability of the whole development. Walkability will reduce the need for private cars and parking spaces, thus allowing the designer to focus more on pedestrian-oriented designs. These 3Ds are very important and general criteria to consider when planning for TODs.

Suburbanization and Transit-Oriented Development in China, by Robert Cervero, Jennifer Day
TODs allow the commuting populations to relocate to farther areas but still maintain their employment. In this way, it is possible to decongest the main urban core of its working population living there.

Urban design affects the travel behavior of users. High-quality walking and cycling environments as well as supportive mixed land uses in the vicinity of rail stations produce improved ridership statistics. Absence of station-area master planning has led to substandard developments where no design and development standards are followed (overcrowded sidewalks and ill-designed stations). Planning TODs should be tied to a larger regional plan as a node that integrates other areas around it.

Methodology
The methodology of the current study involves studies about planning and integrating tropical urban design to transit-oriented developments. Empty residential lots can be acquired by the government and convert these areas as pedestrian hubs for connections. For park areas and streetscapes, they can be improved to provide better walkability and pedestrian access to the intended transport hubs. Existing institutional areas and commercial areas can also be used as connections because they have a high number of users coming to and fro from them.

Based on the transit-oriented development paradigm, the original standards for this study were derived from Australian TODs which have
nearly the same climate and weather conditions in the Philippines. However, the study takes into account the more humid and warmer weather conditions therefore, reducing the estimated walking distances to nearby transit stations.

A. Research Paradigm

![Research Paradigm](image)

Figure 2. Research Paradigm showing the various studies integrated in the planning and the framework from the JICA-NEDA study on the left shows where the study links to new and upcoming national development projects.

B. Design Paradigm

![Design Paradigm](image)

Figure 3. According to this paradigm, the design methodology focuses on the connection of various spaces to lessen the perception of the user’s experience of their travel in the TOD.

Design Solutions & Discussions

A. General Design Considerations
The design styles of the PUS may vary for each area to have their own identity but for this study, the distinct theme is modern tropical. It uses straight lines as direct avenues of access moving to and fro within the PUS. The more natural curvilinear meandering paths around the areas are for those who wish to enjoy the usage of
the park wherein additional amenities can be included when going into more detailed design phases.

B. Sample Designed Areas

Sample PUS, Transport hub, and major connection – Good Year

The PUS near the existing Good Year Service Center and Wilcon Depot at the border of Muntinlupa and Las Pinas stands in a strategic location. It is near the Alabang Central Business District and has direct connection to Daang Hari towards Cavite and MCX that subsequently connects to the South Luzon Expressway (SLEX). SLEX is also accessible via the Alabang-Zapote road that provides option for both northbound and southbound routes.

The space is currently owned by the National Development Company (NDC) under the Department of Trade and Industry (DTI).

According to their website, the NDC was created to support pioneering development-oriented projects vital to the sustainability of the government’s structural reforms and economic policies. With NDC’s support, the TOD will help in realizing the government’s goal for decentralizing Metro Manila and expanding economic growth to neighboring regions. In the schematic plan, there is a space for commercial and rail transit developments near the Alabang-Zapote road. The structures open up to the green space.

Sample Transport hub, major connection, and minor connection – Marcos Alvarez

This is an existing bus garage of various bus operators. The PUS is along Marcos Alvarez St. that is another connection of Las Pinas to Cavite. The traffic situation along Marcos Alvarez St. is most of the time congested because of the volume of private cars combined with the jeepneys and buses passing through the road. With the promotion of public transportation usage, there is a possibility to reduce the traffic along this road and have room for improving the existing streetscape.
Sample local PUS, minor connection, and local road – A. Gatmaitan

The location of this PUS is nestled within the heart of the residential area. It has direct connections to other PUS. This area can be developed as a minor transport hub that caters to LCTs that provide service within the neighborhood.

Alabang-Zapote Road – Alabang-Zapote Road has a 15m RROW. The intended design for the main road contains four lanes of vehicular usage. Two lanes are for buses, trucks and other heavier vehicles. The other two lanes are for lighter vehicles that can either be private and public transportation. Then, there will be two-way bike lanes and sidewalks on both sides with tree cover and shrubs along the streetscape.

Major Connections – The common RROW of major connections are 10m to 12m. The design for these connections will include two-way vehicular access. The sidewalks on each side will be wide enough to accommodate a two-way pedestrian walking corridor and a one-way bike lane. The trees are integrated into the streets and, although not shown in the section, rain shelters and other street furniture can also be included. Some major connections have access to residences but street parking is prohibited along these roads.

Minor Connections – Minor connections have road right-of-way (RROW) of 8m to 9m. The designs include one-way vehicular access with sidewalks on each side. There will also be a dedicated lane for LPT usage and bike lanes. Trees are also integrated within the street section. These roads normally have access to residences but street parking is prohibited along these connections.

Local Roads – These are roads that commonly have 7m to 7.5m. The design features one-way vehicular access with sidewalks on each side and street parking on one side. Street parking is only legal along designated spaces to be delineated based on the site situation of each area. Trees are spread evenly within the streetscape to control vehicular circulation.
Conclusion & Recommendations

The envisioned increase in public transportation usage will allow reduced usage of cars and private transportation. In the long run, future TOD-centers in further provinces can continue to improve, grow, be independent and can be linked together with previous TODs. The study envisions a controlled kind of sprawl that takes into account both urban design and environmental integration.

The planned continuity and connection of various villages, residential areas and roadways might need enhanced provisions for security and safety to maintain the confidence of the users and residents of the TOD.

Future applications for TODs in the local setting can be studied. This can include site specific design problems, such as coastal, upland, agricultural, and protected areas.

Endnotes


transit-oriented_development_Lessons_from_New_York_City_and_Hong_Kong/links/544f1a420cf26dda08902751.pdf


Figure 1. Growth rate of the population of Metro Manila and other nearby regions.
Figure 4. Schematic Design of Good Year Transport Hub.

Figure 5. Schematic Design of Marcos Alvarez Transport Hub

Figure 6. Schematic Plan of Gatmaitan Residential PUS
Figure 7. Growth rate of the population of Metro Manila and other nearby regions.

Figure 8. Schematic Landscape Plan of SLPD TOD. (A) Good Year Transport Hub. (B) Marcos Alvarez Transport Hub. (C) Gatmaitan Residential PUS.
Dr. arch. Natalija Nītavska, Dr. arch. Daiga Zigmunde, Dr. arch. Madara Markova,
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Abstract
The Baltic Forestry, Veterinary and Agricultural University (BOVA) is a network of universities offering the higher education in the field of agriculture, forestry, veterinary and other related sciences. Intensive study courses for various levels of bachelor, master, doctoral and academic staff are organized within the BOVA network in order to strengthen cooperation between the Baltic agricultural universities. Study courses are also opened for students and academic staff from other countries. The study reflects experience in organizing the courses of BOVA in the landscape architecture taking place since 1996. The aim of the courses is to bring together students from different disciplines – landscape architecture and planning, forestry, agriculture, tourism, environmental science, geography in order to discuss the perception and interpretation of the landscapes in different disciplines, describe various landscape functions and values, recognize importance of multidisciplinary approach in the landscape problem solving. The courses are organized in three stages by using different study methods. The first stage is the distance learning for acquiring study materials available on the e-learning (Moodle) platform and elaborating the home task on a given topic. The second stage is the meeting in person and working on the course topic within the workshops, lectures, excursions, group and individual work. The second stage takes two weeks, thus new and innovative study methods are used to intensify the process of learning materials and the course topic. The final stage tests how students have understood the course topic. Students elaborate the final presentations on the course topic and discuss
them with professionals and teachers. After the courses the scientific articles are written in cooperation with leading teachers and other students for the publication in a scientific journal. The last courses of BOVA showed that intensive courses and the use of mixed study methods is the key factor for successful work and adaptation to the perception and learning particularities of the students of the new generation (Z-generation).

Introduction
Taking into account the diverse nature of the landscape, the study process of the landscape architecture and the used teaching methods are multidisciplinary. The study process includes not only direct facts of knowledge and understanding of the landscape, but also economic, social and mental aspects, which are specific directly to the circle of creative professions. Therefore, the lecturers should be familiar not only with the teaching material of the particular study course, but also with a psychological perceptual and cognitive processes of various social groups, groups of various mentalities and genders (Anderson, Krathwohl, 2001). Often, the teaching process is organized in order to cover the possibly widest range of these groups and thus to understand better the differences between the various groups. International intensive study programs and courses is an activity that allows students to get this different experience, as the students, teachers and professionals from different disciplines and countries take part there. The benefits of the international intensive courses are new and in-depth knowledge in a specific area, as a result of communication with other students, teachers and industry representatives during the intensive work in international groups and moving to the quickly and efficiently derived results. The experience of students of working in groups is one of the success factors for the further career development, where the landscape architect should more and more often work in groups with representatives of other disciplines and communicate with the society during the project development (Buchcker
and all, 2002). However, it should be noted that the study work in groups has also limitations associated with an uneven involvement of all the students in the work process and a struggle for a leadership (Fetzer, 2014). The studies of the landscape architecture are closely linked to the comprehension of the profession and the comprehension of the landscape – through the natural, social and ecological processes and existing linkages between all the landscape elements (Asdam, 2012), therefore, the essence of the intensive teaching method is to show the students in a concentrated form the existing essence of the landscape and to display it in the daily work of the landscape architect.

The Baltic Forestry, Veterinary and Agricultural University Network (BOVA) was established in 1996 in collaboration with Latvia University of Agriculture (LLU), Estonian University of Life Sciences, Lithuanian University of Health Sciences and Aleksandras Stulginskis University. Within the BOVA networking the international intensive teaching courses are organized for students of bachelor, master and doctoral programs. BOVA is also working closely with the Nordic Agricultural Universities cooperation network NOVA.

Latvia University of Agriculture has the experience in the organizing and participation in BOVA courses in the field of the landscape architecture since 1996. Intensive programs and courses are organized for the different levels of students – doctoral, master and bachelor, each course to be paid for different theme (Zigmunde D., Ņitavska N., Vugule K., et.al., 2016). The content of the each course of BOVA is based, targeted at the certain topical problems of the landscape architecture, selecting projects oriented teaching method for each individual course (Amstrong 1999; Chinowsky et.al. 2006). Therefore, the purpose of the article is to share the gained experience in the organization of the international intensive courses, highlighting the key benefits and limitative aspects.
Material and method

The lead organizers of the international intensive courses of BOVA in the landscape architecture in LLU are the lecturers from the Department of Landscape Architecture and Planning. The department has an important experience in organizing international courses on different landscape subjects within the international summer schools, ERASMUS+ mobility programs and courses of BOVA. Different teaching approaches according to the course topic and disciplines represented by the involved participants were used in the framework of the courses. Our experience in the organization of the various international intensive courses can be divided into two groups according the teaching methods – multidisciplinary approach and focused approach. These different approaches are based on the represented discipline of members – are they a students of the same area or a students from various areas.

The focused teaching approach, oriented on the students of one specialty with the similar levels of knowledge, representing landscape related areas (landscape architecture, territorial planning, regional planning, landscape ecology, landscape engineering, etc.) is always selected for the process of the courses of BOVA. The focused teaching approach is based on an in-depth research of the problematic of the landscape architecture and teaching, examining it through specific landscape facets – ecological, aesthetic, social environment, and cultural approaches, and involving professionals in the teaching.

Generally the teaching method includes three successive stages:

- The first stage – the distance learning section, using the Moodle e-studies environment (http://estudijas.llu.lv/), acquiring the study materials (scientific articles, lecture materials, examples from practice), elaborating individual home task within the context of the scientific topic of each participant and acquired study materials. This stage allows students to gain background knowledge about individual theme of the landscape architecture
and to prepare for meeting-in-person course with intensive learning process, which is an integral part of the study process (Buhmann, Heins, 2004). This stage takes in average of 20-30 days;
- The second stage – meeting-in-person course, which includes the theoretical basis – lectures, excursions, as well as practical works and workshops. The topics of the lectures cover certain aesthetic, ecological and economic aspects of the landscape problematic which characterize the landscape as a whole or any individual specialized topic (Dramstad and all, 1996; Lowenthal, 2007; Merken, 2011). Working in a groups is one of the important aspects of the intensive courses that contributes the students’ knowledge sharing, promotes skills to discuss, justify and defend their ideas in the group, as well as to acquire social communication skills (Fetzer, 2014). This stage takes in average of 5-10 days;
- The third stage – the final part of the intensive courses, which is like a summary of the entire course. The students present their final works, discuss with the teachers and get the evaluation within the framework of this stage. The final work of the course of the master level is summary of separate exercises given in time of courses. The final work of the course of the doctoral level is a common scientific publication, prepared in cooperation with participating teachers and published in a scientific journal.

Results and discussion
On the basis of the focused learning approach and the choice of the current topics of the landscape architecture, the courses of BOVA in LLU are implemented in all the study levels. Taking into account the specifics of the different study levels that affect the opportunity for students to participate in international intensive courses, the courses of the master-level have been more successful. The one of the restrictive aspects for the implementation of the bachelor and doctoral course was the limited opportunity of the students to operate for a week in person
outside their university and their study graphics or scientific activities there. Table 1 summarizes the examples of implemented courses of BOVA in LLU in recent years, their process, topics and the results obtained.

Within the summarizing of BOVA courses in the field in Landscape architecture the main benefits were detected. Those are exchange of the experience in several aspects – methodological, perceptual, communicative and mental (Table 1). Similar benefits were detected also in a previous research on international courses (Zigmunde D., Nitavska N., Vugule K., et.al., 2016; Zigmunde D., Nitavska N., Markova M, et all, 2016). The further cooperation possibilities are marked within the cooperation between the teachers and students from different countries and universities. Those are joint study programs and capacity strengthening by teachers’ mobility for lectures in the Baltic region.

Conclusions
The network of universities of BOVA is of great importance not only in increasing scientific knowledge of teachers and students, but also in promoting the studies – the landscape architecture becomes increasingly recognized in the international environment, universities are able to provide qualitative international studies and enables their students and staff to assert itself internationally. The activities of BOVA are successfully implemented in the Baltic countries in close cooperation of International Cooperation centers of universities and The Study Centre. The capacity of studies and science in the Baltic regions is strengthened as well with the mobility of students and teachers within the courses of BOVA, because each of the participating countries share their knowledge and experience. Lecturers from outside the Baltic region are invited to the courses, which gives additional knowledge and a versatile perception of outstanding issues. The focused method used in the courses of BOVA provides an in-depth comprehension of the landscape issues because various landscape science disciplines (landscape architecture, landscape planning,
landscape ecology, design, etc.) are involved in their solution, various target groups and study levels – bachelors, masters, doctors, representatives of different industries and citizens.

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Vugule K. Bridging landscapes and cultures within the international summer school’s experience. International conference ECLAS 2016 – Bridging the Gap, 11-14 September 2016, Rapperswil, Switzerland.


<table>
<thead>
<tr>
<th>Year/ Topic/ Level/ ECTS/ Participants</th>
<th>Main tasks of the course</th>
<th>Specific topic</th>
<th>Outcomes and Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016, September/ «Landscape in Focus»/ Bachelor level/ 4 ECTS/ Latvia, Estonia, Lithuania</td>
<td>An exchange of the experience between teachers and students from Latvia, Lithuania and Estonia about landscape analyses and design methods in the Baltic States. The overview of new trends and technologies in the field of the landscape architecture.</td>
<td>The new trends of the landscape – technologies, materials, methods, practice and theory, how to use new technologies and approaches in the design of the landscape architecture.</td>
<td>The expedition diary, the presentation of the group work, including the theory of the ecosystem services, discussion</td>
</tr>
<tr>
<td>2015 October/ «Landscape Cognition» PhD level/ 6 ECTS/ Latvia, Estonia</td>
<td>To strengthen the methodological base; to introduce PhD students with the topic of the landscape cognition, research methods and approaches; to highlight the importance of cognitive aspects in the landscape research</td>
<td>Landscape cognition – methods, tasks, practice and theory, how to use methods in the research of the landscape architecture</td>
<td>the presentation of the group work (Fig.3), individual essay and scientific articles in the international journal «Landscape architecture and Art»</td>
</tr>
<tr>
<td>2015 May/ “Landscape and ideology”/ Master level/ 4 ECTS/ Latvia, Estonia, Lithuania, Finland, Netherlands, Ukraine</td>
<td>To show the coherence between the development of an ideology and the performance of the Landscape Architecture. To give an overview on the main positions in ideological landscapes Knowledge of the ideological landscape architecture and its background To detect the historical development of the landscape in relation to the development of political, social, economic trends during the last 120 years To develop skills of the verbal discussion of the landscape and its ideological contents.</td>
<td>The influence of the ideology on our landscape and the way we perceive the landscape or the way we work as Landscape Architects. A relation between action and space acquired knowledge on style of public space and cultural landscape as major tool of implementing the ideological concept of the space by working in groups; developed project on ideological concept for the definite place (Fig.4)</td>
<td>2014 September/ “Landscape Studio”/ Master level/ 6 ECTS/ Latvia, Estonia, Portugal, Denmark, Spain</td>
</tr>
</tbody>
</table>
Intensive study process

Multidisciplinary approach
- International summer schools
- Different specialities
  students

Focused approach
- BOVA courses
- Only landscape architecture students

Fig. 1. Intensive study process.

Fig. 2. Focused approach in intensive international course of BOVA

1st stage
- Distance learning, using e-learning platform;
- Home task;

2nd stage
- Meeting in person;
- Workshops, lectures, excursions, group works;

3rd stage
- Final presentation;
- Discussions with professionals and teachers;
- Scientific article or publication;

Fig. 3. The final presentation - concept of cognition developed by the participants within the group work
Fig. 4. The final work – poster developed by the participants within the group work.
Introduction

Having studied, worked or taught in landscape architecture for twenty years I am now in the mode of reflecting on my own practice, expertise and passions. In this written piece I begin the process of this reflection. In particular I begin to reflect on my own work that looks at the transformation of ‘folk’ and the creation of ‘place’. Furthermore as someone connected with many artists and considering myself as one also, I want to look at the role of what has been termed socially engaged art in this transformation and creation.

The overall objectives of this essay live under two objectives ‘What Approach?’ and ‘To Parallel Motion’, which are described as follows:

‘What Approach?’ By examining from my own practice as a landscape professionally examples of my own practice, and the art and horticulture project that is Dundee Urban Orchard (DUO), I look at two specific ways of working.

‘To Parallel Motion’. To look at my own experience of user involvement in design and user participation in socially engaged artwork and compare them, parallel them contrast them.

My method as it were, to achieve this is through a subjective manner of self-reflection. This is the basis for a further autoethnography study, which is ‘an approach to research and writing that seeks to describe and systematically analyze personal experience in order to understand cultural experience...Thus, as a method, autoethnography is both process and product’ (ELLIS, E.ADAMS, & P.BOCHNER 2011).

The ‘Folk/Place’ Zeitgeist

Since its emergence in the 1990’s socially engaged art has proliferated and gained traction (e.g. BISHOP 2012, JACOBS & ZELLER 2015). Socially engaged art generally speaking is concerned with not only reflecting and commenting on the world but being more
involved with it, being an active participant. This idea is reflected in the following quote from Tania Bruguera when she says ‘Aesthetics have shifted from the craft that’s required for the transformation of objects (natural or man-made) into a requirement for the craft to transform ourselves (as single person or as a group)’ (Tania Brughera quoted from MORRILL (Ed.) 2015.)

In parallel and co-evolving in the sphere of design is the idea of working closer with ‘users’ in the development of design. Such ‘co-design’ is also gaining traction in the world of architecture and landscape architecture.

**The designer**
The designer in my case landscape architect (chartered) is in my experience often working with a brief they may or may not have been party to the creation of. Roughly in the years 1997 - 2005 of my practice, briefs were developed within the organisation (council work) or external client (in the case of private practice). ‘Users’ were not in any way consulted in the development of the brief. There was even to some extent antagonism to the ‘user’.

From early in my career (from 2001 onward) I was interested in involving people, and at this juncture it is important to introduce two women; Theresa Lynn and Karen Clifford. All three of us worked in a local authority together. The organisation we worked for was in some ways overtly conservative but also progressive in some ways. To retrospectively imagine the situation we were possibly so unmanaged as to exist as an entity out with the ‘authority’, and acted with a high degree of autonomy and creative expression.

Around 2003/4 Karen became involved with creating a city standard skatepark. I was at the time a landscape technical assistant and Karen was team leader. Nobody within our team had experience to do with skating, skaters or the construction of wheeled sports facility. Karen’s response I believe was at this time brave and
unorthodox within a very orthodox place!

She went out and met, and moreover built relationships with the skaters of Dundee, a most particular of groups. A group called Skaters with Vision (SWAV) was set-up. This was in no way a 'tick' boxing exercise. So much so that the actual physical form of the design came directly from a skater in the community. Daryl Smith, a seasoned skater, created a sketch plan/drawing of how he felt the skatepark should be. Not having training in built environment design he was brought into the office and I worked with him to turn his drawings into technical plans. I was therefore a kind of ‘Expert Facilitator’ while he was a ‘User Expert - Designer’. Karen was a professional driving element; I will term her the ‘Dream Deliverer’. To augment the team we contracted council engineers to spec the concrete and makeup of the design. Within this team we found an engineer who turned Daryl, SWAV’s, Karen’s vision, and my drawings into a constructible and affordable built project. As an aside another important role of the landscape architects was in the careful negotiations with the planning department and community where the facility was to be located.

This combining of skills went on to result in a project that was designed appropriately and better, for its purpose within the framework of a built works. In terms of social legacy the skaters created a website, there were celebration days and competitions. Moreover the skaters went on to raise further funds for lighting and other additional works, which reinvigorated the social and built aspects of the project.

Theresa Lynn and I worked together between 2004 - 2011. Theresa was employed as an arts development worker and her background was/is in sculpture and community education. Theresa was the first people centred artist I worked with. We built up a relationship, that simply put relied on me trusting Theresa to deliver (with her workers) and for her to similarly trust
me. The method of working was for us to pull resources and finance thus producing something both would find difficult alone. Within the built component of project, say a park design there would be a set budget, but this budget was considerably greater than Theresa’s. However importantly Theresa had freedoms to take some of our funds and work with people - for which she had the talent and remit. Artist it would seem at times to have endless freedom while also being ignored at others.

One day I met Jonathan Baxter, and we went on a journey together
In 2009 I met artist Jonathan Baxter, in fact it was at his masters of fine art degree show. Between 2009 - 2015 I was variously involved in his ‘projects’ part of the journey mentioned in the heading. To put it another way I was involved in the dreaming - as opposed to dreams of Jonathan or more precisely the dream/reality he constructed and fashioned in a way any artist might sculpt something.

I will at this point now refer to Dundee Urban Orchard (DUO), which was the real seed of this essay. DUO are Jonathan Baxter and Sarah Gittins, the community they work with and the earth of Dundee they plant in. DUO is a socially engaged and ecologically driven art project. DUO is, according to their Internet presence ‘a city-wide art project supporting individuals, community groups and cultural organisations to plant and care for small-scale orchards within Dundee’ (dundeeurbanorchard.net).

Dundee Urban Orchard - Art as if People Mattered

A recent article by Jonathan outlining the work of DUO gives a number of reasons, or issues that led to the growing of DUO. Firstly, they posed the question ‘Could we use our creative skill-set to reframe ‘problems’ and turn them into ‘opportunities’?” (BAXTER 2017). This relates to the idea of creating and ‘sculpting’ in the real world and not referencing the real world. The
term social sculpture was coined by Joseph Beuys, which I feel fits well with this idea of using creativity for not the production of objects but the forming and re-forming of people and place.

The seeds of DUO come from an imagined world and creation from this imagining - if we think of the statement by Bruguera earlier. In this re-imagined ‘re-framed’ world they ask: “Perhaps we could create a participatory artwork that prioritised social and environmental wellbeing - over economic development - by planting a network of small-scale cultural orchards across the city” (IBID).

DUO are driven by a number of issues, for instance the disjointed relationship between the city and its region and moreover, leading on from this the dislocation between food production and consumption. They are directly influenced in their work, referring to Dundee and its rich agricultural region, by Patrick Geddes (pers comm).

Geddes is known for his town planning and social concepts, ‘Geddes was particularly receptive to the concept of regionalism’ (MELLER 1993 p.39) and used his ‘Valley Section’ to describe the region. This diagrammatic representation of an ideal region is based in part on his growing up in the Tay valley. ‘The diagram was a cross-section of a river starting from its source in the hills to the estuary on the plains’ (IBID).

The region as I say is an important concept to DUO. Geddes was interested in many aspects of sociology, biology, planning etc. and had I would say, to use a contemporary term a transdisciplinary approach. He was interested in the intersections of disciplines and life, which I think relates to my own way of approaching this subject, as an asides. With his ‘thinking machine’ he tried to connect ‘Place’, ‘Work’ and ‘Folk’. For me this rings at the central idea of sustainable life and sustainability more generally. I feel DUO are certainly ‘Place’ and ‘Folk’ workers and growers. They are embedded in the richness
that rubs against growing and developing space and ecology. The approach of Geddes has been described as ‘synthetic’, as in synthesis of things (IBID). DUO are a synthesis in a sense of theoretical grounding and a ‘re-framing’, to quote Jonathan’s words to me, of planning and spatial design.

Also important is the idea of biodiversity as a stated aim of Dundee Urban Orchard. We might define biodiversity as roughly the diversity of species and ecosystems. DUO take this a step further by adding cultural diversity. Another aspect of DUO’s work is celebration. Celebration is another key aspect and method of working. Most notably last year saw the first citywide Community Harvest at Dundee’s Botanic Gardens. This event was enlivened with dance, music, talks and stalls relating to produce. This ‘synthesis’ celebration shows the depth and breadth of the DUO project.

DUNDEE WATER (CON) FRONT
Dundee is a city on the edge, or perhaps on the brink. Having lived, loved and worked there for twelve years I have seen great changes take place. As I say Dundee feels at the edge, physically at the edge of land and water, mentally at edge of Scotland - the sixth (sick?) city of Scotland and far from the Britain of the South. Though Scotland goes on further north, it is very much in my mind North, in all that might be imagined by that idea.

In any case a road driven masterplan has now been driven through Dundee’s waterfront area and promises a new future for the city. Stepping out of train station recently the hulking dark grim grey of the Victoria and Albert museum I was witnessed takes shape. A icon sailed/crashed into the city. This is ‘big planning’; this is the ‘grand project’.

DUO couldn’t be further from the big plan though they are of grand vision. They have also enlivened this most top down project with a ‘bottom-up’ project, and through protracted
hacking at authority managed to get an orchard into the central park - The Slessor Gardens of the project. You can’t but be thrilled to see the overflowing raised beds in the park. These raised beds (plant plinths?) are a joy with their calendula overflowing and apple trees. An orchard grows to remind the machine of the development, ‘We the orchard people are here!’ I mention this orchard, not that those in less prominent parts of the city are not just as important, but because to me this symbolises the struggle of DUO and their incredible ability to go ahead and grow orchards in barren minds and soil.

In this work by DUO, I am reminded again of Geddes who ‘had always preached in his social reconstruction doctrine that the planner was more than an administrator. By the quality of his practical work, and the ways in which he organised space and buildings, the planner was to have a social impact as the liberator of the people’. (MILLER 1993 P.292)

Reflections on Reflections
On reflection of my reflections the following comes to mind and to return to my objectives.

‘What Approach?’
It seems that taking the established and trained landscape professionals and skills and working with socially engaged/community artists can lead to positive results. Like all multi-disciplinary approaches it is important that there is trust and respect (as in my work with Theresa) as well mutual understanding of each other’s skills and limitations. It is unfortunate that in the case of the Slessor Garden’s (and to my knowledge) the established planning and other council bodies seemed not to be open to the collaboration with DUO. On the other hand perhaps it is not whether there is an artist or designer but someone who can author a project successfully, and work to be the ‘Dream Deliverer’ as I categorised Karen, and I would say Jonathan and Sarah in the case of DUO.
Landscape architecture is a profession, which is a synthesis subject, as we have discussed in relation to Geddes. It borrows and is influenced by a diverse range of subjects, which are as diverse ranging from scientific worldview, to art and culture. This of course reflects the diversity of the landscape. There is of course a long tradition and synthesis with the visual arts.

To trot out a well-worked horse, the painters of 17th Century landscape prefigured the English landscape style of the 18th Century. This relationship and influence continues. We have only to think of geometric earthworks of George Hargreaves to be at least visually if not conceptually reminded of the works of land artists from 1960’s and 70’s. Socially engaged art I feel could be an influence for us too.

In my own work as a landscape architect I have come across ways of working which genuinely involve users. This requires at times a creativity, which is akin to an artist who sculpts situations, regulations and systems as opposed to marble, clay and bronze. As stated it seems to me that maverick landscape architects such as Karen Clifford are important in cutting and managing political and social worlds, as well as worrying about the quality of material finish and detailing.

‘Parallel Motions’
There is a move toward people-involved/people orientated landscape and spatial design and some elements of art. This socially engaged art, such as the Dundee Urban Orchard project, ‘re-frame’ questions and tropes of urban planning. Artists from my study and experience often assimilate and are influenced by concepts in the wider context. DUO have, it seems, created what is ostensibly a landscape design, ecology and horticulture project and re-represented it as an creative outcome, as said before a kind of social sculpture. Landscape architects themselves I would say are influenced and re-
represent ecology, narrative, history etc. in their work. What I have experienced through working firstly with Theresa Lynn and community artists (to speak taxonomically for a moment) and from my reading of DUO is that artists can play a role and be given a freedom and position which allows them the ability to maneuver in ways that designers may not. On the other hand designers/landscape architects are trained in the creation of space etc. and can have positions of influence not always afforded the artist.

When comparing the skatepark project and DUO, for me both are engagements with and building of spatial and social projects in innovative ways. On the other hand both work in different ways. It is interesting for me to think of the difference between DUO and say the skatepark project.

One was built within, a, let’s say a system - a council. It was made up of the Vision Maker - Karen, Technical Professionals - myself, engineers etc., Users and User-Experts. Working together a successful project was delivered managing to be conventional in a sense and also highly creative, and maverick in terms of council regime, and the time of construction. I would say that to use Michel De Certeau’s concept of the tactic, Karen managed to use ‘tactics’ to create a project that worked for users and local authority equally.

DUO are different in the sense that they came from a combining of artist-expert and community dreams. There was a facilitating of the vision of community groups combined with a rigorous theoretical and conceptual framework. Equal to the visionary and maverick approach of Karen, DUO managed to work on many levels and creatively work within systems, but also perhaps outside systems and with a degree of drive and autonomy not always seen where there is ‘brief’ and ‘client’.

DUO have shown me the power of multilevel approach to ‘place’ and ‘folk’. DUO appears at first inspection a very open, clear and positive and moreover accessible community
project. It is however, not to detract from these aspects also, based on a rigorous research, be it into Dundee and its needs and also a theoretical understanding steeped in socially engaged art, city planning, aesthetics etc. This I feel is a great strength of the artwork. The best landscape projects similarly, may appear almost unseen, but can be backed with layers of meaning, and theory.

**Closing**

I believe that now is the time to engage not only with the artist as object producer but also see the value in the ‘folk’ and ‘place’ art makers. I feel we need to start to recognise the role of these artists and bring them to the table. This is not to say that many landscape architects don’t do this, I mean, take artists and their work seriously. But a larger and greater understanding of the power of the social sculptors would benefit us I feel. As they have a dynamic combination of nurturing and rupture and a tradition of reflecting and confronting society. By examining the development of ‘social sculptural’ forms allows us to show how such artists, manipulate social forms as stand alone projects, to create not only landscape which ‘enhance the natural and built environment for the public benefit’ (landscapeinstitute.org) but also enhance people for the benefit of the landscape (our world). This is not to deny the maneuverability, skills and professional capabilities of the landscape architect, and their ability to be ‘Dream Deliverers’. Perhaps we need to ‘return the favour’ to artists and teach them methods of the designer, if we all are to become sustained people in a sustainable landscape.

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Reference Patrick Geddes, who often used of terms for people (folk) and place in his writing and diagrams.

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Shelter homes in Sweden

The Social Welfare Committee in each municipality is obliged to provide assistance of various kinds at a very early stage when women are at risk of domestic violence (Prop. 1997/98: 55 Kvinnofrid p. 137 and Prop. 2006/07: 38 p. 27). Each municipality should be able to offer abused women temporary housing regardless of age, ethnicity, sexual orientation, disability, addiction or dependence. The accommodation offered should also be appropriate for accompanying children, regardless of age and gender (SOSFS 2009: 22). The purpose of the shelter homes is to support individuals fleeing violent and vulnerable situations, to increase the safety and security of the people concerned and accompanying children, to prevent further exposure to violence and to support the protection seekers in the process of creating an independent existence (Socialstyrelsen 2016). In Sweden, there are no exact statistics on how many places are needed but it is likely that more than 4000 adults and 2700 children spent at least one night at the shelter. At the same time, it is estimated that there is rooms for approximately 1,100 adults and 1,300 accompanying children. The National Board of Health and Welfare conclude the assets are not enough for everyone looking for sheltered homes in Sweden (ibid).

In 2011, The Swedish government states that the shelter homes is an important effort that society offers adults and children seeking refuge from violence but points out that there is a lack of both a comprehensive knowledge of activities in protected housing and an overview of the number of places and their quality regarding both indoor and outdoor environment (government decision S2011 / 8989 / FST). Based on this, the Socialstyrelsen (The National Board of Health and Welfare) was instructed by the government to make an inventory and a comprehensive analysis of the status of sheltered homes in Sweden. The inventory found 206 shelters in Sweden. Of the 195 places that responded to the survey from the National Board, 71% where operated by non-profit organizations, 21 percent are under municipal management, and

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8 percent are run by private operators. Most shelters are situated in large cities and almost 90% of available places are located in apartment buildings, either as individual accommodation or as a collective where the kitchen and bathroom are shared with others (Socialstyrelsen, 2013) and there is a limited access to outdoor environment (Lindberg, 2016).

**Outdoor environment at shelter homes**

In 2015, The Board of Health and Welfare developed quality indicators for shelter homes. Two of the quality areas are: „safety, security and the rule of law“ and „self-determination and integrity.“ This highlights the importance of having access to common areas for socializing and rest for those living at the shelter homes. It is also important for personal development and to be able to choose to socialize with other people in relaxed circumstances. The importance of access to spaces for play and employment for accompanying children and young people is further emphasized. This can contribute in a positive way to the processing of negative experiences for those who have witnessed violence. (Socialstyrelsen, 2016). In a newly published report “Men’s violence against women in close relationships” indicate that there are several knowledge gaps regarding the knowledge of this subject and none of the proposed future fields of research include the outdoor environment’s potential and importance for the residents’ health and wellbeing. The few studies that exist around outdoor environments in sheltered homes support the fact that access to a supportive external environment could increase the victim’s health and wellbeing (Hydén et al., 2016).

In a recent pilot study on sheltered homes in Sweden, the results indicate that, even though the residents had access to gardens, the use of the outdoor environment was minimal or even did not exist at all. This was due to a lack of feeling safe in the outdoor environment and that the space was not enclosed enough for supporting the feeling of security. This raises the issue of how to design the outdoor space so that it comes to its proper use as a health-promoting space.
where the users can feel safe and execute their needs for socializing or play.

Traditionally, battered women have relied to a great extent on private networks in order to find acute shelters. But recently immigrated women in need of shelter homes lack established private networks in Sweden and lack social support in their situation. For cultural reasons, these women also find it difficult to appreciate the outdoor environment, find it difficult to engage in the local, Swedish, community and are in great need of language training and learning of new professions in order to become more independent (Nilsson Öhrn, 2017). Some ongoing integration projects in Sweden show that gardening and growing herbs and vegetables provides immigrants with great opportunities for both learning a new language, learning women to become more independent and starting their own businesses and also learning immigrants to understand and appreciate the Swedish natural and cultural environments (Rasmusson et al. 2016). This could be an important aspect to consider in the design of outdoor space at shelter homes and how to combine all the issues above, in order to have a better organization around sheltered homes providing the residents with language and occupational training in order to become more empowered.

Support in a formal planning process of shelter homes

This is where traditional Environmental Psychology (EP) could be the missing link between a formal planning process addressing the qualities of shelter homes and the outdoor environment. The basic idea with EP is to improve people’s health status by letting them relax, get acquainted with and finally work within the gardens themselves. The concept as such has proven to be effective in some situations and evidence based design of outdoor environment has been put in practice with good results (Lygnum, 2012). In order to develop formal planning processes related to these issues, the landscape disciplines could provide interesting cross-disciplinary solutions and a testing
ground for theories regarding e.g. environmental psychology, landscape quality, countryside development and planning processes in close cooperation with practitioners. This in order to plan for and build shelter homes with access to outdoor environment that can support the residents’ health and well-being.

References
Abstract
The transition to sustainable energy system has started to affect landscapes in many places, producing controversial debates and eventually facing local opposition. Landscape architects, among others, bringing both esthetical and environmental sustainable qualities, can have a central role in energy transition processes. This research examines landscape architects’ involvement and design practice in the development of landscape projects that relate to energy transition. It compares France and the Netherlands: both have political agendas moving towards renewable and carbon-free energy sources.

Data is collected through online surveys sent to landscape architecture associations’ members in France (FFP) and in the Netherlands (NVTL), in order to have a broad and representative sample. Results show that in both countries almost half of the respondents affirm to have been engaged in energy related projects. Another 15-20% sustain that they would like to develop this kind of project, illustrating an increasing awareness of the topic. Nevertheless, in the Netherlands, we witness a prevailing involvement in siting/design of renewable energy technologies and creation of long-term scenarios for energy transition. In France, however, we observe a different focus both on mobility and energy saving. Furthermore, a large group of respondents (30%), regardless of their nationality, referred to the presence of renewable energy technologies when they think of ‘energy landscape’, referring also to the problem of the poor landscape integration of these technologies.

The research reveals contrasting attitudes regarding energy transition and implications for landscape architects. Where the French currently do not seem to have a prominent role, their contribution is not explicit and valorized. Actually, they historically were involved with garden and park design. The Dutch ones, on the contrary, have been involved in the shaping of the land, regional and spatial planning for long.
Introduction
The ongoing energy transition need space [1] and it is generating landscape changes in many places [2]. Landscape architecture refers to a design category - landscape design and planning - that can have a central role in the transition processes, supporting decision-making and knowledge synthesis [3], thanks to the landscape's visible and invisible cultural and societal components. Indeed, landscape architects, urban planners and other environmental designers begin to embrace a conscious management of energy and other resources in their projects.
Meanwhile scientists and engineers are starting to perceive landscape architects as important participants in the planning, design and construction processes of cities and territories, not only related to parks and green spaces, similar to urban planners [4]. They should thus play an important role for developing sustainable landscapes [5]. More and more landscape architects are asked to bring both esthetical and environmental sustainable qualities to transition processes: essential elements of a “cadre de vie” [6]. Conversely, some researches explore the incorporation of renewable energy science principles in energy landscape design [7]. Furthermore, the European Community is engaged in energy transition process in order to transit from fossil fuels towards renewable and carbon-free sources. Among the European nations, France adopted the “The energy transition for the green growth” law in august 2015, and with the Netherlands and other nations subscribed the COP21 agreement.
Within this context, the main aim of this research is to explore the contribution of landscape architects to energy related projects in the energy transition framework and to highlight differences between France and the Netherlands. This comparison is believed to put in perspective the two approaches, highlighting similarities and differences, and enrich the current debate about planning and designing for the energy transition. The two nations have an important and long lasting tradition in landscape architecture [4,
French landscape architecture, historically, was devoted to garden and park design [9]. However, gradually the role of landscape architects has broadened towards urban and public places, [10] also integrating “le grand paysage” [landscape at a large scale]. Dutch practices inspired the growing French landscape architects’ involvement at such a large scale, through the figure of Jacques Sgard, who studied the “Landschapsplannen” in the Netherlands in the 50’s before teaching and training a new generation of landscape architects. [11]

The design approach and designing process have historically participated in regional and spatial planning in the Netherlands [8]. Furthermore, Dutch landscape architecture is recognized as an example of the increasing importance of landscape architecture in strategic thinking of several environmental fields and they are more involved in energy transition issues. For instance, the Dutch Ministry of Spatial Planning, Social Housing and Environment (VROM) commissioned landscape architects for the redaction of an energy atlas to investigate spatial impacts of different technologies for electricity production at the national scale [12].

In this paper we conduct our analysis through the prospective of sustainable energy landscape, meaning a physical environment improving its energy system without compromising others aspect such as landscape quality, biodiversity or food production [13].

**Material and Methods**

In order to answer the central question an online questionnaire [14] has been sent to members of landscape architecture associations in France “Fédération française du paysage” (FFP) and in the Netherlands “Nederlandse vereniging voor tuin en landschapsarchitectuur” (NVTL). We chose these associations to collect broad and representative samples of the national landscape architects’ practice to investigate their involvement and contribution in energy related project and to question them about the “energy landscape” notion. About 750 e-mail were sent to FFP members.
in April 2016, and 208 to NVTL members in November 2016. The total number of answers were respectively 108 (14,4 %) and 35 (16,8%). The questionnaire was composed in French for FFP and in English for NVTL members and tested prior submission with a small sample of landscape architects to verify the understandability of the questions. The similar respond rates allows for the results to be compared. However, for some open questions we collected a larger variety of answer for the French case because of the higher number of answers.

**Results of the online questionnaire with French and Dutch landscape architects**

The first question about the involvement of landscape architects in energy related projects points out that more than a half of respondents (“yes often” and “yes sometimes”) in both countries affirm to have worked in this kind of project. Figure 1 shows that another 15-20% sustain that, even though it is not yet the case, they would like to develop this kind of project, illustrating an increasing awareness of the topic in the landscape architects communities. Furthermore, according to the answers, French landscape architects seem to work more often than Dutch do on energy related projects.

A more detailed insight about the topic is illustrated in Figure 2, providing an overview of the different kind of projects in which landscape architects are involved in the two nations. In both countries, at least one landscape architect affirms to have worked in the listed projects, but French mostly assert to develop “Energy saving in design process” (18,4%) and “Mobility” (16,6%). On the other hand, Dutch practitioners are more involved in “Long term scenario” (13,9%) and “Design of renewable energy production infrastructure” (11,9%). These different percentages suggest a different involvement in energy transition processes, in which French ones seem to work more about energy according to their personal desire, because even if they develop design strategies in order to save energy, for they think it is important to reduce energy input in a system, it is not an aspect that is commonly commissioned.
When the participants were asked in which territorial context they work on energy related projects (see figure 3), surprisingly no considerable differences are found: in both countries the answers are very similar for urban, rural and periurban areas. This is interesting because we expected a higher number of answers for urban and periurban areas in the Netherlands, considering the high population density that is characteristic for this Nation.

The inquiry also confirms that the design teams for energy related projects are multidisciplinary, as it is usual for planning and design disciplines, and landscape architects work together a broad range of disciplines (figure 4). The most quoted categories, collected through an open question, by both French and Dutch landscape architects is “engineer” (respectively 22 and 12 times), followed by the “bureau d’étude technique” [technical consulting office] (10 times) and “architect” (7 times) in France and “urban planners” (7 times) and “ecologists” (7 times) in the Netherlands. We observe a main collaboration with technical experts, according to the technological aspect that energy comprises and requires, both in terms of need and supply quantification and implementation of specific technologies, such as photovoltaics panels. However, landscape architects affirm also that they work with other spatial specialists, such as urban planners and architects that may complement the knowledge brought together, giving an insight about different scales (e.g. building) and about different topics. Interestingly, Dutch landscape architects enumerate 11 categories of other experts and French ones about 25, that is more than the double, but all these expertises are quoted not more than once or twice. This gap in the number of quoted disciplines could be due to the differences in the kind of developed projects or in the usual requirements of team expertise in the two nations, linked to the different extension (or comprehension) of presumed professional
skills of landscape architects in both national traditions. It may also simply result from the higher number of the FFP members answering the question (63) compared to the NVTL (22). In any case, we witness a great variety of experts, according to the great variety of the energy related projects, that are, just to quote some, technicians of wind turbines (e.g. wind turbine park), forest manager (e.g. wood energy project), agronomist (e.g. biomass production for energy).

Subsequently respondents were asked about the meaning of the notion of “energy landscape” through an open question to have a wider range of opinions. We analyzed the responses according to the four main groups developed by Stremke [15] to define the conceptual framework for the planning and design of sustainable energy landscape: sustainable technical criteria, socio-cultural criteria, economical criteria and environmental criteria. These categories are chosen to see what criteria are prominent or less prominent and if some criteria are grouped in the same answer, searching differences and similarities between the nations. For this question again, we collected a more varied and rich set of answers for the French case, probably because of the higher number of responses (96) compared to the Dutch ones (28).

Most of the responses highlight the presence of renewable energy production, both in France (30%) and in the Netherlands (46%), mentioning for example “Parks of windmills in the North sea and solar energy on the roof” (NL) and “éoliennes, champ photovoltaïque” [wind turbines, photovoltaic park] (FR). This shows that the technical criteria is the most discussed in the answers, even if not always linked to sustainability. Indeed “renewable” and “sustainable” are not synonymous, even if both notions are related [15].

In addition, from these data we observe that landscape architects mostly connect “energy landscape” to the ongoing transition process. Some answers also strengthen this link defining an “energy landscape” as “Un paysage de transition énergétique qui produit de l’énergie”
de source renouvelable" [An energy transition landscape that produces energy from renewable source]. Only 2% of French respondents mentioned non-renewable energy sources production, quoting nuclear power plant, and none Dutch. This is not surprising considering the numerous nuclear plants existing in France. Concerning the socio-cultural criteria 14.4% of NVTL and 5% of FFP respondents refer to esthetics values linked to the visualization: “un paysage qui met en scène les énergies renouvelables”[A landscape that stages renewable energy] (FR) or “A landscape wherein the maximal potential of available renewable energy sources is harvested and planned in a spatially attractive way”(NL), where also the importance of the correct scale of integrating renewable energy technologies emerge in the Dutch examples: “Wind energy makes a landscape when placed in a proper scale and measure” (NL). The visual impact is indeed at the center of landscape architects practice, but data show it is more considered in the Netherlands. Nevertheless in both countries the poor spatial integration of renewable energy technologies is highlighted. For instance some state “la pollution des éoliennes mal intégrées” [the visual pollution of badly integrated wind turbines] (FR), or “vast plots of sun collectors, which are not combined with anything else”(NL). Only a few French Landscape architects (2%) relate to the socio cultural criteria/ inhabitants behavior suggesting the necessity of “favoriser le developpement de modes de vie éco-responsables” [promoting the development of eco responsible life styles] and acceptability prior to a change in landscape. For a small number of French landscape architects (two), the notion of “energy landscape” is explicitly discussed in connection to economic criteria: one is mentioned in a general way as “Structuration du paysage avec des considérations économiques en arrière-plan et des économies à faire” [Structuring the landscape with economic considerations in the background and saving up]. The other respondent goes further, proposing solution for the land use competition: “faire en sorte qu’un foncier, quand il n’a pas d’utilité (au-
delà de l’usage donc) agricole ou sylvicole, puisse être productif” [To ensure that a land, when it has no agricultural or forestry utility (beyond the use), can be productive]. This economic criteria is mentioned by one Dutch landscape architect who associates “energy landscape” to “circular economy”.

While only a few respondents mention economic criteria, several do refer to environmental criteria: 14.3% of Dutch and 9% of French respondents. Nevertheless, while Dutch refer mainly to “A self-sustainable landscape in which all energy is renewable, without the use of carbon-based energy” the FFP members also stress the importance of energy saving measures’ implementation: “Aménager de manière à rendre l’espace moins énergivore” [To plan in order to make an area less energy consuming] and one respondent also mentions the use of ecological materials.

Ultimately, concerning the notion of “energy landscape”, no one gives an answer recovering all the criteria of a sustainable energy landscape, but the French answers together arrive to define a more global and nuanced definition of energy compared to the Dutch, showing that even if the involvement in energy transition is different the topic is well known.

**Landscape architect contribution and practice in energy transition**

In this research, we investigate landscape architects’ involvement and contribution in energy related projects in the context of energy transition both in France and in the Netherlands. The research found that French landscape architects assert, in relative percentage proportion, to be more involved in energy related projects than the Dutch. Nevertheless, a study of company websites shows that only eight FFP members list energy-related projects. Moreover, when this is the case, it is merely for renewable technologies impact statement. This apparent contradiction could be explained by the transversality of energy topic, which could be integrated in projects in many different ways, even if the energetic topic is not the main focus. Therefore, it seems that French landscape architects integrate
energy aspects in projects that are not primarily focused on energy transition. On the contrary, Dutch company websites often have an “energy” specific project category, grouping a broader range of projects, such as renewable technology projects and long term scenarios, revealing their involvement in energy focused project. This finding is also supported by the fact that French landscape architects develop mostly “energy saving measures” (energy saving in design process and mobility) compared to the Dutch ones, that are more involved in renewable energy production and global approach to energy transition (long term scenarios). Nevertheless, in France as in the Netherlands the largest group of respondents when asked about the notion of “energy landscape” stress renewable energy production. It may be because of this gap between what is perceived as important and what is mostly developed, that French landscape architects don’t feel to be much involved in energy transition processes. This attitude rises in several answers where is pointed out the need to “faire appel à des paysagistes, seuls professionnels à être en mesure de proposer une vision globale et transversale” [to hire landscape architects, the only professionals to be able to propose a global and transversal vision]. This ‘frustration’, which does not appear in Dutch answers, has also been expressed in several semi-structured interviews, developed with French landscape architects (those interviews will be dealt with in a different publication).

However, the improvement of energy sobriety, through energy saving measures, together with the improvement of energy efficiency and the development of renewable energy production are all important pillars for an effective energy transition process [16]. Even if energy saving is more difficult to visualize and exactly quantify, when referred to spatial strategies. Regarding sustainable energy transition, French landscape architects seems to be less directly involved, even if they wanted to. This desire and need is underlined by the redaction of two documents of methodological support and recommendations for implementing wind turbine [17] and
photovoltaic panels [18] by the “Paysagistes conseils de l’Etat” [Landscape architects State advisers].

The territorial dimension of this problem does not seem to be really taken into account by the majority of French landscape architects in their professional practices, even if some define the notion of “energy landscape” as “un concept permettant d’intégrer l’énergie dans une démarche paysagère globale sur le territoire concerné” [A concept allowing the integration of energy into a global landscape approach on a concerned territory]. From the questionnaire, Dutch landscape architects seem to be more involved in envisioning structural and strategic design for energy landscape. For example, a consortium including landscape architects is developing the “National Perspective Energy and Space” for the Netherlands to inform about sustainable energy transition, from a spatial perspective.

These differences could be due to historical variance in the role of landscape architects in the two nations, where in the Netherlands landscape architects are well recognized figures involved in the shaping of the land at regional scale for long.

Conclusion

For the French landscape architects, a prominent stake is to be identified as skilled and relevant professionals in the field of strategic planning - be it focused on energy issues or more general. For the moment, though some landscape architects are specially involved in strategic and urban planning, public institutions and commissioners generally direct their calls towards other professions, namely urban planners. The professional figure of “paysagiste concepteur” [Landscape architect designer] has been recognized in April 2017, as protected denomination by the Ministry of Environment, Energy and Sea. Such a recognition may help the profession to affirm its role in the field of strategic planning, but this shall deserve more targeted communication efforts. Such institutions as the Landscape and Energy Chair at the ENSP, together with the dissemination of local experiments linking landscape and energy
planning, may progressively affirm the role of landscape architects in energy planning. They still have to demonstrate that they can go beyond the landscape integration of energy transport or production technologies, designing qualitative spaces at a wider scale.

In the Netherlands landscape architects, that have for long been involved in regional planning, seem to continue this activity also in the energy transition framework, participating to the redaction of regional energy transition long terms scenarios. The next step for them has to be the concrete spatial implementation of these energy transition visions. Furthermore, Dutch landscape architects, which work more on renewable energy production, could explore more processes optimizing the use of energy or improving energy sobriety.

In both countries the rapid changes induced – and required – by the transition to a more sustainable society call for new skills. Landscape architects, able to conceive, design and produce livable and desirable environments, have to be in the vanguard among the numerous promoters and stakeholders of the present transitions towards sustainable energy landscapes.

References


Figure 1: Comparison between French and Dutch answers

Do you work on (a) project(s) related to energy?

Do you collaborate with other discipline(s) in energy projects? (Engineer, ecologist etc.)
Figure 3: Comparison between French and Dutch answers

Figure 4: Comparison between French and Dutch answers
Abstract
In October 2012, hurricane Sandy made landfall on the coast of the greater metropolitan area of New York, USA. Large areas of New York and New Jersey were struck by storm surge and extreme precipitation, and suffered prolonged flooding of major residential areas, business districts and important infrastructure networks. In the storm’s aftermath, the US Department of Housing and Urban Development (HUD) issued the Rebuild by Design (RbD) competition, drawing in design firms and engineers from across the globe to come up with long-term sustainable flood defence solutions.

The resulting design proposals consisted of multifunctional flood defence (MFFD) solutions on a regional scale that resulted from a participatory design process wherein stakeholder inclusion was paramount. In spite of strict selection procedures (out of 140+ proposals, seven were awarded funding), and positive jury reports (awards, publications) projects are now encountering significant difficulties implementing the designs.

In this paper, we study the influence of visual representations on the reaction of stakeholders to proposed design solutions. We develop a conceptual framework that is used to critically analyse one of the RbD designs, the New Meadowlands project proposal. Through this post-structural semiotic study of the design image material we aim to understand the disruptive response of key stakeholders with regard to RbD implementation. The analysis entails an iconographic visual content analysis and a visual discourse analysis of the design material, and a social semiotic analysis of the context wherein the design proposals are meant to attain socio-political support.

We argue that some causes of resistance can be traced back to specific semiotic ‘markers’. For example, detailed images that look ‘finished’ do not signify an open participatory process, and showing high-rise development triggers strong
reactions from small communities sceptic of anything government related. Knowing your audience’s ‘semiotic potential’ helps designers to anticipate possible interpretations of design representations and consequentially prevent the negative implications of those interpretations.

**Introduction**

In 2012, hurricane Sandy struck the coast of the greater metropolitan area of New York, USA. Storm surge and prolonged precipitation affected large areas of New York and New Jersey causing the flooding of major residential areas, business districts and important infrastructure networks. Consequentially the US Department of Housing and Urban Development (HUD) issued the Rebuild by Design (RbD) competition with a call aimed at international consortia of design firms and engineers to plan and design long-term sustainable flood defence solutions on a regional scale [1]. The call for proposals also emphasized the need for participatory design processes to ensure that the outcomes enjoyed broad public and political support. As a result, seven proposals for multifunctional flood defence (MFFD) solutions were awarded funding and are now in the process of implementation. However, despite positive jury reports, awards and publications, a lot of the projects are now encountering significant difficulties implementing the designs [2].

Participatory landscape design processes, such as those of RbD, are becoming increasingly multidisciplinary and participatory [3]. Designers, experts and a wide range of stakeholders come together during different design phases to share knowledge, ideas and imaginations about the future state of multifunctional landscape areas [4]. Visual representations, e.g. sketches, cross-sections, maps, photomontages and 3D models, are used to facilitate communication and co-construct knowledge during the different phases of a planning and design process [5, 6]. Many scholars note the importance of doing research into the role that these design representations have in influencing the interaction between the producers and the users of visual landscape
representations, and consequentially how they influence design process outcomes [7, 8]. The goal of this paper is to study this influence of visual representations on the reaction of stakeholders to proposed design solutions. As Dee suggests, a research approach that could ‘highlight the relationship between drawing form and content, product and process, the subjects they privilege and the damaging effect of the uncritical use of techniques’ is needed [7]. Furthermore, the research presented in this paper adheres to a recent call for more critical study of visual landscape design representations [9] by applying such a research framework to the RbD competition.

We present a critical visual analysis of one of the RbD proposals, the New Meadowlands project proposal [10]. Through this semiotic study of the design image material, its production, and its reception we aim to understand the disruptive response of key stakeholders with regard to RbD implementation. In return, this could shed light on disruptive reactions during participatory planning and design processes in general. The analysis entails an iconographic visual content analysis and a visual discourse analysis of the design material, as well as a social semiotic analysis of the context wherein the design proposals were meant to attain socio-political support.

**Conceptual framework**

Visual communication is a process that takes place in three stages, that of the image, production, and audience [11]. These stages constitute, respectively, what an image looks like, how it is produced and how it is received. We define communication as a process of semiosis, i.e. a process of meaning making [6]. The analysis presented in this paper is centred on a renewed engagement with semiotic theory to study these different stages of semiosis. Our conceptual framework consists of the following concepts, which we will explain in brief: semiotics, iconography, and discourse. **Semiotics** entails the study of signs and semiosis [12]. In landscape research semiotics is sparingly applied to study the meaning of
signs in the physical landscape [13] and its sensual experience [14], or how landscape identity is expressed in design representations [15]. However, as representations are forms of visual communication that involve a collection of visual signs, we can expand on these writings by also considering representations themselves as semiotic entities that construct meaning. Signs, according to Eco [12], convey meaning by representing objects that are interpreted by someone. Anything can be a sign, i.e. a word, a sound, an emotion, but also colour, perspective, medium and even font size, as long as it means something to someone. The sign-function that constructs meaning consists of a form of logic, generally distinguished between indexical, iconic and symbolic sign functions [16]. This explains the difference between an icon and a symbol: an icon bears a physical resemblance to the represented, whilst a symbol contains a purely conventional relation by rule or law. Indexical signs contain a relational, or causal, relation in the way that smoke represents fire. Semiotic theory can be used to interpret texts and images iconographically, i.e. based on their immediate and historical context. These interpretations consist of different layers of meaning, depending on the amount of contextualization possible through intertextuality, i.e. the comparison of images from similar contexts [17]. Iconographic landscape research is traditionally focused on the study of landscape as a cultural image, i.e. a cultivated environment, painting or literary prose, which represents social, political and economic issues of specific moments in time [18]. Mitchell suggests that landscapes are actually representations of power which shape and control the people who are part of that landscape [19]. Similarly, an iconographic study of design images could reveal the power that shapes and controls the design processes wherein those images are created and interpreted.

Power is expressed in discourse. Many definitions of discourse exist, but in general they can be defined as specific knowledges that claim a certain truth status [11]. For this paper we define
discourse, and thus the way that knowledge is constructed, from a distinctly semiotic perspective. Discourses are collections of meaning conveying objects [20], i.e. signs, which form frameworks of interpretation [21]. As such, dominant discourses influence the way design representations are created and interpreted during planning and design processes [6]. Like signs, discourses take shape in many forms: from political ideologies and disciplinary expertise to specific design tools and media. The most dominant discourses also produce the subjects they govern [22]. This means that interpretations become self-evident based on the truth status attributed by the discourses that determine those interpretations. Mapping self-validating frameworks of interpretation can thus explain how dominant interpretations are constructed.

In this paper, we consider visual representations of landscape designs as a discourse: specialized forms of knowledge constructed out of a collection of signs by specific actors that influence how people interpret and act upon that knowledge.

**Research design**

The theories introduced above are used to inform three visual research methods that each address one stage of meaning making. For the image stage, we apply semiotic and iconographic theory using a visual content analysis. For the production stage, we apply a visual discourse analysis and for the audience stage we apply a social semiotic discourse analysis.

A **visual content analysis** is used to count and analyse how frequently and in which combinations visual codes occur in a defined set of sample images [23, 11]. ‘Codes’ entail specified signs embedded in design representations. The nature of these codes is derived from semiotic theory [24] and consists of four main categories: knowledge, formulation, mode and medium [25]. The categories of ‘medium’ and ‘mode’ belong to the expression of an image, and are analysed by looking at what visual technique, style, perspective and scale as well as which media were used to present the images. The categories
of ‘knowledge’ and ‘formulation’ belong to the content of an image, and are analysed by interpreting and coding the ‘anchorage’ [26], i.e. the references of the image in the accompanying texts, descriptions, titles and captions. A sign functions because all semiotic categories are present at all times [27]. An image cannot be perceived without a medium to present it on. Knowledge can never be unformulated: presenting knowledge as objective as possible is in itself a formulation of knowledge. This reciprocity of semiotic categories allows us to look for combinations of signs between categories. For instance, the relation between the mode and medium of an image determines the degree of interactivity, i.e. the way that people can interact with the image and its content. The relation between mode and formulation determines the readability of an image or whether people can interpret the content of an image based on the way it is visualized. Finally, the formulation of knowledge influences the validity of the knowledge claim that the image makes, i.e. whether the knowledge and data embedded in the image is sufficient to substantiate the proposed design solutions. If we consider visual design representations as the materialization of discourses, then it is necessarily to question which discourses are represented by means of what kinds of discursive power. Discourse and power can be identified by means of a visual discourse analysis from a Foucaultian perspective [11]. Using such an analysis, one can look at (1) the visual rhetoric of the image, (2) the use of stakeholder-specific techniques and media, and (3) locations, rules, regulations, and codes of conduct attached to the use of specific media during specific phases of planning and design processes. These three steps constitute different levels of discursive power wherein the landscape architect can intervene. Once a complete semiotic deconstruction of the image and its production is achieved, one can look at how such an image can be interpreted by its audience through a social semiotic discourse analysis. Interpretation, in semiotic theory, occurs through a process of signification
by means of the concept of the ‘Interpretant’ [21]. The interpretant is a ‘sign within the mind’ [12], which can be immediate, i.e. context-dependent, as well dynamic, i.e. continuously evolving through its relation to other signs and discourses. The immediate interpretant can be observed, whereas the dynamic interpretant describes how that interpretation is constructed. One is better able to explain productive and counter-productive responses of stakeholders to design propositions by mapping the signs and discourses that influence the interpretation of design representations.

Rebuild by Design

Rebuild by Design offers a well-documented set of design processes wherein we are able to study the critical functions of visual landscape design representations that, in their creation and interpretation, help facilitate visual communication between designers, experts and stakeholders in participatory planning and design processes. Out of the seven winning proposals of the RbD competition, we zoom in on the New Meadowlands project [10]. This proposal was developed by a consortium mainly comprised of designers from the MIT Center for Advanced Urbanism in Boston, MA, and the Dutch design offices ZUS [Zones Urbaines Sensibles] and De Urbanisten.

The Meadowlands consists of a protected natural area and partly urbanized wetlands along the Hackensack River in the state of New Jersey. The competition submission offers a rich corpus of data on a well-documented participatory design process. Additionally, interviews were conducted with representatives of Rebuild by Design, MIT-CAU, ZUS, Urbanisten as well as local stakeholders.

Analysis

The following section describes the critical visual analysis of a specific image, produced by the New Meadowlands project team, for each of the three meaning making stages.

Image

A visual content analysis allows for the coding and analysis of design representations in terms of
semitic complexity. This complexity is defined as a high or low occurrence of code combinations. For instance, a visual content analysis of all the poster boards that were made in the RbD competition showed a high occurrence of different visual techniques, perspectives, scales and ‘anchorage’ within the same poster. However, one of the poster boards showed very few of these combinations. When we look at the codes attributed this particular image (figure 1) we observe the following.

The poster board depicts an area from a large scale size visualized from a bird’s eye perspective, using a combination of a perspective drawing and a cross section, and employing an ‘atmospherical’ style. The content of the image is formulated as the design impression of a strategy to establish a better flood defence functionality. For a poster board, the simplicity of the image seems significant: how does such a poster board function as a means of communication, under different circumstances?

Production
In an interview with one of the designers, the choice of visual rhetoric for this particular poster board visualization is explained as follows:

‘The proposal is divided into three chapters: protect, connect, grow. Here you want to make it safer, so you can further develop your city in the areas that will stay dry, and the ecology can improve in the areas between the dikes. (...) We tried to reduce the story as much as possible, which resulted in this one final image. So when the final presentations were due, and you have to make these panels, we said: all of those analyses and schemes, you could put them on there, but who is really going to read them? (...) So we made one final image that should encompass what we want to do, put a giant slogan on it.’

In regard to the discursive technologies, or choice of medium, the designer explains they used the type of interactivity provided by the poster board medium to consciously engage their audience in their design ideas:

‘It should trigger people, we’re not going to try and explain everything, you need a 200 page
book for that, it should raise questions, and then engage in conversation.’ The discursive apparatus of the poster boards consists of the setting for which it was created, namely a final presentation event of the RbD competition with a specific audience in mind: ‘One of the presentations was for a big audience, on a high level floor somewhere in Manhattan, with all the teams, 10 posters, 10 scale models, and the public could just drop by, ask questions to the designers, have some drinks (...) ‘The second presentation was to the jury, which entailed we had to tell our story in 20 minutes.’ (...) so there is this audience, which means there are certain demands for the illustrations you use, it requires a more effective way of drawing and we took that into account from the beginning’.

Audience
However, as the poster board was created for a specific occasion to enable a specific kind of interaction, it might be interpreted differently when presented under different circumstances. For instance, a member of a local environmental protection agency interpreted the image differently, as he saw the depiction of high-rise buildings in flood prone areas as a repetition of previous mistakes: ‘(...) what Sandy did, places that were not developed at all when I was a kid were now what we call a disaster area. The disaster was that they were allowed to build there in the first place. (...) When it fails, it’s going to be worse than before (...) because what they’re planning, what the major point of the rebuild by design plan was, the one that got the award, was to build the necessary protections into the landscape and then over-develop the land behind that.’ The reaction of this stakeholder to the design presentation was triggered by the depiction of new urban development, made possible by the resulting increased flood safety. This resistance occurred because this type of expression contradicts a local discourse on unsafe urban development in the Meadowlands area. Additional discourses could also be identified
related to environmental protection, local identity, and governmental distrust, that all influenced the way the ideas of the meadowlands plan were perceived.

**Discussion and conclusion**

The framework of critical visual analysis presented in this paper consists of interpretive research methods, e.g. content analysis and discourse analysis. When performing interpretive research it is necessary to prevent over-interpretation, which might occur when from a minimal relationship between signs the maximum of interpretations is deduced [28]. Especially at the image stage a content analysis invites the researcher to draw conclusions regarding the functioning of images in practice. A social semiotic discourse analysis shows that images not always function the way they were intended. Yet, as the interpretation of one person does not represent the interpretation of all stakeholders the interpretation of one powerful stakeholder might trump the interpretations of others. A careful consideration of power dynamics and constant reflection on the analytical choices made by the researcher is necessary. Similarly, locating the discursive power surrounding the use of design representations using a visual discourse analysis is a mostly theoretical enterprise. The researcher locates a potentiality of discursive power, a power whose precise enactment depends on the socio-political context of each design project.

A critical visual analysis of all three stages, i.e. image, production, and audience, produces three different analyses of the same image. The visual content analysis results in a collection of codes that make up the semiotic complexity of the image. Based on this complexity, the researcher can identify specific aspects for further inquiry, e.g. the aspect of interactivity or readability. The visual discourse analysis shows how a visual rhetoric, i.e. a small font type on a large artist’s impression, was used to invite the audience to look closer and engage in conversation. A rhetoric that works because the technology of a poster board fitted the ‘apparatus’, i.e. the
presentations for the general audience and jury. However, the social semiotic discourse analysis also demonstrates that the image gives rise to a different meaning when such a poster board is interpreted outside its original context and without the presence of designers with whom to engage in conversation. With the interactivity of the poster board no longer at play the validity of the proposed design intervention and its consequences can be questioned without the ability to discuss potential issues with the designers.

In conclusion, we argue that some causes of resistance during participatory planning and design processes stem from counter-productive interpretations that can be traced back to specific signs or semiotic ‘markers’. These counter-productive interpretations could offer a possible explanation for the resistance against implementation of some of the RbD proposals. For example, in the case of the New Meadowlands project, showing high-rise development triggers strong reactions from small communities sceptic of anything government related. Knowing your audience’s ‘semiotic potential’ helps designers to anticipate possible interpretations of design representations and consequentially prevent the counter-productive implications of those interpretations.

References


[28] Eco U (1992) *Overinterpreting Texts*. In:
Figure 1 Example of RbD poster board coded for visual content analysis. (Source: Rebuild by Design)
Abstract
The Park of Extremes
Yakutsk, capital of the vast Sakha Republic in Russia’s far north, is a city of extremes. It is just south of the Arctic Circle and the area is covered in permafrost. Winters are cold with temperatures dropping to -50°C. Summers are warm, though rather short, with daily maximum temperatures exceeding +35°C.

This Park of Extremes project is designed to both tackle the challenges of extreme climate and to bring Sakha’s amazing natural ecology closer to the people.

The image of a “sopka” – a large hill covered with trees and steppe grassland that you typically find around Yakutsk – was a key inspiration for our design.

In a permafrost climate, it’s not just the cold weather that is a design issue. You also need to consider other factors: annual soil movement that results in uplifted paving; poor drainage, soil salinization; the seemingly limited planting palette; and the total lack of any weeding or care culture at city level.

To overcome these challenges, we turned to traditional materials and approaches, using permeable surfaces such as traditional wooden paving, gravel/sand mix and local plants well adapted to the conditions. We collect and redirect what little snow and rain water there is and channel it to provide healthy plant growth and to avoid salinization of the soil.

The sopkis and dry steppes of Yakutia gave us inspiration for our planting strategy, which is aimed at creating a sustainable plant community that demands minimum care.

The Park of Extremes or Teachers’ Boulevard Park, Yakutsk, Russia

Introduction
Yakutsk, capital of the vast Sakha Republic in Russia’s far north, is a city of extremes. With a population of 350,000 and growing, it is also the world’s biggest city where winters last almost 10 months (from September until May) and the short summers are hot.
The Sakha Republic or Yakutia covers 18% of Russia’s territory. It is a land rich in diamonds and gold and was originally populated by the Sakha people, a Great Steppe tribe that migrated up to the north.

Yakutia is just south of the Arctic Circle and all of its land is covered in permafrost. Its population is less than a million and the population density is 0.31 persons per sq.km.

Yakutsk is the only city in the Arctic region that keeps growing. Yakutsk’s demographics shows many young families with children. This phenomenon creates a demand for quality public spaces, but at present they are virtually non-existent.

The permafrost has now been actively built over with new residential buildings, although there are few public realm projects, despite the demand for them. Therefore, the city administration and the chief architect of Yakutsk have initiated research into the design and development of the city’s first quality public realm project – The Park of Extremes, also known as Teacher’s Boulevard.

The Challenges
The main objective is to design and build a quality landscape that will be both sustainable and adapted to the unique site conditions.

Dealing with the Extreme Climate
Winters in Yakutsk are long. The first frosts begin at the end of August and between November and mid-March the temperatures are always below freezing. In the coldest month of January the temperatures drop to -50°C (–58°F). Such frost is accompanied by fog and low visibility of just 2-3 meters. Viktor Abanikov, Characteristics of fogs in the urban environment and their microclimatic zoning [1].
The inland location means the air is quite dry and the winter winds are not as strong as in other cities with similar climate, e.g. Norilsk. At -25°C the perceived temperature is comfortable enough for outdoor activities and walks. Kids playing football after school at -25°C in not an uncommon sight. In March, the temperatures
are up to a comfortable -20°C and the skating season on the frozen city canal starts. Although the winds are not very strong, the protection from prevailing south-eastern and south-western winds in the warmer winter/spring season (March-May) is a consideration. Summers are very warm, though rather short, with daily maximum temperatures occasionally exceeding +35°C (86°F). The climate is quite dry with annual precipitation of about 238 mm. Yakutsk location just south of the Arctic Circle makes it a city of white nights or twilight nights in the summer and quite dark winters. In the winter, the light is reflected by the snow, so even a little street lighting makes a difference and makes the city less gloomy. When designing the park in such conditions it was important to create local microclimate with outdoor areas sheltered from the winds and heated indoor shelters for colder months.

Permafrost and hydrology conditions
The climate in Yakutsk is very dry with annual precipitation of 238mm. Yakutia is covered with permafrost, a condition where the soil, rock or sediment is frozen for more than two consecutive years. Permafrost exists beneath a layer of soil which freezes and thaws annually and is called the active layer. As permafrost is a natural barrier to the downward water movement and the active layer in the summer (between 1.2-2 m) is quite thin, most water run off is a surface runoff which is an important starting point to consider when designing drainage in these areas. Nikolay Chekaev, Soil Science and Engineering Geology. Soil moisture regime in permafrost areas [2] Another issue is that in Yakutsk the natural system of lakes and channels that were connected with the Lena River degraded as construction prevented the natural water flow. In permafrost condition this leads to the formation of bogs, soil salinization and formation of palsas or frost heaves.

The site is located next to the one of the lakes that was regenerated in 2012 and the water
flow was restored. The site itself has salty bog areas resulting from inadequate drainage as the existing topography prevents effective surface drainage. An old building also existed on site and as it was not build on stilts it melted the permafrost and created a mosquito filled bog right next to the residential buildings. Our main design objectives here were to restore proper drainage to stop more permafrost melt and salinization and to calculate water needs for the new park vegetation to thrive.

The degraded nature and lack of maintenance
The contrast between the vegetation in and outside the city of Yakutsk in the summer is striking. The city vegetation is very poor in species as the soil salinization is high. Just outside of Yakutsk one sees ‘sopkas’ or small hills covered in pine and larch trees and meadows and in the city the vegetation is less variable and the trees are mostly birch and salt-tolerant Salix species. Alexander Federov, Variability of Permafrost and Landscape Conditions Following Clear Cutting of Larch Forest in Central Yakutia [3]. The salt-tolerant grasses of the genius Phragmites is also a main city grass species that overtakes huge areas. Another interesting challenge is the total lack of any weeding or care culture at the city level. As the summers are very short, the idea of weed control seems like a useless waste of energy and is not even to be considered as an option.

The Design
The Mammoth Steppe as planting strategy inspiration
During the Last Glacial Maximum, the mammoth steppe was the earth’s most extensive biome. It spanned from Spain eastwards across Eurasia to Canada and from the arctic islands southwards to China. It had a cold, dry climate and the animal biomass was dominated by the bison, horse, and the woolly mammoth. This ecosystem covered wide areas of the northern part of the globe, thrived for approximately 100,000 years without major changes and then suddenly all these
animals became extinct about 12,000 years ago. Most of us are aware of what the woolly mammoth looked like, but its habitat has been slightly misrepresented in the past. Until recently scientists imagined the vegetation looked like a monotonous brown grassland. Recreations of the ancient Arctic vegetation relied on fossilized pollen found in the permafrost. Because grasses and sedges tend to produce more pollen than other plants, this analysis produced a biased picture of the landscape. Recent DNA analysis of fossilized mammoth’s gut contents showed that it was actually a colourful steppe landscape filled with wildflowers, grasses and other vegetation. Eske Willerslev, Fifty thousand years of Arctic vegetation and mega faunal diet [4]
The mammoth’s lunch palette proved to be tough (the flowers and grasses also wasn’t as palatable as the mammoth itself to early humans) and up to this day we still can find them growing in the conditions that are very extreme. The Siberian steppes that descend from the Mammoth Steppe have all the common attributes of this landscape typology we love so much – the bursts of colours in the spring, the delicately moving masses of feather grass intertwined with other grasses and perennials. Many species are the same as you find across European steppes in the Ukraine or in the south of Russia. And yet they managed to survive in much harder conditions. The Yakutia steppes are the toughest of all are the relict steppes. The steppes go back to the Pleistocene era and manage to thrive in permafrost of a very thin soil layer (up to 10 cm). As precipitation level is very low there is also very little snow cover to protect the plants. But steppe vegetation requires well drained soil conditions – very different from the salinized marshy conditions of the site. Creating conditions for this landscape typology became one of the key design objectives.

The Extreme Climate and materials
The extreme climate and permafrost makes it impossible to use commonly used hard
materials. Tarmac breaks every summer when the permafrost palsas come out and use of any hard-paving leads to high maintenance costs and yet in the city these materials are widely used. We have looked into traditional Yakut materials and existing private local practices and chose paving materials that would be easy to maintain and fix. The larch was traditionally used in Russian Siberian cities as a paving material and we use it in combination with coarse grit and local sand that contains clay and is similar to the permeable surface of the Jardin Tuileries in Paris.

**Design Strategy**
This pilot project, which is a cross between a small park and a courtyard for four residential blocks, is designed to both tackle the challenges of extreme climate and to bring Sakha's amazing natural ecology closer to the people. The image of a “sopka”, a large mound or hill covered with pine trees and steppe grassland that you typically find around Yakutsk, was a key inspiration for our design. The ‘sopka’ typology also allowed us to tackle most of our main challenges: The landforms are 1-2 meters high and create wind protection and warmer microclimate in the cold months and shade in the hot summer months. (For the winter, a heated pavilion is also a key part of comfort strategy). The hills allow as to recreate the steppe conditions and implement the planting strategy of using sustainable steppe planting communities that will not be overwhelmed by Phragmites species. The hills allow us to plant trees that can grow taller as they are not affected by the permafrost. Also it plays an important role in the water retention strategy. Unfortunately, as the vegetation is quite delicate we couldn’t use the hills as a playscape.

**The Project**
The site is located in the very centre of Yakutsk. A rectangular plot of 200 by 40 meters stretches between four residential buildings and has a north-south axis. The site is adjacent to the lake, but is separated from it by the road. The lakeside
part of the site has an elevation of about 2 meters above the street level. The park is meant to be used by the local residents, but we envision its popularity by many of the city residents as this is the first project of this kind. The sopkas form the green sheltered areas in the park where we place seating areas, a big playground, an outdoor gym with equipment popular with the elderly and the kids, and an area for temporary exhibitions. We use two types of surfaces to reflect the movement patterns in different seasons. The straight path of wooden pavers runs through the park so one can move quickly when it is cold. The rest of the surface is covered in permeable local sand and gavel mix. The heart of the park is located near the main street entrance and starts with a heated cafe pavilion and a big naturalistic playground for all ages. The slides are an important part of the play strategy as they can be used all year. The Climbing Forest play equipment is also made of larch timber. The lighting strategy for the park also reflects the challenges of northern climate. We use small bollard lighting alongside the main path and big lights suspended from the poles at the 2nd floor level to give more light during the dark autumn and winter months. This lighting will be switched off after 9 pm, so it will not disturb the residents’ sleep.

The park’s lakeside end has a portal structure with swings and big stairs with seating, so one can enjoy the views across water. This area has a small granite paved plaza as it will be used heavily on the weekends by newlyweds who will come to have their picture taken in front of the new monument of a local teacher.

Sustainable water management and drainage principles
It was very important for us to drain the site to avoid permafrost melting and the salinisation of the soil. But as the rainfall levels are so low, we needed every drop of water to keep the steppe planting lush at the end of the hot summer. Thus we slow down and retain all thaw and rain water under the hills in a gavel layer. The hills are made of local sand with a clay content that will allow
the moisture to go up to the planting. Any extra water that is not absorbed by the hills seeps through the thin sand layer that underlays the whole park area and to the drainage channels and is then collected in water tanks for future use. The drip irrigation system will provide water in the hotter months. The use of the sand layer has a double-purpose. In permafrost areas, one is not allowed to dig into it. Any hardscape can only be built up, and not down into the permafrost. So, the sand layer is always used to even the topography and it also serves as a drainage layer directs water.

We calculated our water need with a following formula. The annual precipitation in cubic litres for the site is 2162. Our watering needs are about 1261 cubic meters calculated using the water need coefficient for grasses, perennials and trees in the arid climate. So if we collect 859 cubic litres from snow thaw and rainfall we cover 70% of our needs (the calculation were made using the same method that the landscape Drip Irrigation Scheduling Calculator, Ted Gulik, The landscape Drip Irrigation Scheduling Calculator [5]

**Planting strategy**

The sopkas and dry steppes of Yakutia gave us inspiration for our planting palette, which is aimed at creating a sustainable and biodiverse plant community that demands minimum care. Naturalistic and yet striking planting design is a key principle for the park. Although the biodiversity principle is important, the aesthetics are just as important to us. For a new approach to succeed, planting has to please people.

We use steppe planting communities on the hills, but created more impact by using some more colourful plants en masse and doing a new perennial wave style of planting. The matrix of grasses – *Stipa* and *Festuca* species – and *Thymus* and *Carex* is used through the planting. Other local grasses such as *Koeleria* species and some others are used to created a more dramatic effect. The *Artemisia* species are also used extensively. We do not plan to use any fertilizers, but the *Fabaceae* family is very important in
our planting strategy as it provides the level of stability for the overall planting community. We basically use all of the species of Yakutian steppe to create sustainable plant associations with an exception of rare and endangered species. Over a few years we will be able to see how the plant community develops. We also keep some of the salt-tolerant species at the ground level as we believe it doesn’t make sense to change the soil for the site. We do not use any lawn grass or amenity grass as the short summer doesn’t allow it to be walked on or to be sat on. As there are no nurseries in the region, the planting required taking plants from nature. We hope to rescue plants from the areas of newly built roads and new developments around a new gold mine near the city.

Conclusions
The main objectives of this project are to:
- Use sustainable drainage practices that both help to solve the salinization and permafrost issues and provide additional water for the planting. To show how the site can be relinked to the water system through the lake.
- Achieve sustainable planting that would enrich biodiversity and be appealing to the general public and be easy to maintain.
- Create a dialog between the city authorities and the residents and to involve them in the creation of the sustainable public space around them.

In the next 2-3 years one will see the results that one can apply to other cities with similar climates. If proven successful the design principles can be applied on a city level as a public realm greening strategy. The project is scheduled to be built over the summer and fall of 2017 and we will see the results in the near future.

References


Abstract
The present article describes the method used for the development of the science project “Narrating Landscapes”. The main goal of this project is to make digital cultural content about the cultural landscapes of Spain accessible via the internet. The idea is to use an online platform, conceived as a virtual exhibit, to make the population gain their first insights into what is understood by a cultural landscape, what its main characteristics are, and what types of these are present in our country.

An effort has been made to organize the content into an architecture designed to provide an absorbing experience, centered around the user, capable of taking advantage of the potential found in digital technology. The aim is to offer an experience that is complementary to the actual act of visiting a cultural landscape, based on active participation from the user as part of a process of discovery, knowledge acquisition and learning.

The virtual exhibit is structured around an interface that centralizes navigation: a map of the national territory in which 100 cultural landscapes are geo-located. From this map, it is possible to navigate around the geography of Spain, interact with additional information, or select one of the 100 landscapes. Each one of these landscapes is documented with visually attractive material in a panoramic format, with a story organized in sequential order.

This project aims to transmit the idea that cultural landscapes do not derive their value exclusively from historical or aesthetic considerations; the richness found in sensory experience acquires fundamental relevance, and individuals are thus placed at the center of the evaluation criteria.

Narrating landscapes: digital contents to know Spanish cultural landscapes

The present article describes the method used for the development of the science project “Narrating Landscapes”. The main goal of this project is to

This project is financed by FECYT through...
make digital cultural content about the cultural landscapes of Spain accessible via the internet. The idea is to use an online platform, conceived as a virtual exhibit, to make the population gain their first insights into what is understood by a cultural landscape, what its main characteristics are, and what types of these are present in our country.

The relevance of this project arises from the scarce knowledge that the population has about this type of heritage, given that cultural landscapes were first recognized as a category within cultural heritage only two decades ago. Today, they are part of the strategic directives drafted in European agreements regarding regional development. Moreover, the government has promoted the National Plan for Cultural Landscapes, and some Autonomous Communities have put strategies in motion to highlight their value.

Within this context, this platform or virtual exhibit takes on three interrelated topics: (1) the evolution of the concept of heritage up until the notion of cultural landscape; (2) the conceptual, methodological and technical innovation that has emerged from the consideration of these cultural assets; and (3) making 100 Spanish cultural landscapes known to the world, as identified within the framework of the National Plan for Cultural Landscapes, with their protection and characterization improving day by day.

Considering the open and multidisciplinary character of these cultural assets, we must highlight the need in defining general objectives that can be achieved through specific actions:

- Promoting the emotional bond between people and cultural landscapes based on immersion and experience. These are necessary elements of the social appreciation that gives meaning to conservation efforts.

The project has been developed by the Cultural Landscape Research Group of the Technical University of Madrid.
Providing a global understanding of the concept of cultural landscape, scarcely known today by the general population, as well as the specific aspects of its new status as a cultural asset to be protected.

Establishing a line of connection between the scientific realm and society that will allow for the bilateral communication that constitutes an indispensable part of the research dedicated to cultural heritage, and which must be especially sensitive to social participation and appreciation.

An effort has been made to organize the content into an architecture designed to provide an absorbing experience, centered around the user, capable of taking advantage of the potential found in digital technology. The aim is to offer an experience that is complementary to the actual act of visiting a cultural landscape, based on active participation from the user as part of a process of discovery, knowledge acquisition and learning.

**Interactive Maps as a Medium of Discovery**

The virtual exhibit is structured around an interface that centralizes navigation: a map of the national territory in which 100 cultural landscapes are geo-located (Fig. 1). From this map, it is possible to navigate around the geography of Spain, interact with additional information, or select one of the 100 landscapes. Each one of these landscapes is documented with visually attractive material in a panoramic format, with a story organized in sequential order.

Nevertheless, the function of the map as a structure-giving medium is two-fold, since it allows access to the landscapes while at the same time it makes the reading of their spatial relationships and their comparative characterization possible, without any previous hierarchy or categorization. On one hand, the map is the interface on which additional information is indexed, taking the user to a detailed explanation of each one of the landscapes. On the other hand, it provides an
overview of the entire group of landscapes, and allows the user to define the contents of the online map by activating or deactivating layers. In this way, the map is not only presented as a means of communication or a group of links, but also as an interactive instrument for analysis and reference\(^2\).

Establishing the degree of freedom enjoyed by the user in the handling of spatial information has been a key design challenge in creating this map. GIS is a platform involving a great amount of operational complexity in which the user systematizes the information ad hoc; in other words, spatial data, along with its hierarchy and representation, is created with a specific goal in mind, that arises from its use. This freedom in the loading and handling of information requires a specialist user with the ability to discern and deduce specific results beyond a mere spatial relationship between the elements that have been mapped. Therefore, it has been necessary to select content and design specific modes of interaction that will allow the non-specialized user to interact with spatial information, while reducing the possibility for confusion due to the overabundance of data. This objective has been achieved via a multi-component cartographic interface\(^3\). This resource simplifies navigation for the non-specialized user by adding several supplementary elements to the main map that allow for a preliminary systematization of information. In this way, the user is guided towards a certain reading without being totally conditioned. This is done by using components, defined as interactive tools that make the characterization of information easier by showing additional layers or carrying out geo-processing operations. In the map for the virtual exhibit “Narrating Landscapes”, its number and type is adjusted to a series of deduction and inference tasks oriented towards contextualizing the cultural landscapes within the land, and revealing the complexity and dynamism of the human activities that configure them. The interaction of the user with the map has been proposed by way of three components for the multi-level reading of the landscapes on a
national scale: predominant character, associated values, and territorial articulation systems.

Predominant Character
The initial map encountered by the user is a representation of the national territory, on which 100 circular icons appear in four colors; each predominant character has a color assigned to it, so that the icon used to geo-reference each landscape on the map has a color associated to it. In this way, the icons for “agricultural, livestock and forest landscapes” have a green color; “symbolic landscapes” are blue; “industrial landscapes” are yellow; and finally, the icons for “urban, historical and defensive landscapes” are red. The first component therefore consists of a pop-out menu on the left side of the screen that makes it possible to show or hide landscapes based on their predominant character.

Associated Values
Closely related to the predominant character, the second component allows the user to activate or deactivate landscapes based on the presence of a series of associated values. These values are attributes that allow us to characterize the landscape beyond its predominant character. They depend on the presence, on a secondary level, of eight landscape-generating activities pointed out in the National Plan for Cultural Landscapes: Agricultural, livestock and forest landscapes; industrial landscapes; exchange and commercial landscapes; landscapes related to social events; offensive-defensive landscapes; urban systems or historical settlements; large infrastructure; and stages associated to historical events. In this way, the user can, for example, not only know which landscapes are industrial, but also discover which of them possess a secondary character linked to agriculture.

These two components, predominant character and associated values, allow us to work with the landscapes themselves, bringing about relationships between their specialization and their characteristics. It is a mode of navigation that aims to avoid the rigidity derived from the traditional typological method of categorization, allowing us to establish various degrees of relation between the cartographed elements.
In this way, the user can discover the Llobregat Delta landscape for example, which has a predominantly agricultural character but also possesses mining vestiges, allowing us to indicate that industrial activities played a role, to a lesser degree, in its configuration.

Territorial Articulation Systems
The third component allows us to visualize the landscapes along with various spatial articulation systems on a super-territorial level. These have been selected based on sociocultural and historical representativeness criteria. A button on the right upper-hand side allows us to add various layers to the main map: protected natural spaces; the main rivers in the Iberian Peninsula; roman ways (Fig. 2); livestock routes; and cultural development systems such as the different variants of the Way of St. James.

While the first and second components are included with the intention of blurring the boundaries between types, this third component has been incorporated to blur the most literal boundaries found within the territorial organization of the Iberian Peninsula. Faced with the detriment of showing the landscapes as isolated entities within the whole, the inclusion of what we call super-territorial systems is but a resource that allows the user to understand the Iberian Peninsula as a structured unit, and its landscapes within the context of a spatial order higher than the current geopolitical order.

Aside from the interaction between layers, the map allows for vertical navigation. In other words, being attracted by the geo-referentiation icons in each landscape, the user can zoom in and access maps with a greater level of detail, similar to popularly used platforms such as Google Maps. Starting at a certain scale, when the screen begins to frame the territory occupied by the landscape in question, the graphical map is transformed into aerial photography, allowing for a bird’s eye view identification of the structures, forms and elements that compose it.

In summary, the map displaying the 100 cultural landscapes functions as the element giving structure to the platform, providing usability
benefits while communicating basic ideas about the general characteristics of the cultural landscape. Therefore, an essential relationship between usability and the conceptual base of the platform exists. The geo-referentiation icons, along with the layers containing additional information, favor a way of interacting with the map that is simple yet developed enough to make it possible to present the complexity and dynamism inherent to these cultural assets of territorial dimensions.

**Narrating Landscapes**

As mentioned before, the map works simultaneously as a narrative mechanism and an interface that connects the individual landscapes. As a result, navigating the website does not follow a pre-established order; instead, the user can access the information pertaining to a landscape directly, and then move on to studying the set or access other landscapes. In this way, the virtual exhibit is presented as a medium through which we can acquire knowledge openly and without a hierarchy. It is the interaction itself between the user and the platform what makes him/her able to create a story that can lead to the forming of his/her own ideas.

Access to the landscapes from the map occurs through a simple procedure: by pressing on any of the geo-located points. The majority of these landscapes are presented with a basic card including an image, text, an orthophotograph, its associated values, and a specific bibliography. This material, as a whole, explains the main characteristics of the landscape in question. Among the 100 cultural landscapes, 25 have been selected for a wider and more complex narration. The selection is made based on singularity criteria, based on its specific attributes or due to their status as a World Heritage Site. The aim of this selection is to generate a sample that will allow the user to have an immersive sensory experience. Cultural landscapes have made it possible for the first time for the immersion of people in within the cultural assets themselves to acquire transcendental importance. This entails a significant innovation in the exhibit: it becomes
a framework for the transmission of a sensory kind of wealth that becomes more important than even the historical-artistic information found in a traditional narrative.

With this purpose in mind, special value has been placed upon immersive information, defined as that which presents sensory non-quantifiable values, and which, in a certain way, allows the user to become submerged in that particular place and understand its perceivable qualities.

The information shown in the 25 landscapes is, in general, a compilation from various sources that register the personal perceptual experience of an individual in the landscape. This way, the media incorporated includes footage recorded by drones, cellphones or GoPro cameras extracted from platforms such as YouTube or Vimeo, photographs from websites such as Flickr or Panoramio, historical recordings from various archives, or even movies that use a specific landscape as a location.

Given that the quantity of information intended to be included in each of the selected landscapes is high, it is organized into three types of narration: maps, lines and stories. All of them include information in cartographic, audiovisual and textual format, making it necessary to adapt it to each place, organize it and make it accessible.

**Maps**

Maps imply a non-sequential mode for the transmission of information, that makes it possible to have an integral and simultaneous overview of the elements laid out in space. This narrative strategy is used in landscapes with a strong surface component, by laying out a series of points that give access to multimedia content.

**Lines**

This narrative mode is used for landscapes with a layout over a territory that is clearly linked to a linear element; it could be a river, a road or a railway. Along that linear element, we can find different points that give access to multimedia content, as shown in Figure 4 for the Arribes del Duero landscape.
Stories
Maps and lines highlight a spatial quality of the landscape through which the narration is structured. Narration in the form of stories is used to explain landscapes that either do not possess a clear spatial structure, or whose explanation requires additional material to be complete. Its organization therefore takes up the form of an article, in which the text is complemented with interactive elements such as maps with multimedia information or superimposed cartographic information and historical orthophotographs. Figure 5 shows an example for the Sierra Minera de Cartagena landscape.

Innovation and Transmission of Knowledge
The virtual exhibit aims to transmit the idea that cultural landscapes do not derive their value exclusively from historical or aesthetic considerations, as is the case with the traditional categories for cultural heritage; the richness found in sensory experience acquires fundamental relevance, and individuals are thus placed at the center of the evaluation criteria. The idea of the “senseable,” without going into specifics, allows us to reference in a complete manner all the physical and psychological aspects that are contained within the aesthetic experience of a landscape. The “senseable” includes the process that begins with the physical–sensory perception by the human body and continues with the mental construction of individual meanings, and even their interpretation and presence in collective memory.
In this context, the visual culture associated to digital media presents a unique potential for immersion within the landscapes, and it is hoped that it will favor their social appreciation as cultural assets. The communication strategy begins by considering landscapes as being configured, to a significant degree, by the reception and recording of images, with these being understood, in a broad sense, as the capturing of a dense array of sensory stimuli and their associated meanings. The use of a platform that combines virtual simulations, dynamic representations, and interactive cartography
implies an improvement in the way in which the story about the value of cultural assets is transmitted to the public. Ultimately, the idea is about having an innovative communication strategy based on immersion and experience. The development of the internet and information technology has allowed us to establish relationships between large amounts of apparently unrelated data, with which the user can interact and construct his/her own navigation sequence. Concepts such as hypertext and the hypermedium have called us to redefine others such as that of the encyclopedia or the Atlas. As a result, what was classically understood as organized collections of elements has been transformed into hybrid platforms capable of bringing several forms of communication together such as text, video, audio or maps, and organizing them in a non-linear way in which the information offered is interconnected. The development of this project uses these new forms of knowledge acquisition, which are capable of encompassing the complexity inherent to these cultural landscapes. The extended conception of this exhibit as a multi-scalar and multi-perspective medium makes it possible to understand landscapes conceptually, within their national specialization, or within their individual particularities. In this way, we can put together and interconnect text-based information with other more technical media, such as maps, and other media more suitable to explain landscapes from the realm of experience, such as video or audio. The virtual exhibit can therefore be defined as a collection of hypermedia accessible via a website that links all the digital elements (videos, photographs, maps, journey simulations, information). Ultimately, the innovativeness of this proposal lies in the narration it uses to tell the stories associated to the documentation that allows us to characterize, appreciate and get to know these cultural assets. The value of this virtual exhibit as a platform to raise awareness about cultural landscapes can be found in its aim to become a vehicle of sensory experience, beyond the general data and morphological, functional and/or typological
characteristics that they contain. This experience proves indispensable in the social appreciation of landscapes, and it is fundamental in the improvement of the processes to protect them. It is when the sensory values of these landscapes are transmitted to the general public that people become conscious of the qualities that should be preserved. Images, videos, maps, sounds, and other media, allow us to assimilate the landscape through our immersion in it and make us feel the phenomena of sustainable adaptation between society and nature that are inherent to it. Emotion dignifies comprehension.

Endnotes
Figure 1. Map of the national territory on which the 100 cultural landscapes are displayed.

Figure 2. Layout of the territorial articulation system made up of roman roads.
Figure 3. Maps as a narrative form within the mining landscape of Riotinto.

Figure 4. Line as a narrative form in the Arribes del Duero landscape.

Figure 5. Stories as a narrative form in the Sierra Minera de Cartagena landscape.
Abstract
Urban landscapes in the cores of historical cities have had, and continue to have, different functions over time. In many historical city centers the structure takes the form of hollow blocks with internal courtyards. While the function of the buildings may change – from residential to commercial and back again, from densely populated by larger families to being occupied by older pensioners living on their own, for example, so does the function and condition of the inner courtyard. There are often semi-public or semi-private, may have been infilled with further buildings or used solely for car parking while in the past they had gardens or clothes drying grounds. In this macro measurement courtyard spaces become special places, which play an important role in residents’ wellbeing. They often remain relevant spaces and perhaps the only micro-ecological reservoir in a densely populated historic city centre as well as the places for psychological and physical activities by the residents. When adapting modern approaches to the reinvention of courtyard spaces it is necessary to consider historical traditions, where from earlier times these spaces were multifunctional. It is important to successfully combine the needs of modern cities with their historical, current and future aspects, while creating places which meet modern needs. This study explored past and present morphology and use of the courtyard spaces in the 7th (Neubau) district of Vienna by analyzing different historical sources (archival, cartographic, maps, literature and documentary) from the 19th century and comparing them with contemporary maps and conditions, followed by qualitative interviews with a sample of residents of each there different types of courtyard blocks. By developing a scheme charting the dynamics and changes of the courtyard space due to economic, political, urban and cultural factors, we could consider the condition, usage, importance and opportunities to balance green inner space. We also determined how the physiological, emotional and aesthetical status of the residents could be benefitted and planning could influence the future of the urban ecology was developed. We found that these spaces have many potentials and people value them highly for a range of purposes. Older residents could tell stories of the changes over time and some courtyards still reflect the life of the inhabitants and contribute to social capital and integration.
The temporal dynamics of courtyard spaces in historic city cores: A case study of Vienna, Austria

Introduction
Current approaches to urban planning aim at reducing the problems of urban sprawl and peri-urbanisation by densifying urban cores. In addition, so-called ‘nature-based solutions’ are sought for reducing the human impact of the urban microclimate, sealed surfaces, traffic congestion and pollution on humans and biodiversity alike. Many observers see contradictions in this trend – after all, people moved out of crowded city centres to the suburbs or else the dense and poverty-stricken inner city areas were cleared away in the post-war years and people moved to modernist housing estates. In a number of cities, the inner areas undergo population shrinkage as people desire places with more green spaces and better parking and other facilities, especially when they want to bring up their children. Cities such as Genoa in Italy or Lisbon in Portugal have seen considerable population decline in the old central cores, leaving vacant properties and problems of maintaining services and infrastructure. How to re-energise urban cores is thus an important aspect of urban planning and design and it also impacts landscape architecture, which has a role to play in developing innovative solutions for greening such areas and in providing a healthier and more welcoming streetscape.

In today’s historical cities, many of which are under protection as UNESCO world heritage sites, tourism is an increasingly important economic factor which also influences the way that these inner areas are used and re-used. In Porto, Portugal for example, a new wave of tourism has invaded the inner city and areas of abandoned property have become colonized by hostels, bars and Air B’n’Bs. Such trends gradually squeeze local, low income, people out of these areas and the life of them starts to disappear.
The wellbeing of urban citizens depends on many factors – suitability of housing, noise, air pollution, a sense of safety and security, shops and other services and access to green spaces. In inner city areas some studies have shown that green areas are at the bottom of the list of priorities of inner urban citizens in several countries, while safety and security are at the top\(^5\). However, green areas, places to mix and undertake Jan Gehl’s ‘resultant activities’ \(^6\) and safe places for children to play are among the requirements of urban centres – the more so the denser they become. There are important ecological values that influence the well-being and quality of life of the residents\(^7\). There is no such thing as useless space, the contemporary city should use all of the potentiality of spaces \(^8\), especially in the context of historic city cores – such overcrowded multifunctional spaces by the tourist, residents and other users.

Urban landscapes in the cores of historic cities have had, and continue to have, different functions over time. While the older ‘organic’ and dense character of, eg, mediaeval cities poses problems for evolving into something that meets the needs of the modern urban citizen, those cities which contain planed quarters – whether the New Town of Edinburgh, the Example district of Barcelona or many central European cities, there are different possibilities. In these patterns of urban form of the hollow block, where the inner courtyard is surrounded by a number of residences and commercial premises, rising to perhaps six storeys on average, maintains a contrast between the completely public space outside and the semi-public, semi-private or completely private space within. While the function of the buildings may change – from residential to commercial and back again, from densely populated by larger families to being occupied by older pensioners living on their own, for example, so does the function and condition of the inner courtyard. There are often semi-public or semi-private, may have been infilled with further buildings – as was the case in parts of Berlin back in the early 1900s or used solely for
car parking while in the past they had gardens or clothes drying grounds.

In this macro measurement courtyard spaces become special places, which play an important role in residents’ wellbeing. They often remain relevant spaces and perhaps the only micro-ecological reservoir in a densely populated historic city centre as well as the places for psychological and physical activities by the residents. When adapting modern approaches to the reinvention of courtyard spaces it is necessary to consider historical traditions, where from earlier times these spaces were multifunctional. It is important to successfully combine the needs of modern cities with their historical, current and future aspects, while creating places which meet modern needs.

The research study described here is part of a wider project exploring the revitalization potential of a number of historic courtyard-dominated urban cores in central European cities and aimed at the evaluation of the courtyard spaces of the heavily populated commercial and residential 7th district of Vienna. This district is located in the western part from Vienna’s Inner City and bordered with 8th Josefstadt district, the main Inner district of Vienna, the 6th Mariahilf district and the 15th district on the west (see Figure 1).

The aim of the research was to assess the past and current forms, uses and structures of the urban blocks and courtyards in the sample area and to relate this to the perceptions of people living there today.

**Background to the sample area**

Neubau was established as a district in 1850 but some sections of this district dates back many centuries. Before the formation of the urban district, it was an area divided into a few settlements: the oldest settlement that was mentioned in 1202 was St. Ulrich, then Spittelberg, Schottenfeld, Laimgrube, Mariahilfer, Neubau, Schottenfeld and Altlerchenfeld. The population of this district remained relatively
stable from 1864 until the First World War (at around 80 thousand inhabitants) but after the First and Second World Wars the population gradually decreased and never reached the previous number of inhabitants. Since the 1980s, the population has stabilized and by 2015 it numbers some 31 thousand inhabitants – still less than half of its pre-First World War maximum. This can in part be deduced from the fact that the number of apartments has stayed fairly stable but that average family sizes have decreased considerably. From the statistics of 2008 it can be seen that the proportion of the population aged between 20-39 was 38.3% while the Viennese average was 30.9%, suggesting that it had started to gentrify or become a place for hipsters – as also evidenced by the appearance of many new buildings/offices for young businessmen, artists and other creative people.

Methods
The reason for selecting Neubau as a case study includes the dynamic status of the district, the different mixes of residents and tourists, the current lack of urban green infrastructure and the fact that there is already some relatively recent information on the character of the area, the “Neuinterpretation Öffentlicher Raum” research report, provided by DSP-Architect in 2004. In this report the authors mentioned that courtyard spaces have a big potential in Neubau district but that since their priority was to identify the quality of green open spaces within the district, this potential was neglected and has been so ever since.

Case-study characteristics and time study method
By compiling data from a range of different historical sources (archival, cartographic, maps, literature and documents) dating from the 19th century and comparing them by overlaying them period by period on contemporary maps, it is possible to understand the dynamics and changes to the courtyard space arising as a result of the economy, policy, urban and cultural factors. From these analyses and also by referring to a density map (see Figure 2) one single segment
(residential block), with a particularly low population density (163 inhabitants per hectare), was selected as a more detailed case-study in order to analyse the fine-scaled dynamic changes and contemporary use of the spaces within the block. After analysis of this residential block it was possible to develop a contemporary scheme of its condition and use.

**Semi-structured interviews**
While the spatial analysis tells us what is there physically, it is not possible to understand the dynamic occurring due to social and other factors. Therefore, a set of semi-structured interviews were undertaken with some of the residents and visitors to the specific segment of the district, aiming at exploring the contemporary conditions and use of the inner spaces and how the residents relate to these spaces and how it influence them. A total of 12 residents had been interviewed by the time this paper was prepared. They were asked the following questions: “Are these spaces important for residents?”, “How do residents use this space and how does it influence them?”, “Does you feel some spirit of the place here?” and “Are there any conflicts with commercial and other functions within the courtyards?”, “Does the visual contact with the courtyard reflect on their well-being?”.

The interviews were voice-recorded and then listened to in order to extract key words and phrases which were categorised into different themes concerning physical quality, psychological and aesthetic values, safety and security and the architectural organisation of the courtyard spaces. The interviews each took about 10-15 minutes to complete.

**Results**

**Spatial and temporal analysis**
In typical courtyards a current picture emerges of a space characterised by high density development, with the land being divided by a fences into a number of different plots of varying size and use. Sometimes the spaces contain vegetation, small storage huts or
garages and sometimes, due to the sizes of the internal spaces, it could be residential infill constructions of various qualities, which spatially and visually divide the larger plots into smaller ones (see Figure 3). All of these factors change the residential landscape, cause shade in some areas, restrict views and a sense of openness and light from many of the flats that could affect the psychological state of residents.

The map of 1770 (see Figure 4) shows a large-scale residential area which is divided into various gardens and laid out in a variety of patterns ranging from large and middle sized baroque style gardens to small unstructured plots with vegetation. Besides the dynamic sizes of the space usage it can be seen that southern and western part of the area is already formed by the residential building, thus separating these gardens and inner spaces from the outer environment and streets. We can see a process underway where different courtyard space configurations are starting to evolve here. After Andreasgasse and Lindengasse appear in the city layout and construction of the first residential building line, the area finally receives its borders which have remained the same until today.

Further dynamic changes to the green spaces and residential character is visible when comparing the 1770 map with that of 1830. A number of additional buildings have appeared which almost enclose the inner space, which remains generally open and divided into a smaller number of plots which have no specific layout design any more. The internal space has some subdivision but is still quite large in proportion to the build areas.

Moving forwards from 1830 to today shows how the block has now been extremely densely infilled. The central part of the area that used to be divided into eight green plots is now separated into very small transition spaces without any green elements. The only one from eight of green plots, that located in the centre between the LIDL supermarket and a museum building, still exists. The southern and south-western
parts of the block using the ground floors for commercial purposes and the average height of the residential buildings are now six floors.

From a detailed analysis of the area (see Figure 5) we can find 44 separate courtyards (or open spaces among buildings – some are hardly courtyards as such), where 3 courtyards are using as car parking, 18 small spaces only have a ventilation and insolation function, one is equipped with a playground and greenery that belongs to the kindergarten, there is one recreational public space belonging to the museum, there are 14 transit courtyards, 6 recreational examples with greenery and one private courtyard with access only from the supermarket.

Such analyses of space usage shows how it would be possible to improve the green structure even if only by adding some vegetation to the courtyards used for transit. Even so, it is possible to find good unused spaces that could be transformed to semi-public spaces (controlled by time limits, for example) in areas crowded by tourists in the daytime but available to residents in the evenings, for example. Sometimes the spaces are mixed with educational buildings, where they are used as playground and green zones during the school day which could also be open for community use the rest of the time so that taking care of the quality of these spaces and dividing them into several zones (double level playground, green zone with benches etc.) would be important. Rational usage of the spaces should be a first priority for the residents and other users, no matter whether it is a big plot with parking or just a transit zone (see Figure 6).

Users’ needs and activities
The interviews mentioned the unique factors of these spaces, some highlighting the fact that ‘you never know what is behind the facade of the building’ and that they serve as a big soundproof reservoir against the noise of the city such as cars: ‘you can do whatever you want, no one will hear or disturb you, except the neighbours’.
Another important factor pointed out by respondents was additional sunlight and ‘your own fresh microclimate, especially after rain, when your room is filled with the fresh air’ – as explained by the one resident.

The residences were very excited after they were asked ‘does visual contact influence you?”, answering, for example: ‘Of course it influences me a lot. During the spring you can see the blooms in the garden, the trees. In winter everything is totally white as in a fairy-tale and children are playing snowball fights while in the summer this place is like a refrigerator - a good shady place where you can drink fresh drinks with your family and, of course, the most romantic autumn period, where all the trees becomes orange and red’.

Low quality or too great a distance to the closest playground was a common issue that residents with children faced. We asked two families (with and without children), who share their courtyard with the kindergarten whether there are any conflicts or concerns from the quite noisy active playground of the kindergarten. The ones with no children answered: ‘You will be quite surprised, but the noise from the playground doesn’t disturb me at all. As I’m a freelancer and spending almost the whole day working at home, children voices do not disturb me; I could even say that somehow it creates some sort of buffer zone between understanding that I’m not at home and not in the typical office environment’. The family with children stated that it is a great and safe place for their children when they are busy at home – they are away from the streets and easy to look after. ‘This place is organized well and our girls could spend some time even in the evening, when the kindergarten is closed, but still you have got access to the courtyard’.

**Discussion and conclusions**
The current work describes preliminary approaches for analysing the dynamics of courtyard spaces and their condition, the results helping to show not only how the place has
evolved but also in identifying the opportunities for improving them, by developing a priority map of renovation and modernization and identifying the spaces that could be used to solve overcrowded issues in historic city cores.

Perhaps one of the most significant issues in the contemporary city is urban ecology, the quality of micro and macro climate and how it influences the urban living environment. In a time when urban densification is a policy goal at the same time as increasingly recognising the need for space and urban green the potential for breathing new life into poorly and inefficiently used urban courtyards – even in dense examples like the one described here, has potential to improve things considerably. Analyses of this residential block helps to explain how, due to dynamic changes, these spaces still have a future if used more rationally.

The interviews with residents showed that these places, due to dynamic changes, are still trying to adapt and play an important role for residents; somehow even small plots are can be turned into green areas; playgrounds increase the number of users and quality of well-being. The idea that spaces could have different uses at different times of the day helps in their being more efficient. These factors help explain that through all this dynamic changes of courtyard spaces are referenced to its primary ideology – private gardens and recreation zones that are separated from the outer environment within residential blocks in historic city cores.

References
(Endnotes)
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5 Nilsson, K., Pauleit, S., Bell, S., Aalbers, C., Nielsen, T., 2013, Peri-urban Futures: scenarios and model for land use change in Europe, The Dynamics of Peri-Urbanization, 13 – 44 pp;


Figure 1. Vienna with its districts

Figure 2. (left) Density scheme of Neubau district (source: DSP-Architect et al. 2004), (right) selected case study area (source: author).

Figure 3: Courtyard spaces divided by fences, garages and other buildings (source: author)
Low density (Mariahilferstrasse, Zieglergasse, Lindengasse, Andrausgasse): historical development

Figure 4: Historical map analysis showing how the block has gradually become more and more built up and dense (source: the author)
Figure 5: Space usage scheme (source: author)

Figure 6: Examples of different courtyard space types (source: author)
Abstract
In the process of designing landscape structures, social dialogue constitutes the basis for creation of human-friendly environment. Therefore, it is a significant element in the process of education of landscape architects, raising their social awareness and increasing sensitivity to the needs of the people using the designed space.

The purpose of the article is to present - using selected examples of diploma projects of students of the landscaping major - methods and tools of social dialogue used in the design process to create pro-social space.

Social participation can be seen as a catalyst in the design process, causing multi-directional transformation: of the place and the people.

Social dialogue, being a certain conversation between the designer and the users, making use of selected information acquisition tools (workshops, surveys, drawings), results in:
- making the designer more sensitive to social needs,
- effective transformation of previously dehumanised space into bustling places, and
- transformation of social awareness concerning emotional bonds with space and possibilities of using this space.

The presented examples have been chosen both due to the differences in selection of social dialogue tools to fit the user group, as well as due to the differences in the functional programme.

The landscaping project for the kindergarten’s garden required application of tools adapted to the possibility to conduct dialogue with children, in the form of drawing workshops. On the other hand, for design of the land development project for the shared interior area between apartment buildings, it turned out that a survey and direct interviews were more appropriate. In turn, in the case of the largest area, being an example of public town space, a multiple-choice questionnaire turned out to be the most useful. However, selection of the proper dialogue tool requires awareness of its constraints and advantages.

It seems that showing the landscaping beginners the significance of social dialogue in creating...
human-friendly space is one of the main tasks of the teaching process.

Social dialogue – didactical implications

Introduction

Social dialogue in the process of designing landscape architecture objects is the basis for creation of a human-friendly environment. Owing to that it is an extremely important element in the process of educating landscape architects, raising their social awareness and increasing their sensitivity towards the needs of users of the space.

The aim of the paper is to present, on selected examples of landscape architecture students’ diploma designs, the methods and tools of social dialogue utilized in the design process for creation of a pro-social spaces. The presented examples were chosen both paying special attention to differences in choice of tools for social dialogue according to the group of users, and the differences in functional program of the designed objects.

Social dialogue in designing landscape architecture

The notion of social participation denotes the participation of citizens in managing the public issues of their community [1]. Social consults and direct actions play a significant role among the tools for social participation.

Carole Pateman points three main types of participation, that differ in the degree of engagement of participants: the pseudo-participation (that engages just individuals, used to consult the actions), partial participation (the community engages in the process, but only few individuals influence the decisions made) and full participation (every member of the community has equal influence on the outcome of consultations) [2].

Jules Pretty in turn quotes as many as eight types of participation: manipulative participation – mock-up action, engaging only members of the community that do not have influence on decisions made; passive manipulation – people are only informed about planned action, but their
opinion is not taken into account; participation for information sharing – exchange of information based on answering questions (surveys) without possibility to influence final decisions; participation through question – participation in surveys that form the basis for definition of problems and their solutions, with the possibility to change them in the light of responses gathered; participation by material benefits – co-participation connected with acquisition of specific benefits; functional participation – co-participation takes place in the framework of the formed group in order to set the targets for action first; interactive participation – co-participation includes plan analysis and creation of new ideas, the participants influence the final decisions; self mobilization – the participation is an independent initiative of inhabitants, acting together towards change [3].

In landscape architecture design the social participation plays the role of a dialogue between designers and users, and also as an element integrating the local community. ‘Spatial design is this field in which the presence of direct democracy elements (e.g. social consultations) has its special justification, as designing a zoning plan concerns vested interests of both the whole local community and its respective members’ [4]. Social participation can be accomplished with different methods and with different degrees of engagement of the community. The participation of population in the process of designing common public spaces is connected with psychological or social need to co-create your own environment and to have an active attitude towards it [5]. Social dialogue on different architectural scales [6] concerns active participation in decisions and execution, which make it one of the possible ways to accomplish the idea of homeliness [7]. Skillfully conducted it may also lead to occurrence of positive changes, both in spatial and social context, enhancing the identification of users with space and influencing the individualization of architecture [8]. Tools of dialogue that may be used for social participation are mostly surveys and different
design and drawing workshops, and “Planning for real” [9] consulting methods that engage local communities and stress building group cohesion [10].

**Dialogue of the designer with user of space on selected examples of landscape architecture students’ designs**

*Development concept for sensory garden at a preschool in Szczecin*

Subject of this work was the concept for development of children’s garden located at an inclusive preschool in Szczecin, with emphasis on the sensory action. The design works were preceded by studies of the literature, comparative analyses, field analyses, including urbanism and tree stocktaking. Elements of participating design formed an important part of the work, with interviews conducted with the headmaster of the institution and its teachers and workshops with children. Their aim was to learn the needs and expectations of future users of space to the largest possible degree and an attempt to include them in the design process.

Some 90 children, aged 3 to 6 attend the preschool, with some 30 of them disabled – both mentally and physically. The workshops with children were conducted in the group of 5-6 year olds. The children were informed about the purpose of that meeting and how important their participation and opinions were for creation of a garden, that they would enjoy playing in. The workshops were conducted in a free atmosphere of play. First the children were asked to present their visions of dream playground with use of colorful crayons and then, they were asked to discuss them. The children depicted both the devices that were well known to them (swing, slide, small house) and living animals and plants (fig. 1). The outcomes were colorful, energetic drawings that showed space with a specific of home garden that the children shape and become hosts of. What is crucial is the role of plants with play-related properties depicted by children in their presentations and well known to them. But the most valuable element of the meeting was the creation of group cohesion, engagement of
children, feeling of purposefulness of task and work that makes sense both for the designer and children.

Taking teachers’ opinion into consideration and work with children found its fruition in creation of two variants of the spatial development concept for a garden that would link the educational and playful functions with integration, with the main element in form of plants chosen for their ludic and sensory properties. Both variants of the concepts were based on functional division of the grounds, that adjusted the program of the area to needs of its users that were defined thanks to workshops and opinions gathered from the teachers. Within the proposed usable area arrangement, the following elements were suggested: representational zone with lawn and flowerbeds, communication zone and the sensory zone, that consists of several parts equipped with playground devices and elements that stimulate different senses.

The first variant of the concept stands out by its free composition of colorful flowerbeds, wooden pavements and lawns. The whole composition is based on a shape of interconnected circles. The designed interiors allow for group classes, open-air workshops or free or themed play with use of playground devices. Among the proposed traditional elements, such as a play house with slide or swing we also find elements with sensory action. The standing wooden structures and bays with instruments develop hearing. The wooden wall with movable elements that transport water, through play with water and sand, stimulates the sense of touch. Flower-shaped drawing boards grant the possibility of creative play, developing manual skills. Flowerbeds, with their design and choice of plant species that makes them look like a rainbow, form the characteristic element of that composition. Plant species were chosen for their sensory action\(^1\) (Fig.2).

\(^1\) The garden includes species that stimulate vision, among others: ‘Hot Lava’, ‘Leilani’ or ‘Magnus’ cultivars of purple coneflower (Echinacea purpurea), ‘Robert’ cultivar of purple loosestrife, ‘Firetail’ red bistort (Polygonum amplexicaule), and the smell plants like the catnip (Nepeta x faassenii), English lavender (Lavandula angustifolia),
The alternative variant of the concept was based on geometrical composition with dominant squares and rectangles. Similarly to the first variant the sensory action of the space, and plants in particular, was adopted as the crucial element of the design. Among the characteristic elements for development we find the pre-existing tree that was used to hang down color ribbons from it, thus granting it a magical appearance, a colored structure for climbing and portable plastic construction elements. The play elements are supplemented by colored glass, kaleidoscopes and drawing boards installed on the fencing and metal balls within the flowerbeds. Due to intensive colors of the designed elements the flowerbeds are made of plants with toned colors that are to form the background for it. The garden includes portable wooden boxes, in which children can plant seasonal decorative plants and herbs.

Both variants of the area development concept, although different in the choice of particular elements and playground equipment, consequently pursue the aim, which is a child garden with a special emphasis on a sensory action. The attractiveness of space is further enhanced by its reality towards needs and expectations of its future users. Engagement of children in the design process proved crucial for creation of a program that is attractive for them, delivering us an important lesson in empathy and art of communicating. The effects of the work in form of the design were presented to the management of the preschool and will be gradually implemented.

A design of a pro-social space accompanying apartment buildings
Subject of this design was a concept for development of a pro-social space accompanying apartment building complex located in the Pogodno settlement in Szczecin. The aim of the woodland sage (Salvia nemorosa), the hearing with plants like ‘Hamlen’ cultivar of Chinese fountaingrass (Pennisetum alopecuroides) and the taste with ‘Patriot’ cultivar of northern highbush blueberry (Vaccinium corymbosum) and ‘Rondom’ redcurrant (Ribes rubrum) ‘Rondom’.
adopted solutions was to create an integrating yard – a space for neighbors that would be inhabitant-friendly. The following were conducted in the pre-design analysis stage: comparative analysis, historical study, field analysis – including urban and dendrological stocktaking and a survey among the inhabitants of the developed area. The survey was a direct survey conducted with 80 inhabitants (including twenty children, twenty adolescents, twenty adults and twenty older persons) with inclusion of sex criterion. The questions concerned the current mode of use of the yard, frequency of that use, the forms of activity and mode of use proposed by inhabitants and their interest in creation of neighborhood garden forms. The analysis of their answer proved that currently the yard has mostly utility functions (42.3%), which is particularly visible in case of the groups of adults and adolescents. The yard is also used for physical activities and its forms largely depend from the age of users. The existing greenery is used by only 12.5% of respondents. It is used to the smallest extent by the youths, which indicates that its current development does not reflect the needs of that group. The yard is used every day by 40% of respondents, which is mainly connected with the need to perform daily chores. The question relating to the proposed changes in development revealed unsatisfied needs connected with the recreational function of the yard. Among the proposals of girls we find mainly the ability to play in a sandbox, on swings and rockers, draw with chalk and play open-air board games. The boys were more likely to stress playing construction site, riding bikes and playing football. The youths stressed the need for a place for their gathering and also sports. The adults indicated the need to connect recreation and leisure with daily chores e.g. through the possibility to walk the dog. The older people stressed the need of integration and closing neighborhood bonds e.g. by joint accomplishment of forms of recreation. Among the most frequently indicated elements for the development we found: a playground with a sandbox, swings and rockers, an area for playing football, climbing wall, tables for games, tipi
tents, a house on a tree, gazebos, tables, sunbeds, place for bonfire and grill, enclosure for dogs and a botanical garden. Proposed elements should be accompanied by nice greenery. There were also ideas that, due to spatial limitations, would be very hard to accomplish, such as a karting circuit or skatepark. Some of the persons also indicated the need of a car park. Large proportion of respondents (30%) expressed their will to engage in the works leading to creation of social garden. The idea of community garden was least liked by adults, who expressed their fear that it may be destroyed, some of the older people indicated health problems that may prevent them from performing gardening tasks. Based on the results of survey and field analyses the inclusion of such elements as: a playground for children, area for playing football, dog walking enclosure, integrating space for inhabitants, place for calm rest, parking spaces, fruit trees and bushes and herbal gardens were adopted as priorities for the development concept. Assuming the outcome in form of a space that integrates inhabitants, with character of an integrating garden, two variants of the yard development concept were designed. The first variant entitled “neighborhood space as a quiet enclave” fulfills the adopted assumptions preserving the existing parking lot. We proposed: the usable zone, so called social garden with fruit trees and herbs, recreational zone in form of homely recesses around a water pond and decorative lawns, and meeting grounds with common grill, playground for younger children with sandbox and rockers, resting places for their guardians, and a playground for older children, with multi-function device, enclosure for dogs and an utility zone with places to gather waste and parking lot. The second development variant entitled “Neighborhood space as a thriving island” attempts to maximize the accomplishment of motor needs and integration of inhabitants. This concept envisages the demolition of the existing car park and increasing the volume of greenery. Among the zones proposed we find: a social garden that is larger than in previous
version, with an orchard, vegetable and herbal garden located between recreational glades, a family zone with a playground for the youngest users of the yard and sports grounds, activity zone with open-air gym, youth zone with meeting places – seats and gazebo, communication-walking zone that assumes the creation of communication corridors as walking paths among the greenery and the utility zone with the waste disposal area. In both concepts many edible plant species are proposed, stressing the homely, friendly character of the space (fig. 4). The solutions adopted on the basis of opinions of inhabitants and field analysis allowed us to create an integrating yard that with its variant solutions forms a pretext for discussion and enables the inhabitants to make decisions pertaining to future development of space, thus making them the real hosts thereof.

Development project for recreational ground in the town of Gryfino that takes social needs into account

The main aim of the diploma thesis was to create a concept of recreational space that meets the requirement of local users. Due to the size and the location of the area in the center of the town of Gryfino, within the Old Town, survey based on closed-end questions was adopted as most suitable form of social dialogue tool. The northern border of the area is limited by medieval defensive walls, behind them multi-apartment residential buildings are found. The eastern part of the area connects with Town Park and its western border is defined by the bank of Regalica River. To the south the area is limited by services and residential buildings. This location and neighborhood means that, all residents of the town may use the area and its dominant function should be recreation (which is also reflected in local regulations). The

2 Listed historic monument of Western Pomeranian Region since 1985, reg. no. 325.
3 Currently this area has two modes of use, limited by a street running in the south-north direction. The western part is made of service and retail buildings with low architectonical value, which will be demolished in future due to the requirements of Local Zoning Regulations. The eastern part is a run-down green area with a small playground.
questionnaire used in the design process was developed in cooperation with a sociologist, it lists different types of activity connected with recreation, such as: meetings, running, walking, sitting, listening (sound toys, rustle of grass and trees), sunbathing, riding (bicycle, roller-skates), lying down, playing, conversations (spaces integrating the residents), reading, watching (plants, artifacts), eating, exercising, playing open air games, learning (places for contemplation, Wi-Fi access). The form also included questions pertaining to age and sex of the respondents. The surveys were conducted among permanent residents of Gryfino in the center square of the town (Solidarności Sq.), both in the morning and in the afternoon, for three days. There were 98 respondents, 54% of them – women. The most numerous age group (33%) were children aged up to 12. Half of the women surveyed were aged 0 to 12, the most numerous group of men (27%) was that aged 13 to 20.

The distribution of respondents’ choices was quite even, but the three most popular forms for free time activities were (with similar numbers of voices): meeting – 9%, learning – 9% and leisure (lying down) – 8% (Chart 1). Among the respondents the men unanimously agreed that meeting (12%) is the best form for past time activity, while women preferred learning (10%). The results were also grouped according to age groups, which gives us an image of social needs in the respective ages. The youngest (0 to 12 years) group prefers, to equal extent: running (11%), learning (11%) and riding (10%). The youths (13 to 20 years) prefer learning (13%) over other activities. The next activities in order are: lying, exercising, meeting and pitting (9% each). Learning is also most frequently chosen by inhabitants aged 21 to 40 (10%), similarly to meeting (10%) and watching (8%). The 41 to 60 years age group prefers other activities, mostly walking (11%), meeting (9%) and talking (9%). Older people (61+ years) chose mainly meeting (24%), walking (8%) and sitting (8%).

The respondents also demonstrated the will to

4 The choice of the “learning” option was probably boosted with securing access to wireless Wi-Fi network.
add their own proposals, among them new forms for activity (open-air cinema, dancing), but also city furniture (terraces for lying, colorful benches). The basis for the development of the area program was the results of the survey conducted among residents and the provisions of Local Zoning Regulations. The main emphasis was on securing the possibility of spending free time in the way that was mostly preferred by the respondents, that is:

- meeting and resting (lying down) – designing sufficient number of places that facilitate integration, equipped with different seats for different age groups and places that facilitate resting and contemplation of nature;
- learning – shaded areas for contemplation, wireless Internet access, possibility to charge mobile devices, information-display boards.

Due to the large number of youngest respondents aged 0 to 13 years, we also decided to locate a vast playground area, utilizing sensory elements. The functional division of the area is as follows.

A – contemplation zone – located at the river, with equipment limited to convenient seats surrounded by greenery,

B – sensory zone – flower meadow in form of a maze and a sensory garden stimulating seeing (flower colors), smell (flower smells), touch (different textures) and hearing (sounds made by insects, sounds made by plants moved by the wind),

C – rest and recreation zone – equipped in different forms of benches and wooden terraces, and also grassy hills adopted to lying down and sunbeds made of turf,

D – culture and art zone – area of “open air cinema” equipped in sunbeds and open-air gallery,

E – recreation and integration zone in a form of a multi-generation playground: water playground, sand field, “anthill”, “griffon’s nest”; for adults: scaled-up teeters, family swing, pendulum swings, seat for mother and small child, open air gym and permanent boards for social games (Scrabble, Twister) and child games (fig. 4).
Conclusions

Presented examples of diploma thesis utilize different tools of social dialogue, adopted to the communication possibilities of future users of space. The development plan for the preschool garden necessitated use of tools, that were adopted to conduct dialogue with children in form of drawing workshops, while the remaining information was gathered in interviews with teachers and management. In case of development of the neighborhood area between apartment buildings survey proved to be a more appropriate tool, once supplemented with direct conversations. What proved most useful in case of the largest area that form subject of an urban public space development project, was a survey questionnaire with close-ended questions. The choice of an appropriate dialogue tool still requires the knowledge of its advantages and limitations, that we present in table 1.

Table 1. Advantages and disadvantages of selected social dialogue tools (own work).

Summary
Social participation is the characteristic catalyst in the process of designing that triggers multidirectional transformation – of people and places. The social dialogue in a form of conversation between the designer and users, utilizing selected tools for acquisition of information (workshops, surveys, drawings) influences mainly:
- sensitization of designer towards social needs,
- effective transformation of a space that was dehumanized into place thriving with life, as a result of development of joint concept in the process of negotiations with future users,
- and also the transformation of social awareness concerning the emotional connections with space and the possibility of using it.

Showing landscape architecture beginners the importance of social dialogue in creation of a human friendly space seems to be one of the main tasks of the didactic process. We should be aware of both the advantages and disadvantages of the respective tools for social dialogue that are utilized in the design process to create a
pro-social space. Correctly chosen methods of social participation may lead to multidimensional transformation – of place and people, both users of space and landscape architects.

References
Fig. 1. Exemplary proposals of children concerning the development of preschool grounds

<table>
<thead>
<tr>
<th>Swing, play house, elements for self-assembly, 6 year old</th>
<th>Lawn and colored plants, 5 year old</th>
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</thead>
<tbody>
<tr>
<td>Play house, swing and colored plants, 5 year old</td>
<td>Play house, slide and “mobile” insects, 5 year old</td>
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Fig. 2. Concept for development of sensory garden at a Szczecin preschool. The board with selection of plant species and elements of small architecture – Variant 1 (A. Augustyniak, diploma thesis under supervision of M. Czałczyńska-Podolska, ZUT, Szczecin 2016).

Fig. 5. Design for development of recreational grounds in the town of Gryfino that includes social needs (M. Mincel, diploma thesis under supervision of M. Rzeszotarska-Pałka, ZUT, Szczecin 2016)

Fig. 5. Design for development of recreational grounds in the town of Gryfino that includes social needs (M. Mincel, diploma thesis under supervision of M. Rzeszotarska-Pałka, ZUT, Szczecin 2016)
Fig. 4. Project of an accompanying space for apartment buildings. Board with variant 2. (P. Kaniecka, diploma thesis under supervision of M. Czałczyńska-Podolska, ZUT Szczecin 2016)

<table>
<thead>
<tr>
<th>Disadvantages of the tool</th>
<th>Advantages of the tool</th>
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<tbody>
<tr>
<td>* no possibility to acquire ready solutions (children are unable to design that space) *</td>
<td>* group integration, engagement of children *</td>
</tr>
<tr>
<td>* repetition of well known schemes and functional solutions *</td>
<td>* building emotional relations with space, feeling of being *</td>
</tr>
<tr>
<td>* direct interview with teachers and management *</td>
<td>* discussion possibility *</td>
</tr>
<tr>
<td>* survey based on open-ended questions *</td>
<td>* choosing of optimal solution through negotiation, development of joint concept *</td>
</tr>
<tr>
<td>* direct conversations with residents *</td>
<td>* acquiring information about user needs, increase of designer’s awareness of user needs *</td>
</tr>
<tr>
<td>* survey based on close-ended questions *</td>
<td>* increase of designer’s awareness of user needs *</td>
</tr>
<tr>
<td>* threat of omission or simplification of information already at survey preparation stage and later in data processing, suggesting answers *</td>
<td>* acquiring information about user needs, increase of designer’s awareness of user needs *</td>
</tr>
<tr>
<td>* limited possibility of learning future users of the space *</td>
<td>* discussing possibility of choice of optimal solution through negotiations *</td>
</tr>
<tr>
<td>* lack of possibility to develop common concept through negotiations *</td>
<td>* choice of optimal solution through negotiation, development of joint concept *</td>
</tr>
<tr>
<td>* increase of designer’s awareness of user needs *</td>
<td>* lack of possibility to develop common concept through negotiations *</td>
</tr>
<tr>
<td>* possibility to add details to data acquired in survey *</td>
<td>* acquiring information about user needs, increase of designer’s awareness of user needs *</td>
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Table 1. Advantages and disadvantages of selected social dialogue tools (own work).
Abstract
As the challenges facing planning systems have increased in complexity with pressures to respond to threats to both environmental sustainability and human wellbeing the need for objective, evidence based, understanding of both the scenarios to be addressed and the impact of decisions has never been greater. At the same time technological innovation is allowing for faster, more intuitive, use of GIS to the point where geospatial technology can be a useful part of the tool box in not only landscape planning but design also.

The complexities and uncertainties involved with planning problems and their expression as analytical questions mean that framing relevant analyses to adequately address such problems is hard, usually requiring several iterations to achieve the desired knowledge. The traditional separation between planning skills, design skills and GIS skills introduces transactional friction in terms of specialist terminology, different methods of working and timescales of delivery as well as understanding of what constitutes a successful conclusion. The need for external GIS consultancy adds further frictions of cost and legal considerations.

Increasing understanding of Geo-Information Science at the Higher Education stage can reduce these transactional costs, particularly by allowing planners and designers to undertake some stages themselves. However teaching both the technical and theoretical knowledge needed is challenging, particularly when this must be integrated within a broad, multi-disciplinary, degree subject such as landscape architecture. This paper discusses the development of the Advanced Digital Landscape Analysis Masters course at SLU since 2012, and in particular the recent innovation of “flipping” the classroom. This replaces traditional lecture formats with online videos followed by discussion seminars, freeing time for more direct teaching and practical experience as well as new components such as GeoDesign. The paper will also review other technological innovations which are making GeoDesign a more intuitive and practical
From GIS to GeoDesign: Technological change in Higher Education for Landscape Architecture and Planning

As the challenges facing planning systems have increased in complexity with pressures to respond to threats to both environmental sustainability and human wellbeing the need for objective, evidence based, understanding of both the scenarios to be addressed and the impact of decisions has never been greater. So do students of Landscape Architecture, Planning and Environmental Management need more training in the use of GIS, and if so how this can be integrated within time pressured, multidisciplinary degree courses? We consider the case of Sweden.

Is there a demand for spatial skills?
Sang [1] provides an extensive review of scenario modelling for application in landscape planning and environmental management. One criterion used was how easy the models would be to deploy in practice given the skills available. The report includes the results from a survey sent to municipalities in Sweden asking about their modelling needs and current capabilities. Since each municipality followed its own departmental structure, replies came from a variety of sources but mostly a Head of Department or Group Leader with responsibility for planning or environmental management. Figure 1 shows how respondents described their job responsibility. It can be seen that relatively few of the 218 responses came from GIS analysts or specific GIS departments. So it is reasonable to infer that their responses reflect operational needs rather than personal preference for a technical or quantitative approach. Nor are they concentrated in particular types of landscape planning work given their responses when asked to indicate their top priority issues (Figure 2).

Taken across these various application areas as a whole, it would seem that only a third do not consider statistical or other modelling approach.
tools necessary to their work (Figure 3). Of the remainder the largest number stated they used consultants for such work, with only 12% having a specialist support department and around a third having team members with specialist skills. Even if many of these specialists are by training from backgrounds other than landscape architecture and planning (e.g. GIS or ecology) that suggests the teams as a whole have a demand for such skills. In many cases this need is being met at present by consultancy which is not only expensive but introduces transaction costs around data licensing, privacy and communication which limits the use of scenario models in decision making. As one respondent commented:

‘We are very understaffed, so we would have the most benefit from simple models (easy to handle). However, this would be a great help when needing to relatively quickly produce a forecast when not wanting to deliver all data to the consultant, then wait for an answer, and then still have to revise. As to more extensive investigations we must probably continue to hire a consultant, but it is still a great advantage in having one’s own knowledge of the models, so that you know what to order and can view the result.’ Anon ([1], Appendix 3)

Thus it is not with respect to the most complex models that skills shortages becomes an issue, since these are less often required, but rather with respect to frequently encountered decisions. Most respondents agreed that their department would benefit from increased access to such skills though many pointed to resource limitations to hiring specialists. But even if this is done, lack of mutual understanding of the methods and issues leads to greater transaction costs for the use of models.

**Can GIS tuition be outsourced to other departments?**

There are points in favour and against such an approach:

In Favour:
- Courses may already exist
- Students will mix across courses and learn from each other.
- Methods from other disciplines will be covered.
- It may be financially more sustainable.
- It is more likely that staff active in GI Science research will be involved.

Against:
- Courses may already be full
- Methods taught and examples used will be less tailored to students needs and some components such as statistics or programming may be unnecessarily advanced.
- Students may see it is peripheral to their degree and not prioritise it.
- Staff who teach the course will not be available to help integrate the GIS skills learnt into other courses. It is thus likely these will be forgotten or out dated (even before graduation).
- GI Science research is likely to stay within other disciplines rather than be directed toward problems of most relevance to landscape architecture and planning.

Can GIS tuition be outsource to online courses?
There are many online courses available both connected with specific software (https://www.esri.com/training/) and free or open source [2]. These are certainly effective in teaching the mechanics of how to operate software and some address theoretical issues such as how to interpret statistical output from GIS tools. This is a valuable resource for individuals looking to take up a new method, but they have some significant limitations for teaching at degree level:
- In the absence of a teacher the practical work needs to be “step by step”. This means it is easy to complete a task by performing each step without really understanding why or developing confidence for independent problem solving.
- If more complex work is attempted any problem will lead to a frustrating block to progress which cannot be resolved without
much web searching or a teacher intervening.
- It is possible to learn how to operate the software without understanding the potential sources of error this can lead to. As such it may lead to over-confidence.
- It sends a message as to what is considered important in the degree if some subjects are not afforded resources and scheduled time.

Geographical Information Science is more than a tool. Students need to understand basic spatial theory in order to appreciate the limits of each analytical method. They need to understand the basic principles of key analytical methods, even if only to discuss requirements with specialists. Finally they need to have some insight into modelling methods in order to appreciate their potential but also spot when a technique is being ‘over sold’ by a specialist or consultancy.

The Utility Threshold
The question is not simply ‘should GIS be taught within a landscape architecture degree’ but rather ‘how much GIS should be taught’? If too little is learnt then this shallow knowledge is unlikely to be of use by itself and that may even be remembered with some bitterness as a difficult and ultimately pointless experience. Providing more time but too much depth may do likewise. An optimal balance must be found where the subject is taught in sufficient depth to provide a useful foundation, while also providing sufficient time for students to become familiar with both the methods and the software covered. Within a landscape architecture degree the first part is achievable within specific GIS courses, but the time to achieve familiarity requires integration with other courses. The whole degree needs to not only communicate GIS knowledge but demonstrate its relevance to practice. Only then will students feel confident and motivated to adopt it into their working lives on graduation.

Bridging the Utility Threshold with the Flipped Classroom
The course Advance Digital Landscape Analysis with GIS is a 15 credit course taught in English
at SLU over 10 weeks for Master and PhD level students. The aim of the course is to provide a relatively advanced understanding of both the software and key analytical techniques. Ideally all students would graduate as independent users of these methods. The challenge for this course has this been three fold:

- To both stretch the more experienced or adept students to achieve the aims, while also providing a more basic foundation for those students with little prior knowledge for whom the steep learning proves challenging (there are no GIS prerequisites).
- To deliver a spatial theory to students with little prior training in that area.
- To embed the methods delivered within relevant examples from practice.
- To ensure practical exercises are completed at pace while also helping students become confident as independent learners.

For a ten week course, delivering both theoretical and practical knowledge has been a significant challenge. The practical skills are those which take most time to deliver and are usually the principle reason students take the course. Since 2011 the theory has been delivered via four traditional two hour lectures plus discussion seminars focused on a GIS text book. However some students felt that the theory was disconnected from the practical exercises and the applied literature seminars. The sheer number of lectures, theory seminars and literature seminars also reduced the available time for the practical work.

In 2017 it was decided to adopt a “flipped classroom” approach. Instead of lectures, theory would be delivered via three online videos of 1-1.5 hours each to be watched by the students at their own pace over one or two weeks per video. Each was followed by small group discussion seminars which should connect the theory to the planning literature. This should, it was hoped, free more time for discussion and better connect spatial-theory to landscape analysis in practice. The risk was that students would not use the videos or not understand them so a teaching aid called ScalableLearning (www.ScalableLearning.
Com) was used to deliver the videos. This allows students to click “confused” and so mark the video for class discussion or ask questions online. Tutors can also review the progress each student is making with the video.

To test whether the flipped classroom approach had been effective as a method for teaching the theory aspects of the course the same exam paper was used in 2017 as in 2015 allowing direct comparison of the results. Figure 5 shows the grades achieved ranked from low to high in each year.

The 2015 cohort contained more students so one might expect slightly more variance in their exam grades than the 2017 cohort, but what is clear is that the 2017 cohort made considerably better grades overall. Feedback from students at the end of the course suggested that, while some students did miss being able to ask questions during the lecture, the ability rewind and review slides outweighed this.

As the course examiner, it was also notable that reference to spatial theory within reports from the practical work was also more common in 2017, suggesting that the relevance of theory to the practical work was better understood. However one important caveat is that some students felt rather stressed by the need to understand the video and conduct practical work in parallel, despite the fact that four hours a week were set aside for it to be viewed. The suspicious is that, once able to review each lecture in detail, students were more aware of what they needed to know. In traditional lectures much information is probably lost if not noted down. One needs, therefore, to carefully re-assess how much content to deliver. This is a practical issue also, creating the videos took roughly one week each from writing the script to recording and editing the final product.

Reflecting back to the opening question as to whether landscape architecture and planning students need to learn GIS themselves, at least one student thought so:

‘After taking it I feel like a better planner in general, much thanks to learning to think
critically about GIS-based information.’ Anon (ADLA course comments 2017)

And with respect to whether this task can be outsourced, that rather depends on whether the course in question delivers the skills Landscape Architects and Planners are going to need:

“The theory and background of analysis and models, learning what questions that can be asked and what to look for where. Learning to deal with the questions that arises making me confident to be able to handle problems myself.’ Anon (ADLA Course Comments 2017)

It must also be acknowledged that success on one course does not necessarily translate into confidence to explore the methods and technology further. That requires ongoing use of GIS which other courses may struggle to accommodate.

**Bridging the familiarity threshold with GeoDesign**

On one level GeoDesign is nothing new [3, 4]. Scenarios of population change, or flood risk or climate change have simply been part of the criterion for a landscape design. However, deciding whether or not the design succeeds in addressing that assignment rarely involves testing it through a model. The process of incremental adjustment to a design [5] is costly if one relies on consultancy for the modelling, and the process of revision is slow. Indeed the models themselves are often constructed more with objective optimisation in mind than subjective satisfaction [1]. There may even be a certain mutual skepticism between the two communities, with designers seeing models as limiting their agency while modelers view design as dangerously subjective. This of course represents a caricature and a misunderstanding of both since designers need conceptual models and models are designed by their creators. GeoDesign helps to break down these barriers by placing the design approach in the lead and adapting the modelling methods to support
this. That may not be without compromise in terms of the accuracy of the models used, so this does not replace traditional GIS methods, but it aims to maximize the use of those methods which can be deployed to a given circumstance. For example even approximate models may be sufficient to reject some design options, or some pre-calculated scenario models sufficient to focus design effort on those options which are most likely to meet certain objective criteria. Yes these models may constrain a designer’s options, but no more so than a comprehensive design brief should do so. At the same time they may inspire new thinking or help deploy the designer’s skill more efficiently. In geodesign the focus is on the finding those models and analytical methods that can be used without materially disrupting the design process.

**Virtual Reality, Augmented Reality and Tactile User Interfaces**

GeoDesign requires a good mutual understanding between GIS experts and designers in order to find both the techniques to use and a working process which is effective [6]. This does not necessarily entail new technologies, indeed printing out scenario models and working through them via a paper design process has simplicity to recommend it ([1], Appendix 4).

‘We need user-friendly tools. We have time constraints and a system is not used if it is too complicated’ Anon ([1], Appendix 3)

One option to help bridge this communication gap is to make use of recent technological developments to deliver GIS via more intuitive and design oriented tools. Visualisation is a common tool of the designer and planner, from simple collages to rendered models. Virtual Reality (VR) allows a fully immersive experience where scale, perspective and even audio context can be better understood and explored. Augmented Reality (AR) takes this further by allowing the designer to blend the proposals into reality by superimposing it via AR “goggles”. However while these options do add
to a designers understanding of their plans, they still require considerable effort in development. They are also still usually solitary experiences. The user is isolated within their own virtual world, precisely the opposite of the requirements for collaborative design decisions.

Tactile User Interfaces seek to break down these simple barriers. Touch screen tables for example make a GIS map similarly accessible to the paper one, but with the ability to edit and run models behind them. Augmented Reality Sand Boxes (https://arsandbox.ucdavis.edu/) take this a step further, converting the tangible landscape of the sand into a terrain model (Figure 5).

In figure 5 a real time flow model is projected back onto the sand to show how water flow would change as the user re-sculpts the terrain bringing simple flood models under the direct control of designers and indeed the general public. 3D printers can then close the loop, virtual models can be transformed to intuitive physical ones making virtual landscapes as tactile as a traditional architect’s model.

These tools substantially reduce the ergonomic, perceptual and knowledge barriers to accessing spatial data and models. Combined with carefully selected models which support sketching and iterative design approaches (e.g. ESRI City Engine), they also may help to integrate GIS knowledge throughout a degree in Landscape Architecture, Planning or Environmental Management. That would ensure students are not only informed about spatial data and models, but familiar with them through frequent use.

Intuitive interfaces do not, of course, reduce the importance of understanding the limitations of such data and models. Visualisations in particular carry a strong air of authenticity which must be guarded against. This only reinforces the importance of giving landscape architects and planners some foundational knowledge of GIS since they are increasingly likely to use such tools in the future or to be asked to respond to scenario models, perhaps quite complex models developed by specialists, which are presented in this intuitive and persuasive way. Thus theoretical understanding is key even if they do
not personally use GIS software.

**Conclusion**

The need for greater training in spatial data handling and related methods and technologies is clear. It can no longer be considered an optional extra, as one survey respondent succinctly stated: ‘There is generally a need for a simple way to get a good basis for decisions. The demands are constantly increasing for risk analysis of various kinds while demands for fast processes and simplicity increases elsewhere. Good tools are important to meet these different types of expectations.’

Anon ([1], Appendix 3)

Incorporating such tools into planning and architectural practice entails finding time within Bachelor and Master degrees for communicating theoretical knowledge and practical software experience. Teaching methods such as flipped classroom can help create space in the schedule for both within dedicated GIS modules but without prior experience of GIS such courses can be stressful and the benefit may be lost if skills are not subsequently used and confidence developed. GeoDesign can help integrate spatial analyses and modelling more seamlessly throughout the whole degree, serving as both an early introduction to GIS and a pragmatic method which is likely to be retained and applied in practice after graduation.

**References**

5. Lawson, B., Dorst, K., *Design Expertise*

Figure 1: Area of Responsibility of Respondents to Survey (Sang 2015 Appendix 3)

Figure 2: Priority Issues for Survey Respondents

If you are using statistical predictions to develop scenarios, who does that work? Choose the option(s) that suit you where you work (NB multiple responses possible per respondent):

1. The work is carried out by planners or environmentalists who have knowledge of statistical basis.
2. There is a special unit who performs the work after inquiry.
3. We usually use private consulting firms in order to carry out the work.
4. We do not use it this way of working.

Figure 3: Who makes the scenario models? (Sang 2015 Appendix 3)
Figure 4 Percentage Mark Achieved in Final Exam for the Advanced Digital Landscape Analysis Course, SLU

Figure 5 The Augmented Reality Sandbox
Abstract
To settle the Mediterranean wilderness: the case study of the winescape in Oddoene, in Sardinia. This paper aims to focus on the forms of the long and slow colonization of territories. Such a colonization is indeed able to trigger virtuous processes of maintenance for the so-called “socio- ecological systems”, in evolving interrelation between the human activities and the environment. This issue is included in the greater theme of the contemporary transformations in rural landscapes, namely in the Mediterranean. As E. Sereni put it in 1961, this transformation has been characterized by a deep semantic layering, producing forms of resilient habitats and high-value inertial. Nowadays, these landscapes are crossed by a deep dichotomy: on one hand the loss of meaning not only physical, of the weaker margins of rurality, in a continuous trend toward uncontrolled re-naturalization and ecological flattening. On the other hand, we could see an interesting phenomenon of a gradual yet unpredictable re-appropriation of these new forms of wilderness. Now the core issue of the long-time construction of landscape has a peculiar standpoint in those contests at the limits of the contemporaneity. As a matter of facts, a prime example is Sardinia, where this dichotomy between re-colonization and re-naturalization takes unusual characters for the contemporary project. Through the explication of transformative processes in the Oddoene Valley, a rural context in Sardinia, this paper tries to relate the catalyst role of the landscape design to the cyclical process of recolonization and re-naturalization. The transformative power of the landscape design would strengthens only by coming to terms with its intrinsic contradiction; such design is, in fact, a temporary act, but intended in accordance with the long time transformation of the same landscape. In other words, the landscape design, seen as further slice over the longue durée of any palimpsest, became a tool that might be valuable only through a deep understanding of the history of the places. Only in this way, the landscape design could become the preferred relational instrument between time.
and space.

The long time habitat: Abandon and resurgence as a constant of the Sardinian landscape

The evolution of rural landscapes is a continuous process of rewriting previous uses [1]. Wilderness may be colonized, while places rich in physical connections may be deserted. Such alternation, following the unpredictability of history, left in the territory a stratigraphy of signs and uses. All these layers tell the story of continuous adapting to the proper geographical, historical, climatic and cultural conditions.

The landscape history of the rural settlement in Sardinia is illustrative of the above, with its ‘disconcerting habit of disappearing, reappearing, disintegrating, splitting, regathering in compact agglomerations, even changing seat’. J. Day [2]. The Sardinian rural settlements known a continuous process of colonization and abandonment, in a contest that M. Le Lannou defines ‘the least cultivated and more deforested in Italy’[3].

It is well know that ‘the rural space produces as many residues as the more its orography is pronounced’, as the fundamental Manifesto of the Third Landscape by G. Clement has shown [4]. In Sardinia, this is even truer: the peculiar orographic conditions of the island, together with the chronic shortage of inhabitants, have influenced the cultural heritage in a way that nowadays is extremely varied and complex if compared to its actual size.

The Sardinian motto ‘sa terra mudat a prammas’ (the land changes by palm) epitomise this meticulous quest for necessary places for human activities, creating a sort of rural micronomadism. The climatic, landscaping and historical shapes have led to the elaboration of common land rights over great extensions of land, which still survive today in the countryside. For instant, in the Sardinian villages it was customary to give portions of these common lands to each family, in order to satisfy the ancillary necessities of the rural life.

Nowadays, between 15% and 20% of the island
surface is a sort of common land. Much of this land is made up of forests and moors, but there are characteristic cases where changes have altered these common land rights. Oddoene is one of these: it was an abandoned and re-naturalized rural landscape that, starting from the 50’, local communities have gradually re-colonized, turning it into a contemporary and high-quality winescape. Through an entrusted management and care based on a progressive stratification of actions and knowledge, the locals succeeded in enriching the ecological mosaic [5]. Moreover, innovations such as the increase of the tourist flow and the need to re-naturalize the ecological network are developing interesting phenomena related to the social re-thinking of workplaces.

**Recolonization: The Oddoene’s affair, paradigms and peculiarity of a garden in the mountains**

It is well known that the recolonization is a concept involving the process of signification of a place, which is superimposed on the earlier signs. The above mentioned process normally occurs through the organization of workspaces and the relationships between them. But in the Oddoene valley the recolonization appeared to be happened randomly, without a previous plan. Indeed local morphologies, contingent necessities and limited gears have designed an organic landscape where plants like olive trees and vineyards and terracing contributed and still contribute to create as an everlasting structure. The valley, located in the municipality of Dorgali along the eastern coast of Sardinia, is one of the emblematic cases where ‘the management of environmental resource generates landscapes.’ [6].

This definition above relies upon the unpredictable evolution of places and history, which Joao Gomes da Silva defines ‘the thickness of time’ [7]. In fact, after centuries of abandon, the valley has become in a very short period of time an interesting winescape for its characters and morphologies.

This wooded valley, embedded among the most
important mountain peaks of the island and far from the settlements, has been a part of the local common lands, used for grazing and occasionally for crops. During the nineteenth century, heavy cleavage and aggressive pastures stripped the valley away of its ecological defenses, exposing it to strong erosions and the collapse of its productive utility. At the end of the World War II, with the return of the veterans and the following economic crisis, the municipality of Dorgali decided to split the lands of Oddoene to the most in need of the same municipality, in order to increase their low incomes with the one deriving from the cultivations. The historical expertise of the locals in vineyard art and their ability in the construction of dry-stone walls complemented the scenario, turning into a miracle. It should be noted also that this could be possible because of the Italian Agrarian Reform of the ’50, the updating techniques of those years and the optimistic context of exponential growth of well-being of the Italian post war blooming. As a result, the land tenants began pounding, digging, raising primitive barriers, erecting terraces, digging wells, planting vineyards, and olive trees, which soon found a suitable, well-drained, well-exposed soil. Within few decades, the Oddoene valley became a garden, cultivated by hundreds of renters. Now the valley is a patchwork of carefully cultivated small plots, guarded by minimal and rigorous rural devices, constantly expanding to the wilds (figure1).

Transformation Processes, characters and perspectives of an ongoing story:
The Oddoene landscaping structure is illustrative of the correspondence between nature and necessity. In this regard, it should be recalled that the historical characters of rural architecture, duly expressed by G. Pagano in his essay Architettura rurale italiana, are also qualified by their neutrality, and by their blank correspondence between uses and spaces [8]. It should be underline that the Oddoene valley represent a very ‘landscape workshop’, where traditional and contemporary practices are still in a highly dialectical phase. Therefore, the analysis of such
landscaping structure could be a very useful interpretative model, having also considered the contemporary need to rediscover a more ethical dimension of life.

The water
The Oddoene valley, namely its morphology, is also paradigmatic of the role of the water for the construction of rural landscapes. Two imposing mountain barriers, along the East and West sides, define the valley, so that it behaves like a great water collector. The waters from the mountain engrave deep transverse streams that are gathered, like a comb, by the main river that flows into a lake northward. This east-to-west orientation is the morphological base on which rural colonization has occurred. Secondly, the rural colonization is rooted through land divisions, water management and crop patterns.

The tracks
The valley was a historic crossing between two regions of the island, until its abandon after the opening of a more direct road in the nineteenth century, which tanged the valley upward. The courtyard of the Bonu Caminu sanctuary is the most important witness of this ancient role, which locals used today for some religious celebrations and as a core place of the valley. The medieval path ran along the main river, crossing the transverse streams. The new tracks open by the settlers started from this path to reach rural funds. This network of roads plus water forms a plot of high ecological potential, since links the wilds, the river ecotones and the wooded slopes of the mountains.

The terracing
The terracing technique provides for what E. Sereni defines ‘the form that man, in the course and for the purpose of his agricultural productive activities, consciously and systematically imprints the natural landscape’ [9]. As a matter of fact, the terracing allows smoothing the slope, prevent the erosion and control the capture and distribution of idro-resources. In Oddoene, this technique becomes a very model. The ancient local tradition of the dry-wall construction helped to control the
tormented orography of the valley: the removal of the stones from the ground, in order to plow it, fastened a landscaping infrastructure capable to comply with the rural needs. The terracing and drywall pattern thus come to be also a water and climatic control instrument. The land fragmentation then overthrew the plot, creating a new ecological network between the mountains and the valley. This process of self-construction in a territorial scale happened in 50 years over 1000 hectares without advanced tools and created the conformity between the intangible cultural heritage of a community and its formal and concrete outcomes.

The device
The colonization process has always a topic moment during the building’s founding act. After the identification of the boundaries (the latin mensura et delimitatio [10]) the house represent the symbolic takeover of the new habitat. In Oddoene, this identification is made by placing the buildings in a prominent position with respect to the fields and the landscape. Placing on the podium, on a high point that looks and can be looked, binds to the terracing practice. This combines the new agricultural morphology with the new social phenomena of the rural colony. The podium is always the scrap of the field: the highest, stony, woody, and therefore less suitable for crops. Setting up on the natural shreds leftover by the agriculture, has designed a network of building with a high ecological quality. Community practices of grape and olive harvesting have stoked the formal evolution of rural devices. Primitive devices become country houses, which evolve in relation to the artificial soil of terracing and colonizing, through light elements, the intermediate natural spaces. This risk of uncontrolled saturation of natural niches is a critical issue for the ecosystemic balance of the valley. Contemporary interpretation of the local constructive tradition is the task for controlling formalistic and representative drifts, which are in contrast, inter alia, with the original community vocation of the valley.
The Fields
Oddoene was a common land and, as such, indivisible. Custom, however, has led the tenants to behave as owners, and so, selling, dividing and building on the assigned plots. The resulting fragmentation compromises the subtle socio-ecological balance of the first phase of colonization. Nowadays the valley is out of the previous common rules on land, due to the improvement in land ownership and the not clearly distinguishable common uses. Although some contrast between the new private properties the main and the previous form of common land still exists, it shall be noted that the property configuration of the valley is barely based on ordinary sale, purchase and lease of the estates.

Renaturalization: Insiders and outsiders as new rural catalysts
The renaturalisation is not a process of re-balancing environmental components compared to anthropic components alone, but, above all, could be defined as a reaction arising from the end of a colonization cycle. This reaction needs appropriate catalysts, either fortuitous or induced.
In the Oddoene case study, the fortuitous catalyst is the new rural tourism in the area, bringing a new balance between productive needs and preservation of natural habitats. On the other hand, the induced catalyst is the landscape design, which precisely is the instrument conceived to regulate this reaction.
The particular position of Oddoene makes it an ideal hub for the naturalistic, archaeological and cultural heritages that might attracts more and more visitors. If, as yesterday, the landscape transformation of the valley has been made, as catalyst, exclusively by the insiders (the farmers who have opened tracks, erected walls and homes), nowadays even the outsiders (*i.e* the tourists) are a part of this catalysts of this transformation. This trend affects the rural life of the settlers by introducing new challenges (figure2).
Batched land and common land: an outlook for contemporaneity

In contemporary landscapes, this bivalence (outfield and infield) also considers the wilderness as a fundamental resource for the rural landscape, especially for the densification of biodiversity and complementary ecosystems to the anthropic. Gilles Clement, Manifesto of the Third Landscape [11].

The current sales-purchases and leases of the original parcels are re-designing the landscape of the valley. New owners do not want to obtain the less useful parts for agriculture but they are interested in the most transformed parts, such as vineyards and olive groves on terraces and their real estate. This ‘individual rationalization’ [12] will leave to the administration a network made of scraps and spaces of high biodiversity, along the waterways, boundaries, roads, and rugged areas. Such redrawing of the boundaries and parcels becomes an interesting opportunity to explicate and strengthen the ecological network. The redrawing grants the link between the natural scraps, remained public, with the water network along mountain and valley. However, such network is under thread by mono-cultural trends and the rapid mechanization of agriculture. Currently and interestingly, both the University of Cagliari and the administration of Dorgali are committed to redesigning the ecosystem network of Oddoene, envisaging contemporary forms of common land management, in accordance with the the tradition and history of the place. At the same time, the design should support also, the activities of a contemporary agricultural park. Indeed, it is possible to postulate, along these intermediate spaces, new forms of relationship between insiders and outsiders, as privileged multifunctional spaces. Using the definition of R. Forman, a Land mosaic is in fact the necessary condition for a balanced development between anthropic activities and biodiversity [13]. From an anthropocentric approach to a biocentric ethic
Considering the landscape in an ecological perspective means putting the biological phenomena at the center. Man does not play an exclusive role in transformation processes, but is considered one of the forces that interact in the overall picture. Carlo Tosco, Paesaggio storico [14].

Facing the challenges of contemporaneity, the re-reading and recovery of historic rural landscapes must be interpreted as the evolutionary product of the recognition that must start from the community itself. It is interesting to note that, in Oddoene, the exogenous processes of recognition activated a change from an anthropocentric approach to a biocentric ethic. The community of Oddoene aspires so to be consciously rooted in the past, but without trivialization, in full inclusion of the evolutionary dynamics of its place. The landscape of Oddoene was a ‘material reference of collective memory’ [15]. The self-determined historical process was essentially aimed an integrate income through land improvement, while the aesthetic result was only ancillary for the community expertise. The landscape of the farmer’s memory overlaps the reality, made of terracing, vineyards and houses. However, it is through the external eye of the outsider that the landscape in Oddoene is a ‘relational’ object vis-à-vis other places and needs.

It is interesting to know that visions and lifestyles of visitors and inhabitants integrate now in a unique concept, which still demands a new vision and a new model. We will see below such new model, already underlining that the protection of the natural role of the valley must come along with its productive role. It is up to landscape architecture to achieve that.

A new model rural park: a multifunctional collective hub

In light of the rapid changes in the Oddoene valley, some conclusions can be drawn here. The main theme is to strength the ecosystemic relationships between environment, production, uses and necessity. The Oddoene experience shown that this could be achieved through the design of relationship spaces between
insiders and outsiders. The connection of the natural scraps with the rivers and the fields allows the contact of the productive needs with the leisure one, being the connection also an ecological infrastructure capable of facing future transformations. The landscaping structures of the hydrographic grid and the terracing establish the interface between public and private. The transformation processes, elaborated for the rural needs, establish the operational toolkit for a rural park (figure 3). In this way, the promotion of the agricultural goods would be related to small-scale accommodations and cultural itineraries. Thus, rural devices shall be intended in a multifunctional role, as potential minimal places of hospitality and promotion. Avoiding ‘rigid and definitive solutions in favour of reversible, incomplete, imperfect devices that allow to continuously adapting the inhabited space to new and unplanned activities’ as A. Branzi stated in *Modernità debole e diffusa* [16]. Moreover, river ecotones, usually the preferred places for light and nature-loving journeys, might be equipped with minimal elements such as platforms, cabins and observation devices. In the points of contact with the road network, such as bridges and guides, could be placed interface devices aimed to the promotion of food and culture. The vast heritage of minimal construction shall be reinvented to meet the needs of the production and those of the new rural tourism. The devices might be larger in order to accommodate ancillary functions, but preserving its archetypal character of wilderness cabins, in accordance to logics of juxtaposition or by working with the ground. Despite the theme of hospitality in rural areas is not new, the not common suggestion is to adjust the related tourism to the same logic and necessity that structured the settlement of the valley. This attitude shall be traced in the latest Portuguese experiences, such as *Casa no tempo* and *Cabanas no rio* of Aires Mateus [17], or *Herdade do Barrocal* of Joao Gomes Da Silva [18]. These interventions operate at a minimal scale of relationship between architecture and landscape, in order to depotentiate the phenomenon of excessive formalization of the buildings, which is
compromising the archetypal quality of the rural settlement. Indeed the operational toolkit for the park aims to render systematic this attitude, reaching the right balance between comfortable widespread hospitality and a deep understanding of the place you chose to visit and live.

The suggested park of the Oddoene valley shall be a new hub of diversified and unplanned activities, the design concept being the necessity principle of self-preservation. The environment and agriculture needs shall be considered at the same level in order to empower those who live and visit that landscape. As a consequence, the insiders and outsiders will protect and transform together the landscape, not jeopardizing the ecological balance. This approach will allows the landscape design to overcome the yet apparent dichotomy between recolonization and renaturalization, or the old fight between the Nature versus the Mankind.

References
Figure 1
The landscape structure of the valley and the processes of colonization and naturalization from the 1950’s to the present.
Figure 2
The design tools of the ecological network between the settlements and its characters: colonization, devices, sociality, and nature.

Figure 3
Axonometric projection of a valley tile. The morphological and spatial relations between settlement, agriculture, viability and ecological networks are clear. The reinterpretation of these characters constitutes the operational toolkit for the landscape project.
Abstract
Focus of this paper is the exploration of the complex reciprocity between processes of urban and environmental transformation through the lens of landscape urbanism, for a better understanding of our current urban ecologies and their inner tensions. This integrates the scale of architecture in a new dimension, concerning diverse constructed environments of the post-industrial era. It includes issues not only related to the history of urban settlements and their evolution, to the rules of politics, economics, sociology and technologies, but also effects connected to natural phenomena, pollution, waste, space reclaiming/reuse/recovering, material recycling, land productivity and consumption, and alternative processes of energy production for a more sustainable growth. These elements define a new systemic and coordinated vision for urban design which, encompassing multiple dimensional scales and defining new landscape structures, includes infrastructure, urbanism, natural resources, agriculture within a new frame of relationship between public and private sectors in often fragile contexts. The recognition of the palimpsest of forms and structures becomes inspiration for proactive design proposals at the urban/metropolitan scale, crossing boundaries between codified fields and strategies.
New methodologies and regulations for performative and networked operational procedures are explored in some exemplary cases between Detroit and New York, through critical and experimental designs proposals capable to deal with processes of local and territorial transformation. New urban morphologies and building typologies are then strategically integrated and coordinated into our landscapes with a deep understanding of their sensitive nature. The consequences of these processes on the structure and quality of spaces and life could be described as part of a complex “urban metabolism,” which is systematic, creative and participative, identifying material and “immaterial” issues that give form to rhizomatic and diverse processes of change for more...
Resilient Landscapes.

Transforming Territories: a landscape of “In-Tension-Alities”

“Territory is our condition of existence, the positive product of the collaboration between man and nature, and also our irreplaceable patrimony. In the territory is the inner meaning of man and civilization, their relationship with the natural world ...” (Muratori, S. Civiltà e Territorio, 1967)

The Scene.
The flow of people, resources, material and immaterial goods, and at the same time of powers, and strategies of control, have always shaped/reshaped our geographies and processes of urbanization. Therefore built and inbuilt landscapes have been characterized by gradual or dramatic changes, leading to new architectural typologies and urban morphologies corresponding to the transformation of means of production, distribution, circulation, consumption and to the shift of political, economic and ideological realms. The effects of these processes on structure and quality of space and life could be described as part of a complex Urban Metabolism[1] which looks at the city and its territory as a complex organism.

This new dynamic landscape has reached a high level of complexity where natural environments (geology, hydrology, topography) and cultural environments (productive lands, urban settlements, infrastructural networks) need to be synergistically understood as part of an articulated ecological system, with both micro and macro implications. It is the synthesis of geographic-historical contents (collective values), aesthetic-perceptual contents (individual values), and ecological-natural contents (biological values)[2].

Since the city as a definable entity and result of predetermined models has become obsolete, we are now called to work with a sort of collage of fragments, heterogeneous and dynamic, often in conflict and unpredictable, subjected to the balance of variable forces, with their own order
and rules, and their own ways of evolving, which we have to understand and manage. This determines the need for new tools and methods to observe, record and analyze urban phenomena towards more sensitive interventions.

A shift from the utopia of canonic forms to heterotopic processes and performable methodologies has derived from that, modifying our way of understanding and approaching urban contexts, overcoming the emphasis towards towns and cities, building and form, to focus on the process of growth-shrinking of these subjects within their landscapes. We need to re-think these in a systematic way and accordingly to the ecological, infrastructural, technical, social, and political challenging processes that they generate and derive from, and the relevance of their effects on metropolitan areas.

For these reasons design interventions need to proactively operate across greater extents of time and dimensional scales from the geography of entire regions, to the engineering and new techniques concerning building and environmental components, capable of dealing with critical problems such as water, waste and energy management, reuse, recycling and reclaiming of objects and land, consumption of resources, pollution and environmental risks due to climate change. This approach more than on solid objects, focuses on the several levels of interactions within open fields as coordinated ecosystems. It requires reimagining instruments, expertise, roles, and responsibilities that today are still often rigidly separated, operating through hyper-bureaucratic structures which do not take into consideration the cross-relationships between the several fields and scales involved into the transformation processes of spaces.

This calls for a sort of multidimensional and multidisciplinary approach, which should be able to cross simultaneously: Scales -from the global one of networked political, economic logistics and natural strategies, to the local ones of micro-oriented intervention related to the needs of specific communities and to the local natural life cycles; Fields –from the strictly urban and infrastructural ones, and the different gradients...
of human manipulation of productive lands, to
the natural ones related to flora and fauna, soil,
water, and air; Time/Space –from the status quo
and the understanding of its past as a complex
process of actions and reactions, to its future
projections and their implications on a global
scale of issues concerning shrinking and fast
growing processes of metropolitan areas and
their uncontrolled consumption of space.
Here the dominance of corridors of technological,
financial and productive powers over settlements,
become strategies for physical and social
exclusion and isolation, generating conflicts and
inequalities. While unifying and overcoming
differences related to geographical and political
boundaries at a large scale, infrastructure can
act then as a divider and generator of social
disengagement at the local one, making the
connection to and between urban and ecological
patterns more abstract.
This panorama has generated a sort of
postindustrial Meta-Urbanism, as programmatic
layering: textures and flows where new design
experiments are capable of injecting the
territorial scale into the fields enclosed within
the consolidated city, but also of operating in
the blurred zones between suburbs, terrain
vague, producing areas, natural sensitive sites
and metropolitan desert. These interstitial
zones of frictions and exchange produce the
complex ecology of our current landscapes,
which overcoming the deterministic paradigm,
open to diversity and indetermination, where the
understanding of organizational and working
processes of ecology helps to generate more
adaptable and resilient urban structure operating
through redundancy.
In the crucial role assigned to understanding
topography and reinterpreting its values through
the design proposals, it is still possible to find
some common ground between Architecture,
Landscape and Urban Design, their peculiarities
but also their similarities, not only in terms
of formal and spatial expressions, like the
experiments of Land Art for example, but also as
contents and meanings, introducing the temporal
processes of acceleration-deceleration as a
component of the design proposal, to understand its life cycle within the context.
If we consider our landscapes as the pluralistic and active expression of our society, of the ideological and metaphysical values shaping it, then it becomes the ‘active cultural agent’ defined by J. Corner in his book *Landscape Imagination*[^4], that proactively and critically synthesize our way of being and adapting to the context we operate in and express through, continuously reactivating and rethinking it, towards the production of new meanings. Within this landscape we find the final and perhaps purest concept of democracy, since everyone is equally but differently called to take care of it, to equally and personally belong to it, and critically operate in it.
Being a synthesis of variously man and ecological-made structures and functions -not only their image- our landscapes become a fundamental lens to decode contemporary metropolitan regions and to understand their values and performability, as we perceive them and at the same time, as we act redefining them even while we describe them. We then become part of the same story, witnesses and actors recalling and generating memories without which a future ‘prophecy’ would be impossible, so any ‘hope’ would be impossible. C. Rowe, *Collage City*[^5].
This evolving process deals with and creates values of differentiation and of persistence or memory, which are relevant in the way an environment changes and survives, critically redefining the *Urban Ecologies*[^6] we live in and move thorough, characterized by heterogeneity and complexity: cross interactions between infrastructures, concentrated or dispersed urban structures, productive land, and residual or neglected areas with their potentialities. This substantiates new urban systems open and strategically integrated into their landscapes, defining processes of change that involve the overall regional metabolism. Consistently with this metabolic approach, and considering both built and unbuilt environments, we operate and organize the change by means of Maintenance, Transformation, and Substitution as different
but coordinated degrees of regeneration. While Maintenance is a way of preserving/improving the status quo, especially in historically consolidated urban, productive, and natural contexts, which have often also symbolic values in relation to the identity of the place; Transformation involves a structural change of the system and its functioning/program, operating on crucial parts of it and its connectivity; and then Substitution as action that implies the total rethinking of structure and form of a specific part or of the entire system, replacing the old with a radically new one, thus changing the qualities of its context as well. This Metabolic Intervention concerns several dimensional scales, space and time frames as well, from the extra specific related to the object, to the regional ones beyond political and administrative boundaries, to the global one regarding synergic decisions. It requires thinking of new coordinated and creative strategies, tools and codes to plan, design and manage the scale of the landscape, to envision it and invest in it. Therefore it is crucial to consider the entire and networked life cycle of the system environment, its formation, growth, consumption and its eventual destruction and recycling, similarly to the physical metabolism of individuals, which manages the biological, chemical, and energetic transformation processes within a human body and its livelihood. This also enables professional operators into the field of architecture and planning to re-think their roles, tasks and objectives in designing buildings, cities and landscapes, considered as adaptable and flexible processes, an integrated and interactive part of a more complex territorial and environmental dimension, still in need to find new physical and spatial possibilities of expression, to define a place, becoming applied knowledge open to new strategies of management and decision making. At the territorial scale, we have to envision a new paradigm of a networked city, formed by differentiated but connected epicenters that identify strategic locations for new design interventions as densifying points, dynamic and open to shift their functionality. It is a sort of
capillary system that gradually evolves, balancing the effects of the change of its parts in synergy to the overall, to localize and direct modalities and dimensions of the transformation. This specialized but also flexible and hierarchized polycentric network of existing and new integrated nodes makes the overall system sustainable and adaptable, always proactively able to create new alternative paths and synopses, avoiding the collapse of the structure because of the change of contextual conditions. In this context, the crisis becomes an opportunity for the development of new strategies, redefining connectivity based on a sustainable balance of growth and available resources, in a competitive framework.

The new cores that characterize a project at the scale of the landscape, unlike the previous centralized paradigms operating at the scale of the consolidated city, constitute a sort of episodic but integrated model which creates new territorial and urban structure. Here the old nodes can gain new symbolic meaning, sort of ‘mediators’ actively integrated with the new ones and capable of orienting the existing communities within the new networked environment, making it recognizable and attractive. Pierre Donadieu, *La société Paysaggiste*[^7].

This system of heterogeneous epicenters within the landscape is territorially linked and locally specialized accordingly to the other close nodes and to the environment in which they operate. At the microscale these epicenters, as a point of accumulation of territorial forces, work like permeable clusters of localized exchanges, and are open to opportunities for Landscape Architecture. This finds place in problematic ‘between spaces,’ where elements with different nature collide: where infrastructures cross city, landscape, and productive land; where the city meets and merges with its surroundings, creating thresholds where informal, spontaneous, uncontrolled and incredibly fast strategies of growth or shrinking are in progress. Charles Waldheim, *Landscape Urbanism Reader*[^8].

Through these performative design interventions,
we can give form to a rhizomatous and diverse process of transformation of our urban landscapes which we aim to be resilient, so capable of absorbing more than of resisting to the changes of the environmental conditions and of retaining most of its structure and functions once it returns to the original state. This is represented through proactive strategies and design experimentations geared towards potential futuristic visions openly framed within a landscape urbanism approach, since if we cannot control the volatile tides of change, we can learn to build better boats. We can design and redesign organization, institutions, and systems to better absorb disruption, operate under a wider variety of conditions, and shift more fluidly between several circumstances. To do that we need to understand the concept of as continuous and rhizomatous process of transformation/ adaptation⁹⁹.

The Action.
This background describes the complexity of the scene within which operate some of the current examples of design strategies that are noted below, underlining the great potential of our postindustrial environments. These express different ways to approach the design of urban space transformations, often driven and promoted by local communities, rather than the result of the intervention of a centralized institution. These are also focused on design strategies- more than models- operating systemically at multiple levels, not only on formal/aesthetic ones, but related to issues of pollution, ecological risks, social imbalance, sustainable production, and recognition of values of ‘ordinary heritage.’ As in the case of Detroit, which among several other American cities, has been deeply affected by the crisis in the decline of automobile production. The shrinking process has involved mostly the downtown of the city, its closer surrounding and the infrastructural system, meanwhile several gated communities have been growing within the metropolitan area. This produced no-man lands and incredibly suggestive ‘urban deserts’, which replaced the traditional American sprawl of single family houses just
outside the downtown area. In turn, it has led to a new fragmented landscape and renewed modalities of the use and share of it by the ones left, introducing an unprecedented combination of the units of the lot and of the block. Plenty of literature and studies have been produced about this postindustrial urban phenomenon and its several dramatic effects on the physical and social environment. In the last 15-20 years this has also given to the city the opportunity to re-think itself, opening to experimental strategies of adaptation that have redirected the transformation in creative and proactive ways. Several art and now agriculturally-based initiatives have been introduced to retrofit the cityscape, its structure and also its social setting. Informal and less institutionalized projects are reactivating bottom up selected areas of the city, attracting new dynamic and proactive local strategies which are readapting its public realm. Not far away from the well-known cultural institution DIA museum with its Matisse, Degas and the murals by Rivera celebrating the mechanistic society of production, the MOCAD and the Red Bull House of Art today represent the new face of the art scene in Detroit. Meanwhile, since 1986 the Heidelberg Art Project by the artist Tyree Guyton in the McDougall-Hunt Neighborhood, has been creatively and progressively transforming the empty houses and lots of the area in a colorful and eclectic open air museum, a land art piece that celebrates crisis and decay of the city, of the ideology that created that urban-social model.

In the Eastern Market district, the Adopt a Lot program has introduced new strategies of productive adaptation of the several empty lots, transforming them in opportunities for self-managed and free urban farming. Similarly in the North End Neighborhood, the Agri-Hood project by Tyson Geresh introduces us to new possibilities for a more sensitive and adaptable urban planning. Two acres of urban farming are located here as part of the nonprofit Michigan Farming Initiative (MUFI) where 50,000 pounds of fresh vegetables have been produced per year, and mostly by and for the
low-income community. This project is unique, having at the center of the housing planning proposal, the working farm as the social and spatial incubator that operates also at political and administrative levels, directing the future process of transformation/gentrification on a more sustainable path, using low-cost building systems like shipping containers and recycled construction materials from the local industrial archeology.

In New York, where the process of de-industrialization has been slower and less dramatic because of the more heterogeneous production system and due to the presence of a stronger metropolitan economy, the transformation process that has involved all the urban waterfronts, has been the key in changing its dynamics and morphology, often through an aggressive gentrification, barely balanced by its green components. Piers, highways and factories along the water have been in fact demolished, replaced, transformed, densified, embellished during the last 30-40 years, starting from the island of Manhattan (Battery Park and Hudson River) and then Queens (Long Island City), Brooklyn (Dumbo and Brooklyn Bridge Park) and Staten Island (Fresh Kills Park) with progressively more attention to the design of spaces for leisure and public services, and in the more recent projects, also to ecological and environmental issues such as rising currents, pollution and waste, more than pure real estate speculation, still the main engine of these transformation processes.

Along with the shoreline, more recent projects in the city have been operating with some of the dismissed fragments of infrastructure within its core neighborhoods, as is the case of the well-known 1.45 miles-long project of the High Line by Field Operation with Diller Scofidio + Renfro across the Meatpacking District and Chelsea on the West side of Manhattan.

This elevated green promenade has been opening in phases from 2006 until 2017, experimenting a new approach in the US towards the reuse of infrastructural archeology metabolically reintroduced into the public realm of the city.
At the same time this has also boosted a strong process of gentrification of the entire area through mostly small acupunctural interventions except for the last of these at its end. In fact, the 28 acres of the Hudson Yards are located here on the site of the West Side Rail Yard by Kohn Pedersen Fox Associates, which is dramatically changing the skyline of the city and the balance of its dynamics. Several are the local activities and residents that have been leaving these areas due to the effects of gentrification that transformed the previous manufacturing nature of it, into a product for global tourists who now enjoy the roof scape of the city. Far from the inconveniences of the street level, it has created a sort of “elegant living room” for each investor (often foreign) who can afford the bird’s-eye view of the Hudson River sunset, beyond the gated and controlled ‘front yard’ represented by the High Line Park.

On the opposite side of the island, and also of the ground line, are the three blocks from Essex to Clinton Street on the Lower East Side, of the former Williamsburg Bridge Trolley Terminal adjacent to the Essex Street subway station active until 1948. The so-called “Lowline” or Delancey Underground, now legally part of the 1,650,000 sq. ft. Seward Park Urban Renewal Area, is open to new creative possibilities to rethink and reuse the extended underground network of spaces in the city. This first underground park, co-founded by James Ramsey and Dan Barasch with Arup, opened in 2012 thanks to a Kickstarter campaign. This allowed the installation called Imagining the Lowline, of a 30 feet solar canopy capable of directing sunlight into unlit spaces through a “remote skylight” designed by RAAD studio. This optical system is made of parabolic reflectors- a sun collector dish and a sun distribution dish- connected by an “heliotube” containing optical fiber cables that channel the light into a live cultivated underground area, creating a park that brings new possibilities of life and programs in these forgotten infrastructural spaces. The great resonance of the project within the community, and the strong support received by politicians,
public administration and media, led to an extension of the closing date of the installation which opened in 2015 by executive producer Robyn Shapiro and industrial designer Ed Jacobs, to March 2017. This introduced a sort of reverse code in approaching the spaces of the city redefining their values, which become more experiential than commercial, more collective than individual, more integrative and performative than isolative and constative. Through these new typologies of synergic and contextually-aware projects we are then called to manage, adapt and reorganize the active and flexible set of spatial systems within our environments, critically identifying sensitive locations which could work as opportunities for the creation of a remapping process and of an original design vocabulary of strategies and methodologies which will generate renewed ‘po(i)etic’ effects on a wider scale, resolving, limiting, or positively converting the limiting issues in proactive potentialities.

Endnotes

[1] Urban Metabolism is mostly related to the scale of an Urban Region which supports its own sustainable growth in terms of spatial, social, energetic, and economic balance through internal and external exchange processes improving systems of production and reproduction and its power of attraction. A. Wolman in his book entitled *A typical American City* (1965) defines urban metabolism as ‘all commodities needed to sustain a city’s inhabitants at home, at work, and at play,’ but his approach was mostly focused on the physical aspects of the balance of production and exchange of energy and natural resources, more than on their effects on the quality of space and life. An evolution and extension of the same concept is included in C. Kennedy’s book *Changing Metabolism of Cities* (2007), where he defined it as a ‘totality of the technical and socio economic processes that occur in cities, resulting in growth, production of energy, and elimination of waste.’ His point of view is more focused on the way the overall system of the lifecycle of an urban environment works and has interesting
references to P. Geddes’ (1885) studies about the city as a ‘living machine’ with its own metabolism and related social effects.


[10] The Greek etymology of the word ‘poetic’ from ποιεω, means ‘to do,’ ‘to operate’ and so to be active through conscious actions which also have immaterial values or effects, and are esthetically balanced. This is also related to the way M. Heidegger used the same word ‘poetic’ as the only way for humans to inhabit a space, actively transforming it into a ‘specific’ place.
Abstract

In co-creative projects of landscape design metaphors have proven to be helpful to understand, push, and shape processes of transformation. They initiate, inspire and productively disturb playful processes of unfolding and vanishing, of negotiating and positing.

The paper discusses the use of metaphors in landscape design referring to experience gained in the projects *Spatial vision South Luxembourg* and *Spatial vision Münsterland*. Transformation in the urban landscapes of South Luxemburg is a process of restructuring a former industrial region into a new urban landscape with university, creative industry and housing. The design team introduced a metaphor referring to the vernacular describing the area as *red coast*. Spontaneous reactions of stakeholders ranged from shrugging to immediate playful use of the metaphor to describe the area’s talents, threats and future paths. Discussing transformation in the rural region of the German Münsterland involved working with the metaphor *quilt* that refers to the industrial heritage of the area. It encapsulates the particularities of the constantly shaped and cultivated land. And it pushed the stakeholders to approach spatial questions in a creative way. They reacted by playing with the metaphor and using it in related design projects to illustrate how the proposed interventions are woven into the spatial fabric.

The projects illustrate that metaphors build a common ground for discussing strategies of transformation. They help to disturb familiar patterns of debate, create a playful, creative atmosphere and find a common language for an abstract space. This communicative playfulness makes them a powerful means of co-creative landscape design.

**Keywords:**
metaphors, disturbance, co-creative landscape design, transformation, playfulness
Introduction
The paper discusses the use of metaphors in co-creative landscape design. In several co-creative projects of landscape design metaphors have proven to be helpful to understand, push, and shape processes of transformation. How can they initiate, inspire and productively disturb playful processes of unfolding and vanishing, of negotiating and positing?

The European Landscape convention defines landscape as an area, as perceived by people, whose character is the natural and human factors and their interaction (Council of Europe, 2000). This holistic approach refers to all types of landscapes: natural, rural and urban, exceptional, mediocre or even degraded. It demands co-creative processes with different groups of stakeholders, facilitating the exchange of perceptions, questions and ideas for the shared landscape. The goal is to identify landscape qualities and characters.

These qualities and characters are influenced by fundamental transformation processes. Landscapes are permanently changing, whether through transitions in the field of energy production and distribution, through European framework directives such as the Water Framework Directive, or through people's changing perspectives, e.g. on industrial heritage sites. That's why it is crucial to search for and do research on good processes that can cope with the complexity of landscape transformation and people's perception of it.

Case studies
The following two case studies had been analysed with special regard to the use of metaphors. The author of this paper was engaged in both projects and thus can provide in-depth insight into processes and results, challenges and supportive elements. The findings also benefit from an evaluation of the project in Münsterland that was carried out by the author as part of the project Parklandschaft 2.0.
Case study South Luxembourg

Transformation in the urban landscapes of the South Region of Grand Duchy of Luxembourg is a process of restructuring a former industrial region into a new urban landscape with university, creative industry and housing. The discussion of spatial qualities of the country’s south region was initiated by the Ministry of the Interior which oversaw the spatial planning. The project was part of the European Interreg project SAUL (Sustainable and accessible urban landscapes) and it was designed as a co-creative process involving planning professionals from municipalities, organisations, associations such as culture and nature conservation groups and the interested public. The aim of this process was to raise awareness of the spatial qualities of the urban landscape and to identify and assess landscape characters. In the very beginning of the project, journeys by bicycle, organized by experts from the regional cyclist club, inspired people to share their knowledge about different aspects of the traversed landscapes. Later, journeys by foot, designed by artist Boris Sieverts, led through the diverse landscape of the south. These journeys produced new perceptual contexts linking old and new elements of landscapes and addressing processes of transformation. One outcome of this process of engaging with landscape was a spatial vision which used the metaphor red coast to express the unique spatial constellations. The metaphor was based on the geology of the region and referred to the vernacular describing the area as red coast. The topographic edge of the coast, the beaches, slopes, harbours, cliffs, bays and the surrounding open sea allow different options for development. Bays with the green hills of the topographic edge at a stone’s throw may focus on housing development whereas the harbours located at large openings of the red coast are predestined for the service industries and the new university. Through playing with the metaphor landscape characters were found that subdivide the region based on its landscape qualities instead on municipal territory. For each character a specific relation to the red coast can be defined. The design team expressed the vision...
with drawings, maps and schemes and invited a broad range of stakeholders to engage in the discussion of the region’s spatial development.

This is the first time I can feel my home region in a planning document, said the Minister for the Interior and Planning in one of the workshops, designed to reflect the findings of the explorations. Spontaneous reactions of other stakeholders ranged from shrugging to immediate playful use of the metaphor (the image and the wording) to describe the area’s talents, threats and future paths. Where do the big tankers land? Where will the posh yachts sail? Which will be our favourite beach? As a coast and the inherent sea is an image all the participants knew, the discussions were assessable for those without a professional background in planning and design, too. This was crucial because the small municipalities in South Luxemburg are often not equipped with landscape architects and urban planners in the planning departments. The group developed an understanding for which local planning projects would reinforce the spatial vision and which ones would be against it. Although this was not made explicit in the texts and images, the group agreed most of the time. Playing with the metaphor had created a sense of place.

**Case study Münsterland**
The participants of the project *Raumperspektiven* in the rural region of the German Münsterland have been searching for landscape qualities, too. The goal was to understand the common landscapes of the newly formed region of the Regionale 2016, a temporary coalition of municipalities working for eight years on innovative ways of landscape transformation. With the program *Regionale* the federal state of North Rhine Westphalia encourages regional cooperation and pilot projects in all fields of regional development. Perceiving and reflecting spatial characteristics with a mixed group of stakeholders (including 80 mayors, representatives of the municipal planning departments and of organisations) was a crucial
part. Over a period of one year, several walks and workshops addressed the question: What is the landscape’s character today and how will it change in the future? Today, the spatial fabric of the region consists of small spatial elements (cities, rivers, ways, forests) distributed evenly over the whole region. There is no big stream, city or forest. The land has been cultivated by people over centuries and this cultivation is generic for the region. Transformation of this cultivated land has been constant but with a caring attitude. Will it stay like this in the future? The metaphor quilt encapsulated the particularities of the constantly shaped and cultivated land on two scales: region and place. The quilt has seams, dots, linings, meshes etc. Sketches and diagrams depict these elements. A map shows the way they work together as part of the cultivated land. The metaphor quilt refers to the industrial heritage of the area. The textile industry is still part of the regional memory. Hence the metaphor was compatible and playing with it came naturally to the people involved. This metaphor encapsulates the particularities of the constantly shaped and cultivated land and it pushed the stakeholders to approach spatial questions in a creative way.

For some, notions like seams, dots and lining were disturbing but also inspiring so that they engaged in the discussion. People reacted by playing with the metaphor and using it in related design projects to illustrate how the proposed interventions are woven into the spatial fabric. A group of citizens in the city of Werne, for example, found ways to express their vision for the river that runs through the city by applying the metaphor: Along the seam different patches and knots illustrates potentials for restructuring the city along its river. For this group, the metaphor was a catalyst. They used it to work with citizens who had no background in planning and design. The plans and images they drew depicted aspects of the quilt in a very concrete way.
Conclusions: Inspiring translations, open images, engaging with space

Metaphors consist of image and text. Both are quoting from contexts often distant from the object (the landscape) – at least at first sight. After a closer look, though, there is an inspiring connection that provokes playful translations to and from the world of the metaphor. This play benefits from the tension that is created by introducing the metaphor in a process [1]. The metaphor creatively disturbs familiar patterns of discussion. A close look in the history and geology of Luxembourg’s south region reveals the relevance of considering the topographic edge as coast [2]. It is crucial that metaphors refer to the history of an area and mirror features of the region.

In both projects landscape qualities and characters have been identified by working with the metaphors. To inspire a playful discussion, the metaphor had to be presented in images and words (e.g. the image/map of the red coast and the notions like harbours, bays etc. in Luxembourg). These words and images are coherent means in complex processes of transformation. They help to grasp the essence of a region. To express the distinct character of a region goes far beyond analysis. Elements are highlighted, others are softened or even left out. Developing and sharpening these images together with the group rather than presenting a finalized image by experts is crucial for the success. The landscape architects inspired the group with a first idea for a metaphor and started a discussion. While discussing a first draft of a new map for a region, stakeholder could step by step learn a shared language for their landscapes. This language does not replace professional languages but adds to them. The landscape architects had to be open to adapt the elements of the metaphor that did not work. In both projects, they were accepted in their professional role as experts for landscape transformation and visualisation.

In both projects the discussions benefited from
the fact that the participants could refer to their mutual perceptions of the region while engaging with the landscape through walking parts of it. Walks with the artist Boris Sieverts confronted the participants with a diverse range of situations. He combined paths, situations, and views and creates a sequence of images while walking. Participants of his tours were guided to experience these newly written landscape stories [3]. The fact that walkers can become part of the Raumgeschehehen, and intensively perceive and change it, makes walking a process of understanding that is directly linked to design [4]. Walkers explore what is already there, immediately creating and thus changing this reality by walking through it and by connecting elements in their minds and with their bodies and by reflecting on the insights gained. In this process of understanding an outcome of the simple act of walking becomes explicit: Questions and ideas. Walking rhythmically merges the motion of the body and the lines of thought. It merges perception, physical challenge, and rhythmic movement. Thus, it brings perception and flow together, creating an interplay that is well-suited to generating new ideas [5]. The walks in South Luxembourg and the Münsterland formed the foundation of both finding a suitable metaphor and opening for intuitive ways of approaching the landscapes. Through addressing the ludic drive, metaphors encourage people to use their intuition - an important precondition for co-creative, open design processes [6]. An important framework for such playful discussions was a carefully design process, that in both projects had been developed by an expert for communicative planning [7]. The participants agreed on rules, e.g. to look at the region without its municipal borders and to meet in a non-hierarchic, mixed team (the so-called group de travail mixed in Luxemburg and the core group in Münsterland) and to discuss on eye-level. Small diverse groups, a consistent facilitation and a transparent design process were key factors for success.
Implicit knowledge

Working with metaphors helps to generate implicit knowledge. People agreed on landscape qualities and on relevant themes of transformation. The qualities were put down in images and not in formal plans, though. The work with metaphors was part of informal processes of landscape development that aim to convince people to support a project or a set of strategies rather than dictate rules for landscape planning. People can draw on their gained implicit knowledge in all contexts of regional development they are involved in. Because they were part of a co-creative process they presumably will contribute their insight in their daily discussions and decisions.

From a scientific point of view, playing with the metaphor connects elements that had not been linked so far. According to neuroscientist Gerald Hüther these new ties are crucial for processes of innovation [8]. In fact, in both projects the involved people developed an understanding for the characteristics and potentials of their region. One of the municipalities in south Luxembourg questioned a pending project for a new settlement – and finally skipped the plan. They opted for a much more innovative way of restructuring their city. Hence the gained implicit, shared knowledge influenced hands-on decisions for the future development of the spatial structure of the region.

Landscape qualities and landscape characters had been found and portrayed through working with metaphors. The metaphors established a common ground for discussing spatial strategies and for activating the resources of stakeholders. They helped to make spatial qualities visible, encouraged a playful, creative atmosphere, opened the process for people with different professional backgrounds and provided a shared language for a complex space. Thus, metaphors are likely to be a successful tool for implementing the European Landscape Convention.
References


Abstract
Landscape identity plays an important role in improving and maintaining the quality of urban environments and enhancing the quality of human life. Understanding and promoting of landscape identity is necessary to successfully help us get a handle on why the particular place is like it is, what our role in it might be, and how we can sustain or change it. Hence, this research is trying to clarify the confusions between landscape identity and other relevant identities; propose a new framework for assessing landscape identity; and most importantly to propose a valid methodology to assess such identity.

Introduction
Public spaces are the primary space for public interaction and activity in our cities. There are opportunities to improve the quality of such places. Therefore it is always a challenging aspiration to the landscape practitioners to create a user-friendly public space. Hence, thinking afresh about our public spaces is needed, how it is used and how people move in it. However, Due to modernization and globalization, more and more public spaces are facing danger of repetitiveness and sameness taking place in our cities. Therefore, this study is aiming to develop a way to identify the landscape identity of urban public space and to provide ability to assess the quality and uniqueness of such space.

Landscape identity is a vital component in urban development and acts as an important aspect to the quality of functionality in landscape. It can create an image of a place that people could relate highly to in their daily lives. However, due to the diversification of all the literature on different aspects of identity, it is currently very hard for both academics and practitioners to identify the correct identity that they can focus on when developing urban places, and due to globalisation landscape identities are vastly ignored and vanish. China is a typical example [1].
Based on the above problem, this paper is aiming to carry out an intellectual inquiry in an attempt to clarify the definition of “landscape identity”; develop a conceptual framework from it; and most importantly, to develop an identification and assessment methodology to apply such conceptual framework into practical use.

**Defining Landscape Identity**

1. Related Definitions of Landscape Identity

Stobbelaar and Pedroli have identified Existential and Spatial Identity as the two major identities that contribute to the landscape identity [2]. It is a social and personal construction in which the physical features of the area are components in the construction process [3][4]. Due to the fact that people contribute to landscape identities from social and cultural aspects, landscape identity has been seen to unite inhabitants to each other and also distinguish them from other areas [2].

Despite the past research on the term, the definition of “landscape identity” is still ambiguous in the past; at the same time, other terms have been introduced that describe similar ideas of landscape identity, which focus on developing an identity that applies to small-scaled places, for example a city quarter or a street. These identities all describe a subset or an aspect of landscape identity by different researchers. The most commonly used terms related to landscape identity are:

- **Place Identity**: It is an important factor to enhance the quality of urban life in cities that embrace environmental, economic and social aspects [5][6]. It is developed when a place is viewed as a significant part of life by the residents and able to fulfill their behavioral goals better than any alternatives [7][8][9].

- **Place Attachment**: It is an affective bonding that people established with specific areas where they prefer to remain and where they feel comfortable and safe [8][10][11]. The term has been commonly related to
place identity [6], because it helps to tighten the behavioral relationships between people and their environment [12]. However, place attachment does not always focus on positive feelings, as it might also include negative feelings on the surroundings.

**Personal Identity:** Originally the term is related to how people recognise one another by their appearance and a bond to personal history and experiences [13][14][15]. Later on, Proshansky further differentiated the personal identity in landscape study to how people “feel” about the surrounding environment through their feelings with the physical world and life experiences [5].

- **Culture Identity:** Cultural heritage serves to develop a positive image to external people as a unique location factor in the global competition [16]. Throughout the historical time frame, culture has largely embedded into people’s memory, therefore, memory plays an important role in the cultural identity. Not only the person-environment interaction contributes to the place bond, but also the memories of those experiences and memories of significant events, stories or people all contribute significantly to building the places identity [10][17][18].

**Community identity:** Each community has their own characters, which leads to different landscape characteristics [19][20]. Thompson and Travlou provided empirical evidence of the benefits people could gain via interaction with local natural resources [21]. It is the environments and events that link the past with the present resulting in a felt sense of coherence [5].

- **Sense of Place:** It is a multidimensional construct representing beliefs, emotions and behavioral commitments concerning a particular geographic setting [22]. It has been viewed as a concept of place identity, incorporated with place attachment [6]; it is usually associated with people’s self-fulfillment through place experiences [23]. The term also
indicates that residents who have lived longer in a place are more likely to have developed significant relationships with other residents as well as the surrounding environment [24].

2. Landscape Identity Framework

In all of the relative identities, major literatures have all mentioned the concept of how the physical environment influences local people’s feelings. Therefore it is supported that the physical aspect is one of the major aspects in landscape identity. Besides landscape identity also focuses on how people contribute to the environment to make the place more attractive and distinguished to the outside world. From this perspective social activity is important in which local people interact with their place to make it unique. As users are a key attribute of urban places, landscape identity is not only about the uniqueness of the physical place and its functionality, but also the ability to provide psychological comfort – Sensory. An important part of an area is its inheritance from its past, which is a benefit of a traditional community having long dwelt there. These are usually expressed through physical and spiritual heritage, which are deeply embedded with human memory.

From the above fact, as a formal way to define and unify the meaning of landscape identity, the term can be defined as a distinct, recognisable and consistent pattern of elements in the small-scaled place that is distinguishable from another. The idea of interaction between human, place and space from different perspectives to derive a better quality of living environment was also mentioned by Thwaites and Simkins [25]. Overall, all the effective factors of different identities could be summarised into four aspects: physical, social, sensory and memory, which are the common aspects of local level’s landscape identity.

With this clear understanding of all the different aspects that contribute to landscape identity, it forms the basis for the development of the research methodology used in this paper.
Such conceptual framework provides the perspectives that the assessment process needs to concentrate on (the four aspects).

**Data Collection Methodology**

1. **Study site**
The research has chosen Yantai Hill area at Yantai, China to be the study site due to its strong representation in all the major landscape identity aspects. The area is famous for its rich history and divers physical architecture and cultures from such history, e.g. From 1880 to 1920, with the western banks open, China and western businesses began to get into the local area.

2. **Data collection through PPEI**
Shao has proven that using 180° horizontal panoramic photographs in landscape research’s data gathering process is an effective and accurate method given the currently limitation in other technologies [26]. Hence this research carried out 180° panoramic photo elicitation interviews (PPEI for short) combined with onsite and offsite interviews with local and non-local participants in order to gather efficient and accurate data on the preferences of different participants’ opinions. The photos were taken along the center of the street using a Nikon Coolpix P510 Digital Camera with zoom range from 24mm to 1000mm (35mm equivalent focal lengths). The camera was attached to a tripod at eye level.

In order to gather diversified opinions under different circumstances, the research has chosen to carry out PPEI at both onsite and offsite locations with local and non-local participants. Shinebourne, Watts and Stenner proved that using 40 to 80 photos with 40-60 participants for qualitative research method would produce robust data on a normal research project, however the photos that are used in their research are normal 60° photos [27][28]. Therefore, with 180° panoramic photos, it is decided to use a total of 30 180° panoramic photos and 60 participants sample size for this research.
In each interview, participants were shown a set of 30 A3 panoramic photos and asked to use different colored adhesive dots to mark the elements they like or dislike, and their opinions throughout the interview process were recorded and noted on the photos. The entire interview conversation was also digitally recorded for later analysis. Each color represents one aspect of landscape identity:

- Blue Dot --- Physical Aspect
- Green Dot --- Social Aspect
- Yellow Dot --- Sensory Aspect
- Red Dot --- Memory Aspect

Furthermore, it is not only the positive perspectives that are cast as landscape identity, but also the negative ones. Hence, each participant was asked to mark their selections by “+” and “-” to represent their positive and negative feelings correspondingly, empty for no specific feeling (Figure 1). The only difference between onsite and offsite interviews is that the onsite interview participants have the real-sight as their comparisons to the panoramic photos.

Data Analysis Methodology
1. Counting Collected Data
Based on the elements selected and the reason of selection, all participants’ opinions are standardized and organized into the overall landscape identity assessment table for interpolation.

2. Overall Assessment
There are 4 sections in the table, and the interpretation is as following (Figure 7):

Qualitative Assessment: The section is divided into positive and negative pie chart columns. The aim is to visualise the quality assessment for four landscape identity aspects that are related to one physical location. Each pie chart represents an overall preference across four aspects in relation to one physical location. Each color in the pie chart represents one aspect:

- Blue --- Physical Aspect
- Green --- Social Aspect
- Yellow --- Sensory Aspect
- Red --- Memory Aspect
The size of the pie chart is decided by the overall selections of the elements in the same location, and the proportion of each color in the pie chart is determined by the number of corresponding preference selections in each aspect from the aspect assessment tables. For example, at the far left side of overall assessment table, there are 31 “Like” on Zhangyu Wine Cultural Museum” in its physical appearance; 34 “Like” on “Wine Annual Expo” carried out at the museum; 27 “Like” on “Wine Tasting”; and 62 “Like” from three memory related elements (named “Zhang Bishi”, “Zhangyu Ltd”, “Sun Zhongshan Inscribe: 品重醴泉”) that are all related to the museum. Hence, explaining the size of the positive pie chart and proportion of each color in the chart that related to the landscape identities at the location: Zhangyu Wine Cultural Museum. The negative pie charts generated in the same way.

A bigger sized pie chart indicates that more participants viewed such location as unique elements that could represent landscape identity, regardless of which aspects it emphasized on, hence, providing a direct and precise observation for the importance of all landscape identity elements.

Elements in the Same Location: Each of the four columns under the middle section represents one aspect, with the physical aspect representing both the aspect element and the location, and others in a row representing the corresponding elements that have been identified from other individual aspects assessment tables that are related to the same physical location. Each row is an indication of how many aspects a single location could represent the landscape identity from.

Sum and Rank: The last two sections on the right of the table represent the sum and the rank of such location among all landscape identity elements. The rank number is an indication of the importance of such location and it is based on the sum of the count of all selections for each element identified in aspects location section on
This research has plotted all the pie chart information in Figure 2 on to the local map to produce a more direct and comprehensive view. With the names shown on the map, by using the map and assessment table together, users can: identify the landscape identity elements; analyse the aspects they represent and assess the quality of such identity for the corresponding aspects or as a general point. In total, there are 2 maps for visualising landscape identity from an overall perspective (Map 1, 2):

- Map 1: Positive Landscape Identities
- Map 2: Negative Landscape Identities

From the map it can be clearly seen which elements most strongly represent the landscape identity from the size of each pie chart on the map --- the bigger the more important. And from the proportion of different colors in each pie chart, one could identify the aspect the elements have emphasised on (Map 1 and 2). Therefore, the maps provide a direct and visualised way for its users to both identify and assess corresponding landscape identities.

The overall assessment table has the power to do both landscape identity identification and show its corresponding assessment via the pie charts. The table ranks all identified landscape identity elements via their number of selections. The pie chart has the ability to indicate multiple findings. It indicates the importance of the elements by the total size; tell how many aspects the local elements cover via the color involved in the pie chart; present the importance of each aspect at one location via the size of each color proportion in the pie chart. Most importantly these pie charts are plotted on a local map to provide a direct view on the location of each landscape identity and their corresponding assessment.

**Discussion**

This research has resulted in two sets of findings which are related to each other; the first is the
conceptual framework of landscape identity developed through literature review, the second used that framework to develop a methodology on both data collection and analysis process that generates and analyses data to further prove the properties of landscape identity as defined. In this way, the results from the methodology have provided a rigorous and easy access to investigate landscape identity through both individual aspects and overall perspective, which can be used to refine landscape identity development. The results are very customisable in the sense that users can tailor the data gathered at each stage during the data assessment process to better meet their own requirements in landscape study.

Another important contribution from the thesis methodology is its data analysis process. The final results that are derived by the thesis methodology are: final mapping for both positive and negative landscape identity elements (via pie charts), and the participant groups impact map. In these maps, the representation elements of landscape identity and its relative preference from different participant groups are all explicitly expressed and the overall assessment table provides details of landscape identity elements. The derivation process followed a specific procedure, which not only quantifies but also visualise information gathered at each step, these steps can also be used for other research purposes on landscape identity, e.g. one could only use the physical aspect table to investigate deeper into the physical aspect of landscape identity. Through the method of data analysis process, all data collected can be categorised into four different aspects and then corresponding analysis on the individual aspects was carried out. This has further proven the validity of conceptual framework of landscape identity.

Conclusion
The claim for landscape identity is that it is an effective indication by which to engage various aspects’ elements to provide distinguishable uniqueness of a local site and increase the
bond between places and people. Therefore the major objective of this research is to help both academics and practitioners to understand, identify and assess landscape identity. Throughout the thesis development, the research believes the findings can contribute to the solution of resolving the current identity loss of cities globally and help to deliver a better living environment that people feel more attached to.

References


Map 1: Positive Landscape Identities

Map 2: Negative Landscape Identities

Figure 2: Overall Assessment Table
Abstract

‘Architecture has always represented the prototype of a work of art the reception of which is consummated by a collectivity in a state of distraction...’

- Walter Benjamin

The state of distraction to which Benjamin refers is, in large part, due to habituation, the psychological phenomenon in which the physiological response to a stimulus decreases with repeated exposure. This process is unconscious: the more we encounter something, the less we will pay attention to it. This paper proposes that professionals responsible for the design of our built environment – landscape architects, architects, and urban planners – must reengage their attention to the environment in order to adequately analyze it and propose responsive designs. This paper describes a mechanism for dishabituation: the appropriation and adaptation of a technique for exploring and analyzing an urban environment. This technique is Guy Debord and the Situationist International’s dérive, defined as ‘a technique of rapid passage through varied ambiances’. This technique, in its revised form, is being investigated as a means to reengage our attention, and as a tool for site analysis. A reinterpretation of the dérive retains the subjectivity of Debord’s concept but capitalizes on the strengths of contemporary mapping technology, namely the aggregation and filtering of many data points and sets. This new method serves as a strategy for crowdsourcing the location of a temporary intervention in an introductory environmental design course offered to 150 students including landscape architecture, architecture, and urban planning majors. A two-phase exploration gives students the opportunity to analyze their immediate and surrounding environment, and to develop skills in mapping, cataloguing, representing, and abstracting those conditions. This paper describes psychogeography (a term coined by Guy Debord) and its cartographic representations in the cognitive, analogue, and digital realms, a specific methodology for a dérive and intervention.
conducted in an environmental design course, and the role of these cartographies in the design and transformation of the built environment.

**Introduction**

‘Architecture has always represented the prototype of a work of art the reception of which is consummated by a collectivity in a state of distraction...’¹

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The state of distraction to which Benjamin refers is, in large part, due to *habituation*, the psychological phenomenon in which the physiological response to a stimulus decreases with repeated exposure. This process is unconscious: the more we encounter something, the less we will pay attention to it. This paper proposes that professionals responsible for the design of our built environment – landscape architects, architects, and urban planners – must reengage their attention to the environment in order to adequately analyze it and propose responsive designs. This suggests that creation occurs after a reaction to our surroundings, that an analytical representation becomes a catalyst for creation and transformation in spite of the disconnect between what is physically present and what is perceived. This paper describes a mechanism for dishabituation: the appropriation and adaptation of a technique for exploring and analyzing an urban environment. This technique is Guy Debord and the Situationist International’s *dérive*, defined as ‘a technique of rapid passage through varied ambiences.’² This technique, in its revised form, is being investigated as a means to reengage our attention, and as a tool for site analysis. This paper describes psychogeography (a term coined by Guy Debord) and its cartographic representations in the cognitive, analogue, and digital realms, a specific methodology for a *dérive* and intervention conducted in an environmental design course, and the role of these cartographies in the design and transformation of the built environment.

Geography, as an inherently interdisciplinary
field, provides a scaffold for a course designed as an interdisciplinary introduction to the principles of environmental design. Artist and geographer Trevor Paglan explains geographer-philosopher Henri Lefebvre’s theory of the production of space, saying: “Space is not a container for human activities, but is actively ‘produced’ through human activity. The spaces humans produce, in turn, set powerful constraints upon subsequent activity.” This feedback loop between the built environment and the people that inhabit it is a meta-principle underlying the course. Experimental geography, more specifically, is a realm of investigation of the built environment, which according to Nato Thompson in his book *Experimental Geography*, is “a field combining ambiguity, empiricism, techniques of representation, and education…” This definition also holds true for fields engaged in the design of the built environment, including landscape architecture, architecture, and urban planning.

**Psychogeography: The Intersection Of Cognitive, Analogue, And Digital Mapping**

*Psychogeography and Cognitive Mapping*  
Psychogeography, a subset of experimental geography, highlights the psychological component of our perception and experience of the built environment. Psychogeography is commonly associated with the Situationist International, an interdisciplinary and politically-motivated organization active in Europe in the mid-20th century. Guy Debord, co-founder of the Situationist International, defined psychogeography as: “the study of the specific effects of the geographical environment... on the emotions and behavior of individuals.” The geography of our environment as we perceive it leaves a neurological imprint – specific cells called place cells fire when we occupy a specific location in the environment, constructing a cognitive map. Our brain, specifically the hippocampus, represents and stores spatial information in two ways: as egocentric space, and as allocentric space. Egocentric space is based on the location of the body/viewer, and the locations of objects relative to this point. In order to
understand the spatial locations and relationships between objects regardless of the body’s position, an allocentric spatial representation is needed. In this, a cognitive map is formed ‘within some kind of absolute framework.’ How are these cognitive maps constructed? Through the physical exploration of our environment: ‘curiosity-driven exploration is the basis for encoding a ‘map’.’ This is not a task-driven process, but rather comes from a desire to familiarize ourselves with our environment. Exploration diminishes through habituation, but can be renewed through a novel stimulus (for example, the movement, removal, or addition of an object). The methodology to be described invokes a two-step process to reengage our attention to our built environment by providing novel stimuli.

Psychogeography can now be understood to include the concept of affordances, a term and concept introduced by the psychologist J. J. Gibson in the 1970s. Affordances are the opportunities that the environment may offer to someone occupying that environment. It is relative and speaks to the interaction between the environment and the occupant - in contrast with its physical characteristics. Affordances may be generalized – a bench affords the opportunity to sit – or they may vary by age, mobility, and other factors. For example, a child perceives a railing as something to swing from, while adults typically do not. Affordances relate to the potential for our bodies to physically interact with our environment, primarily a tactile event.

We also, of course, perceive and map our environment through visual scanning. Research by Ehinger and Oliva at MIT has shown that ‘people show a preference for particular ‘canonical’ views.’ The preferred views from a given location were those that captured the greatest spatial volume – in other words, those views which provided the most information about the environment. Cognitive mapping, through physical exploration, affordances, and visual scanning, frames the dérive adaptation.
**Psychogeography and the Dérive**

Under the rubric of psychogeography, the Situationist International developed the *dérive* as a tool for their theory of unitary urbanism, defined as a strategy by which: ‘The environment is explored and challenged...to provide alternative ways of using and living in the environment.’

The *dérive* is a method of analysis which can provide a framework for intervention. Adam Bernard, in his essay ‘The Legacy of the Situationist International,’ describes the value of unitary urbanism as a strategy which values sensory perception and emotional provocation, critiquing the prevailing strategy which privileges financial models. Subjective and sensory experiences become lenses through which the urban environment is analyzed. Debord suggests that: ‘from a *dérive* point of view cities have psychogeographical contours, with constant currents, fixed points and vortexes that strongly discourage entry into or exit from certain zones.’

With regard to representations of the *dérive*, Debord appropriated the Surrealist collage technique called the exquisite corpse, and applied it to cartographic representations of psychogeography. Existing maps of cities were cut up and reassembled, often with gaps between areas of the city to more accurately reflect the experience of the city: specifically its discontinuities. *The Naked City* map from 1957 was created from the Plan de Paris, a popular map of Paris at the time (Fig. 2). Nineteen sections of the map were extracted and reassembled, and red arrows were added to illustrate ‘spontaneous turns of direction’ that one is compelled to make when moving between these sections, each of which has a ‘unity of atmosphere.’ The ‘renovated cartography,’ in Debord’s words, constructed here creates a synthesis between existing conditions and the human experience.

The cartographer Denis Cosgrove explains the significance of the *dérive*:

Thought of cartographically, the *dérive* was a conscious challenge to the apparently omniscient,
disembodied and totalizing urban map that had become the principal instrument for urban planning and ‘comprehensive redevelopment’ during the post-war years. Resistance to the disembodied, visually dominated approach to designing for the urban environment continues to be of concern over a half-century later. The method does not presume to be comprehensive, but rather brings awareness to our richly layered and nuanced built environments and their affordances.

**Contemporary Psychogeography and Digital Mapping**

The artist, designer, and educator Christian Nold has built his career on a reinterpretation of psychogeography. He employs current technology for participatory mapping, or mapping in which data is contributed by a large group of participants. His book *Emotional Cartography* describes a bio mapping project, a participatory mapping project in which 98 participants wore GPS devices and galvanic skin response sensors to track their movements on an hour-long walk through San Francisco and record their emotional responses along their route (Fig. 3). What is unique about this strategy is that it collects personal, idiosyncratic, data which remains archived in the final map, but thanks to the large number of participants, the aggregated data points to commonalities in perceptual experience. Color indicates emotional data: the bright red dots indicate arousal, while the darker dots show points of calm. Nold has also conducted similar studies in Stockport and Greenwich in the UK, using similar technologies but experimenting with different cartographic representations. While Nold clearly builds on the *dérive* method of the Situationists, he critiques the narrowness of their agenda, saying: Rather than the continuous drifting through the city that the Situationists imagined, the Greenwich Emotion Map suggests an experience of the city as a series of distinct ‘events’, by which we mean moments of distinctive attention... This vision of the environment as a stage for events suggests an active engagement not
covered by the normal concept of the ‘walk’ or ‘drift’. It suggests an embodied being within the environment actively interacting with people, objects and places.\textsuperscript{17}

Nold’s methodology serves as a precedent for the reinterpretation of the \textit{dérive} that will be subsequently described. While Nold’s method acts solely as an analytical tool rather than a basis for intervention, his method addresses the cognitive processes of habituation and attention to novel stimuli that occur at the scale of the individual, while collecting data from enough participants to identify common patterns of response. Additionally, the integration of technologically-advanced tools for data collection, specifically GPS tracking and geotagged photography, have been incorporated in the project methodology.

\textbf{Adapted Dérive Methodology And Assessment}\textsuperscript{18}

\textit{Adapted Dérive Methodology}

This reinterpretation of the \textit{dérive} retains the subjectivity of Debord’s concept but capitalizes on the strengths of contemporary mapping technology, namely the aggregation and filtering of many data points and sets. This new method serves as a strategy for crowdsourcing the location of a temporary intervention in an introductory environmental design course offered to 150 students including landscape architecture, architecture, and city planning majors. As a general education elective, learning objectives include understanding the physiological, psychological, and social influences on thinking and behavior, how the mind and body work in concert, and how the environment affects human behavior. Cal Poly’s campus is an ideal setting to reflect on the relationship between people, the built environment, and nature. The campus is adjacent to downtown San Luis Obispo and occupies a unique and dynamic natural landscape, surrounded by rolling hills and distinctive geological features, the Nine Sisters, which are ancient volcanic plugs. One’s experience of places on campus inevitably includes foreground, middle ground, and
background perceptual stimuli, due to the rolling terrain and dramatic views.

This project, for which the adapted dérive is phase one, suggests that in order to design for the built environment, we must be aware of the many complex elements and systems that compose it. One way to cultivate this awareness is to disrupt our expectations and make the perception and interpretation of the existing context a conscious process: in other words, invoke dishabitation. The dérive serves as the first step in this process, laying the groundwork for the deployment and documentation of a portable camera obscura. A camera obscura, which projects the exterior environment onto the interior of a dark space, requires active participation as one context is superimposed on another. This two-phase exploration gives students the opportunity to reflect on their immediate and surrounding environment, and to develop skills in mapping, cataloguing, representing, and abstracting those conditions.

In order to prepare for the deployment of the camera obscura, students conduct a dérive to analyze the context (campus) from an experiential perspective. This mapping method was developed in collaboration with the university’s GIS Specialist. We began with Debord’s guidelines for a dérive:
Number: several small groups of two or three people
Duration: average of one day, but can be a few hours midday
Area: ‘If one sticks to the direct exploration of a particular terrain, one is concentrating primarily on research for a psychogeographical urbanism.’

Our methods of representation of the dérive include both analogue and digital components. Students are asked to create an analogue psychogeographic map in their sketchbook, as a way to provoke a subjective observation, experience, and recording (Fig. 4). Beginning with a blank page rather than a campus map, students must rely on their observations, highlighting the
difference between what they experience and the omniscient view of the commercial map.

The digital dérive method utilizes free geotracking applications in which students record their dérive route and add placemarks when they identify a place (Fig. 5). A discussion about place versus space, and the definition of place as the intersection of physical attributes, activities, and conceptions, precedes the dérive. Students also take analytical photographs that are geotagged to their route map, cataloguing both physical and experiential characteristics of each place. The digital dérive maps with placemarks are then aggregated and made public through the ArcGIS website. This web interface allows the user to toggle between the 37 route maps, to see a single map with all 37 routes and placemarks, and to view the density of placemarks as a heat map (Figs. 6 and 7). Through this process of data collection, aggregation, and filtering, we are able to identify the most commonly marked places, and determine an ideal site for our camera obscura. Students begin to see, in Cosgrove’s words, the map as: ‘one of those instruments that serves to extend the capacities of the human body...The map also has a powerful recursive quality, at once a memory device and a foundation for projective action.’

**Digital Dérive Assessment**

The digital dérive provides an opportunity to take many idiosyncratic and subjective data points and mine them for commonalities. While there is a diverse array of placemarks, several places on campus are foregrounded through the heat map visualization. Once the general site is chosen, the portable camera obscura is brought to the site. It is then up to the students to fine-tune the siting, by determining the exact placement and orientation of the aperture relative to the immediate and distant context. This paper will not expound on phase two of the process, the deployment of the camera obscura: however, Figure 8 shows examples of the images experienced by the students inside the camera obscura.
Based on the outcomes of this methodology, one critique is that a dérive as it was originally defined by Debord is conducted without an agenda. Here, the students are primed for their dérive by being informed that the data will be used to identify a site for a camera obscura. However, Debord’s dérive was really a starting point for this method; as a tool for site analysis, priming (identifying qualities or characteristics to look for, with regard to affordances) is paramount.

Conclusion

This method, a psychogeographic survey and intervention, privileges experiential characteristics over objective, geometrically measurable ones in order to create a conscious reengagement between the designer and his/her environment. Debord, in his 1958 essay “Theory of the Dérive,” notes that a sense of unity in a given area of the city and the threads that connect these areas are highly variable. Situationist scholar Thomas F. McDonough highlights the value of this variability, both in concept and in representation: Debord’s map...foregrounds its contingency by structuring itself as a narrative open to numerous readings. It openly acknowledges itself as the trace of practices of inhabiting rather than as an imaginary resolution of real contradictions. As a narrative open to multiple readings, this type of cartography can be didactic – an end in and of itself – or part of a design methodology for intervention. In future iterations of this project, it could be useful to add a third media to the mapping method: following the analogue psychogeographic map and digital dérive, students could create their own The Naked City map using an existing map of Cal Poly’s campus, cutting fragments and reassembling them to more closely approximate their experience. As this project continues to be refined and re-engaged, a strategy for comparing the results of the analogue and digital mappings must be developed.

In a broader context, information gathered
through a digital dérive and the other components of the method could prove a useful tool for designers as they consider the relationship between intervention, user, and context. The power of the digital dérive as it might be utilized in practice is two-fold: the collective memory and experiences of the inhabitants are typically untapped resources, and the technology to capture, share, and aggregate the data is user-friendly and readily analyzed to provide a basis for design intervention that can more appropriately address the needs and preferences of future users. For both designers and inhabitants, a renewed conscious awareness of, or dishabitation to, aspects of the existing environment is critical to sensitive and successful analysis and intervention.

Endnotes
5 *Internationale Situationniste #1 (June 1958)* Translated by Ken Knabb.
6 Andersen, p.623.
7 Andersen, p.623.


11 Barnard, p.108.


16 Nold.

17 Nold, p.67.


19 Debord, 1956.


21 Cosgrove, p.168.

22 McDonough, p.69.
Figure 1: Brain and sensory organs; ten figures showing dissections of the brain, eye and ear. Line engraving by A. Bell, 1788/1797. Source: (Creative Commons)

Figure 2: Guy Debord, The Naked City map and detail, 1957. This psychogeographic map reflects a collage technique of the Surrealists, the exquisite corpse - Paris map fragments were cut up and reassembled to more closely mirror the human experience of the city. Source: (Frac Centre)
Figure 3: Christian Nold, San Francisco Emotion Map and detail, 2001. Source: (Christian Nold)

Figure 4: Student, analogue psychogeographic map drawn in sketchbook during dérive, 2016. Source: (Author, 2016)

Figure 5: Student, digital dérive map: route and placemarks shown on Google Earth, 2016. Source: (Author, 2016)

Figure 6: Class, aggregated digital dérive map with routes and placemarks, 2016. Source: (Author, 2016)

Figure 7: Class, aggregated digital dérive heat map showing density of placemarks, 2016. Source: (Author, 2016)

Figure 8: Student, photographs from inside the camera obscura, 2016. As students sit in darkness, an image of the external environment is projected through an aperture upside-down and backwards on a screen inside the space. Source: (Author, 2016)
Abstract
Ecological concepts have been evolving as we learn to appreciate ecocentric perspective embracing change beyond the concept of equilibrium. Measures taken to regulate the environment have long assumed a state of stability aka. homeostasis or stationary stability. In contrast most riverine regimes and ecosystems are characterized by the principle of homeorhesis or evolutionary stability (Waddington 1955) - preserving a systems characteristic flow processes.
Non-equilibrium ecosystems offer capacity to absorb changes and to persist in a globally stable dynamic regime far from equilibrium.
Waddington expanded the concept of resilience and argues that every system is potentially moving towards moments of bifurcation where irreversible change may occur “catastrophically”.
The history of engineering is the history of taming nature in order to advert catastrophic change. reducing nature to an object and to an exploitable resource to the service of mankind is the legacy of modern sciences. Can contemporary science help to reframe our attitude to appreciate an animate nature and predict change as less catastrophic?
How can we imagine organizing the urban condition and its interfacing civic infrastructural systems coexisting or more precisely - coevolving with this paradigm of continuous change as an ordering principle? Can we think of urbanization and civic culture as a similarly emergent concept that keeps altering as it has been altering before? How can future modernization and urbanization be developed in concert with these anticipated rates of change?
One starting point is to address nature not as a passive product (natura naturata) but as a producing entity (natura naturans). The appreciation of nature’s selforganizing capacities calls for design to understand its role in facilitating a coevolutionary path. The close reading of natures animate and producing capacities carry the potential of design as coproductivity. (Ernst Bloch)
Preserving the flow!
Jörg Sieweke
paradoXcity

Keywords: evolutionary stability, homeorhesis, natura naturans, Preserving the flow!, Waddington, ecosystems

In contrast to current convention of biomimicry
we need to embrace natural systems performance and organization and most significant their metabolism. Biomimicry should therefore surpass the objective of drawing from formal repertoire of nature to a model of comprehending and utilizing metabolic mechanisms and how they maintain structures.

Preserving The Flow
How can we advance recent ecological concepts from a human-centric towards an eco-centric perspective without wandering off into the world of esotericism? Ecological concepts have been evolving as we learn to bridge eco-centric with human-centric perspective embracing change beyond the concept of equilibrium. The comparatively recent history of modernization and its effects become tangible if one faces the regulation of rivers. The juxtaposition of the vivid nature of the water relative to built grey infrastructure intuitively reveals the project’s implicit mindset of control and order. How can we begin to address the subdued and neglected animate nature of a river today? Delta landscapes like the lower Mississippi, aka. “Old Man River are among the most productive ecosystems of all: in terms of productivity they exceed tropical rainforests. Their rich metabolism provides an abundance of seafood as well as the most fertile agricultural land in the floodplains. The typical deltaic metabolism provides and maintains structures as the continuous build-up of natural levees as well as the shifting alluvial fan for brackish ecosystems to thrive. At the same time, this landscape of abundance is ephemeral. It does not remain stable in its local place for long, so nothing can be considered permanent except change itself as a defining parameter. The River will eventually breach the levee it built for itself and thereby frequently alter its course, yet it will remain in the alluvial delta-fan. In Louisiana this principle was understood by the Native Americans, who adapted to the swampy ground with light and mobile forms of settlement on the natural levees or with subtle elevations such as heaps of oyster-shells.
Since the aftermath of the 1927 flood, the management of the Mississippi River and Tributaries Project (MRTP) has regulated the surrounding environment along a paradigm focused on averting change. The side effects of this regulation have recently been acknowledged as quite significant, as the entire project’s integrity is being questioned. Formerly marginalized externalities of channelizing the River surface have emerged today as unintended consequences at the scale of the entire project. A range of problems have developed, notably a) the loss of the Louisiana Delta landscape due to wetland erosion, b) an increased exposure of New Orleans to storm surge due to loss of deltaic cypress forest buffer, c) growing hypoxia dead zones of algae bloom along the Gulf Coast due to excess nutrient discharged by the River and d) the risk of loosing the youngest part of the MRTP itself, the Rivers navigable pass in the Bird-Foot Delta.

The hinge point of the Delta fan is located at the confluence with the Red River; here the Mississippi would prefer to jump channels to a shorter and steeper path to the gulf. If it were for the River to decide, it would divert westwards into a lush cypress forest basin known as the Atchafalaya. The Mississippi River is tired of flowing past New Orleans; it has gone this way for too long. The sediment has elevated its own bed, and its levees have become the highest ground in the Delta. The River would rather follow gravity again and wander all around the Southern Louisiana Delta, building the most fertile land of sediment and nutrient by breaking through a levee occasionally (crevasse). It would also want to push back the Gulf’s salinity gradient of encroaching brackish water with the rivers abundant volume of freshwater.

The nascent ambition of the River to shift its course and jump channels had not been accounted for – quite the opposite. It has been conceptualized in static fashion as forced to be fixed in place, needing to accommodate industry and settlement. Great quantities of steel and concrete structural engineering have been brought in to turn the River’s stability into
stagnation. In the meantime, global trade and commerce of national and international reach rely on the river to stay where it is. In fact, a United States Congressional decision set in place since the 1950s prescribes not only its delineation, but also the flow rate of the Mississippi as fixed to 70/30 in an attempt to prevent the river from following its next path of entropy into the Atchafalaya. All multi-faceted investment, reinsurance networks and economic tangents at stake require the stream to be reduced to a channel - a plumbing system or a discharge problem to use the current terminology of its managers. As one consequence of channeling the adjacent Louisiana Delta is starving from being cut off from further sediment replenishment as the land erodes into the sea at increasing rates. The land subsides faster since the river is no longer allowed to supply its sediment deposit over the levees into the delta landscape. Instead, the accumulating sediment in the river clogs the shipping channel. Dredging the River for navigation can barely keep up today and will not be able to accommodate post-Panama class shipping drafts. Excess nutrient from agricultural run-off throughout the Mississippi watershed channeled to the Gulf is creating algae blooms. The decomposition of algae by bacteria consumes large amounts of oxygen and leaves barely any for other creatures. In consequence a Dead Zone in the Gulf of Mexico is turning an increasing area of the coast along the continental shelf into an oxygen-depleted Hypoxia Zone. The Mississippi carries numerous neglected properties. The River’s hydrologic regime, its sediment regime and its salinity regime, to name a few, have either been overlooked or knowingly marginalized in favor of mandating the Mississippi river as a shipping channel. The late consequences of this denial surface today in a scale that exceeds human control by far. The entire “plumbing project” commissioned by priorities of flood-protect ion and navigation will no longer be able to provide for either of its two purposes. The project begins to bite its own tail. Eventually the Lower Mississippi River and Tributary Project (MRTP) fails at precisely
the scale of its misconduct with economical implications going far beyond it. The potential loss of the Delta, as well as the MRTP itself, may threaten the future existence of the city of New Orleans and the Port of Southern Louisiana. Consequently we ultimately arrive at the most basic question: What would the river do? Despite the trillion dollars spent to avert change, the River will not be tamed. We therefore need to reconsider the paradigm of control and order facing intrinsic principles of change in landscapes, relative to the mandates projected on managing the river. How can we better understand landscape change and the intrinsic patterns of resilience and adaptations to be smarter in making civilized infrastructures that better fit with riverscapes?

Alternative concepts for managing the Mississippi have been suggested in the past, as John Barry lays out descending voices in his epic narrative *Rising Tide*. Already in 1987 an EPA study suggested that, instead of forcing the River and the Delta to freeze in its 1953 flow rate of 30/70 between the Atchafalaya and the Mississippi, a pro-active strategy would assume to collaborate with the River’s dynamic trajectory and the deltaic transition. The next inevitable shift of the River would be guided in a gradual and controlled fashion utilizing the “Old River Control Structure” to avoid increased risk of catastrophic failure. The flow towards the Atchafalaya would be shifting at a rate of one percent per year, allowing the ecosystem and the economy to accommodate the transition incrementally. (EPA 1987 p. 42-41)

Preserving the flow

Measures taken to regulate the environment have assumed a state of stability, but must more accurately be addressed as homeostasis or stationary stability. In contrast, most riverine regimes and ecosystems are more accurately characterized by the principle of homeorhesis or evolutionary stability, a preservation of a system’s characteristic flow processes (Waddington 1955). Ecologists since Holling (1973) have expanded the notion of non-equilibrium ecosystems to the concept of resilience: a system’s capacity
to absorb changes and to persist in a globally stable dynamic regime far from equilibrium. Waddington expanded the concept of resilience building on catastrophe theory emerging at the time. He argues that every system is potentially moving towards moments of bifurcation where irreversible change occurs “catastrophically”. He applied catastrophe theory to multi-factorial development in biological morphogenesis. Waddington used topological 3D models of attractor surfaces occupied by the innumerable variables simultaneously altering these dynamic processes. His surface models are represented as folded planes indicating paths for an imagined sphere to follow, aka. chreod (Greek for necessary path). In their topologic principle they appear very similar to a basic delta fan configuration showing multiple distributary pathways. The points of bifurcation result from altering pushing and pulling variables in the surface, creating an epigenetic landscape. This concept assumes both a producing and a produced condition represented in the same surface.

If we translate the topological principle of folded surface into a delta fan landscape we would think of the bifurcations as distributaries or crevasses (natural diversions). The beauty of Waddington’s epigenetic surface interpreted for the delta analogy is that, instead of running one pass through this model, we would think of the deltaic fan running multiple iterations until eventually the next necessary shifting occurs as an outcome of the River’s own alteration to the system, namely the River silting up its bed, natural levee building and barrier island formations. The geological survey provides evidence of these stratified patterns of riverine deposition. Waddington developed this topological diagram of an epigenetic landscape to communicate embryonic development studies. Although he did utilize the topological surface model to visualize his theory, he had no actual interest in rendering landscapes. Paradoxically in doing so he provides the meaningful abstraction of deltaic environment as a topology and the contingencies that are carried in it. The Paradoxcity research on DeltaCities
becomes instructive since deltas are by definition resembled by ongoing dynamic geomorphological processes. As in a real world lab one may perceive ecosystem change in real time. Another emblematic condition of deltaic environments is the river as an identifiable driver of change. The rivers in pre-modern times were referred to as a subject or a god like entity. In the process of the secularization of nature that has occurred in modernity the river has been reduced to an object. Today we struggle with concepts to reassign animate qualities or agency to the river. One starting point is to address nature not as a passive product (natura naturata) but as a producing entity (natura naturans). The appreciation of nature’s self-organizing capacities allows understanding our role in facilitating a co-evolutionary path. The close reading of the animate and productive capacities also carry the potential of co-productivity. In contrast to the tradition of bio-mimicry (learning from natural form), we need to learn how to better understand natural systems’ performance and organization and, most significantly, their metabolism. Bio-Mimicry should therefore be expanded from the objective of drawing from formal repertoire to a model for constructing and maintaining metabolic structures.

The elegance of the concept natura naturans lays in its self-evident Latin grammar, which allows us to look at concepts of animate nature with the most objective and rationally validated language: if it’s Latin its probably tested and established over centuries and most likely true. For Spinoza, natura naturans refers to the self-causing activity of nature, while natura naturata, meaning “nature natured”, refers to nature considered as a passive product of an infinite causal chain. (Wikipedia, June 2017)

Instead of increasing measures of control by installing more grey infrastructure, how can we begin to appreciate the deltaic metabolism providing structure for itself? Can we find ways to tap into these metabolic services without compromising their integrity with counterproductive infrastructure? The more recent agenda associated with ecosystem
services and green infrastructure can be understood as first attempts to identify the enduring or redundant productive capacities of “natural” systems. These insights require a holistic perspective that apprehends the layered ecological amalgam’s implications and appreciates the culture/nature hybrids that reside in the swampy ground of deltas. (Jonas 2012)

In order to fully reconcile these alienated and unresolved nature/culture hybrids, we need to learn about contemporary critical ecosystem theory just as much as emerging discourse in the humanities that readjust our relationship to objects known as “object orientated philosophy.” We may begin to consider the river as a legal subject (Serres, 1995), as human/nonhuman hybrids (Latour, 1993) we created for ourselves and ultimately as something too large to fully comprehend and manage in its entity: a HyperObject (Morton 2013). We need to focus on matters of concern of non-human entities. It’s a call to disclose all the non-represented objects we have created for ourselves and invite them to the parliament of things. (Latour 1993)

Apparently after choosing to recuse ourselves as an integral part of the natural world around us our ecological concepts are still catching up to grasp a vivid nature that we used to belong to. Consequently we are then left with a variety of approximations to this environment.

1. One historically significant and later marginalized approximation can be addresses as spiritual either religious, if backed by religious institution, or shamanic if not. After the churches’ attempt to claim the spectacle of natural processes for its own narratives secularization was a necessary response liberating the phenomenon of nature form faith, again.

2. Aesthetics are another significant timeless and less marginalized approximation residing in art and can provide both consensus and distraction as we can observe with the work of Joseph Beuys for example. The way we perceive the world around us with our senses remains an intuitive, subjective and purely qualitative approach to be validated.
3. Oddly the predominant approximation to nature is a rationalized, objective, quantitative approach that validates itself by means of measure, models and abstractions. In ecological terms coevolution offers a path that accounts for both the human-centric perspective of landscapes’ utility and the eco-centric perspective of landscapes’ agency to identify synergies between the two. Allianztechnik is a term introduced by Ernst Bloch, he suggests a co-evolutionary path of artistic potentiality in concert with natures own potentiality to arrive at a natura supernaturans.

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Abstract
The growth of contemporary cities has been accompanied by the appearance of forgotten and abandoned spaces, as well as derelict structures that are part of a broad category of neglected and unoccupied spaces within cities. This situation which arises for economic reasons, property speculation, and the consequent expansion of the suburbs has become an important topic subject, as can be seen from the international bibliographical review about the “reuse” of vacant land and derelict structures in cities.

Traditionally urban planning dealt with growth which was the centre of attention. Modern urban planning arose in the 19th century associated with the need to find suitable housing for a growing urban population, and it retained this function over almost the entire 20th century. Although during that period there were some amounts of ruins that urban planners had to cope with, such destruction was occasional and scattered, linked to cataclysms or other exceptional circumstances.

In the final quarter of the 20th century urban planners were faced with situations that had been unknown in the lives of cities. Suddenly they found that not only the central areas of agglomerations but also entire urban regions were losing residents and businesses instead of growing.

These “perforated/random” abandoned or vacant spaces are a potential challenge when it comes to assigning them new “functions”. Most of these spaces house ecological formations. Some are the remnants of gardens or derelict green structures that survive over time and very often also perform a social role, but usually underperforming.

This study seeks to raise awareness of the aesthetic, functional and ecological qualities that these abandoned spaces can bring to a city and discuss ways of integrating them into the urban landscape that go beyond the conventional urban restoration models but rather represent alternative intervention solutions that may be applied permanently or temporarily. The refurbishing or reorganising of these spaces...
will strengthen the urban ecological structure in addition to green spaces and so contribute to the promotion and preservation of biodiversity, urban resilience and risk mitigation.

The study presented here is part of NoVOID Project – “Ruins and vacant lands in the Portuguese cities: exploring hidden life in urban derelicts and alternative planning proposals for the perforated city”, funded by the FCT and which is based on the identifying and classifying of the main vacant and derelict urban spaces (ruined buildings and public places vacant plots and abandoned or suspended projects) and assigning them an occupation in line with the new trends and sensitivities of architecture, landscape architecture and other specialist fields. The project, based on genuine situations in Portuguese cities Lisbon and Barreiro, seeks to contribute to sustainable urban and landscape proposals, of a permanent or temporary nature, that enhance their potential functional, ecological and aesthetic role and, in some cases, be an alternative to the conventional models of urban landscape restoration.

Introduction

The growing number of abandoned, neglected and unoccupied urban spaces, marks a new era of cities where the urban landscape has become “perforated” by ruins and vacant properties. These areas are widespread in the urban landscape, from the centre to the periphery. Their intermittent and ubiquitous presence calls for a moment of criticism and provides an opportunity for creativity.

There have been many terms used to describe this kind of landscape. Sometimes, the images conveyed by some of these terms evoke the abandonment, the disinvestment or the uncertainty, and marginality: “disabitato”, “wasteland”, “derelict land”, “drosscape”; “brownfield”, “nameless place”, “space of uncertainty”, “marginalia”, “interstices”, “in-between spaces”, or even “void”… The link to imperfection and incompleteness explains why to the solution has been to contradict
these expressions and transform them through major investments in urban regeneration and refurbishing operations. Such places bring to mind the paradoxical ideas of absence and possibilities. An ambiguity that appears to have found agreement in the French term *terrain vague*, adopted by Ignasi de Solà-Morales to refer to city interstices, “its negative image, as much a critique as a possible alternative” [1]. Indeed, *terrain vague* summarises the complex phenomena of abandoned places in less strict and more holistic terms, accepting the triviality of the landscape and treating the “vague” in definition to be of aesthetic value. Gilles Clément goes further with his Manifeste du *tiers paysage* [2], when he praises the ecological value of such spaces, abandoned by Man but delivered to Nature. His work opened doors to a new way of understanding the functional, ecological and aesthetic value of these places.

In the context of the NoVOID Project – “Ruins and vacant lands in Portuguese cities: exploring hidden life in urban derelicts and alternative planning proposals for the perforated city”, funded by the FCT, we will present the quantification by defined categories: ruin, ruin and yard and vacant land, to the cities of Lisbon and Barreiro, in order to future landscape architecture proposals.

**Terrain Vague and the History of Contemporary Landscape Architecture**

Both the American Revolution (1776) and the French Revolution (1789) paved the way for increasing social democratisation, which meant that gardens, parks and enclosures that had belonged to the Crown, the aristocracy and the Church were opened to the public. The Industrial Revolution, which began in England in the second half of the 18th century and continued until the first half of the 19th century, spread to Western Europe and to the USA, bringing industrialisation to the major cities. Due to the factories huge need for manpower there was a rural exodus and unplanned urban growth which led to serious pollution and precarious living conditions. The building of the railways over this period brought
major upheaval to cities, such that “With a trebled population, with railways and expanded roads crisscrossing the countryside, with town spreading independently into suburbs, with huge areas ravaged by exploitation, with smoke pollution damaging the life of man and plant and destroying human pride in environment, the end of the century saw Britain in a sorry state of landscape decomposition”[3]. The Public Parks Movement began in England, the birthplace of the Industrial Revolution, and the world’s first public park, Birkenhead Park, opened in Liverpool, as an attempt to mitigate the negative effects of the pollution caused by industrialisation and the commercial port. Birkenhead Park (58 ha) was designed by Joseph Paxton (1803-1865) in 1843 and opened in 1847. On the other side of the Atlantic in New York, Frederick Law Olmsted (1822-1903) and Calvert Vaux (1824-1895), as part of a multidisciplinary team, designed Central Park (341 ha) in 1856, on marshland unsuited for building skyscrapers. Frederick Law Olmsted had visited Birkenhead Park in 1850 and had been very impressed by this public park, stating: “[...] in democratic America there was nothing to be thought of as comparable with this People’s Garden [Birkenhead Park]. Indeed, gardening, had here reached a perfection that I had never before dreamed of”[4].

The transformation of Paris from 1852-1870, directed by Baron Haussmann (1809-1891), was concentrated in the “city’s old quarters”[5], with the aim of accommodating the growing population, as the number of inhabitants had doubled in the 19th century, and of creating places for recreation and conviviality such as gardens (Jardins des Champs-Élysées, Jardin des Plantes du Mans, etc.), parks (Parc des Buttes-Chaumont, Parc Monceau, Bois de Boulogne, etc.) and boulevards (Boulevard Montmartre, Boulevard des Capucines, etc.), thus ensuring that the 19th century landscape became essentially “[...] urban, public and Romantic”[6]. Parc des Buttes Chaumont was built in a former quarry and the design and work was overseen by the engineer Jean-Charles Alphand (1817-1891)[7], one of the main designers of new green spaces in Paris.
According to Gonçalo Ribeiro Teles “At the end of the 19th century the industrialisation era becomes more marked in Lisbon, as factories are built on the outskirts such as Alcântara and Poço do Bispo. During its time as an industrial city Lisbon’s population almost doubled from 200 000 inhabitants in the 19th century to around 350 000 inhabitants at the beginning of the 20th century”\(^8\). In Lisbon, one of the largest urban parks, Parque Eduardo VII (25 ha), designed by the architect Francisco Keil do Amaral, was opened in 1945. Before the project was completed, the land was the stage for informal and improvised use over a long period of waiting and indecision from the first project to the day the park opened\(^9\).

From the nineteen seventies, in a post-industrialism period, old factories that had been closed down begun to be seen as industrial heritage, and History of Contemporary Landscape Architecture projects started to arise, aimed at recovering terrains vagues and abandoned spaces. One of the first projects under this new approach was Gas Works Park (8 ha) in Seattle, designed by the landscape architect Richard Haag (born 1923), which was opened to the public in 1975. The architect took advantage of the abandoned gas plant, retaining the industrial structures in the make-up of the park and preserving its memory. The project paid particular attention to the treating of contaminated soil, which was moved and modelled to form an artificial hill called the Great Mound, and which provides a scenic view of Lake Union and the city of Seattle. Other examples followed as spaces abandoned by industry were recovered. In Germany, in the nineteen nineties, the landscape architect Peter Latz (born 1939) converted a heavily contaminated, steel plant covering 230 hectares into the famous Landschaftspark Duisburg-Nord (North Duisburg Landscape Park) as part of IBA Emscherpark. Another project worthy of mention because of the organisation and scale was the urbanisation plan for EXPO'98 (1998 Lisbon World Fair) which transformed one of the city’s largest brownfields (50 ha) into the setting for the World Fair of 1998.
A key contemporary reference of a linear park that took over a deactivated transport structure is The High Line Park, built from 2009 to 2014 in New York, a project developed in line with a planting plan devised by Piet Oudolf (born 1944) and coordinated by the landscape architect James Corner (born 1961). The nature of the vacant land changed the way we appreciate and understand the landscape. Christophe Girot argues there are two dominant approaches to landscaping vacant land: the first holds that the ruin will inevitably be the aesthetic core of the project, while the second more reactionary and inclusive attitude seeks a more active change through which the vacant land is seen as the starting point for a new landscape\(^\text{[10]}\). We can also add that while these approaches are contradictory they are often complementary at the time of the intervention and are the raw material for creativity and the readapting of new city dynamics, where very often the budget is limited. Their conversion into public parks or gardens is a permanent, rigid and costly solution. We should question the option for long-term solutions. Meanwhile or intermediate uses are increasingly the solution most suited to the dynamism of contemporary cities. One example that may prove to be the model for this approach to reusing abandoned urban spaces for new temporary or intermediates ends is the former Berlin airport which gave rise to Tempelhofer Feld\(^\text{[11]}\). Another example of readapting to the new dynamics of a city is the Petite Ceinture de Paris: one of the oldest railway lines in the city it was deactivated in 1993, and today is host to new experiences of urbanity and nature that contrast with conventional urban planning \(^\text{[12]}\). Christophe Girot points out that “When confronted with desolation, there is always a chance to cultivate a new garden. This is the case of the temporary gardens on the terrain vague of the abandoned Hardturm stadium in Zurich (2014)\(^\text{[13]}\). All over the world, city dwellers, organised in collectives or associations, have the chance to increase participation in city building.

Many initiatives of this type go through a stage of re-appropriation of public space or the
occupation of terrains vagues or abandoned land. In this way, they aim to act as urban catalysts and regeneration projects. And the strategies used favour greater flexibility and reversibility of access and uses over density of forms and design. To attract the public and bring investment and profitability to the project, it is normal to include services (restaurants, shops, artists’ studios, gymnasiums) and organise events, such as concerts, conferences and festivals, or to include facilities such as allotments, playgrounds, creative workshops, art galleries, community kitchens. The interest in this type of approach stems from its scope, as it can be implemented in new areas of the city that are being eyed up by real state developers and in dilapidated neighbourhoods or the poorest parts of the city.

Vacant land in Lisbon and Barreiro: between reality and potential

The research project NoVOID – “Ruins and vacant lands in Portuguese cities: exploring hidden life in urban derelicts and alternative planning proposals for the perforated city“, funded by the FCT, where the multidisciplinary team consists of geographers, architects, landscape architects, urban planners, botanists and other specialists, aims at looking into and discuss the value and potential of vacant and abandoned land in four cities – Guimarães, Vizela, Lisbon and Barreiro – and present solutions that enhance their value through meanwhile and permanent projects. Therefore, the project seeks to answer a number of questions, such as: how many plots of vacant land are there, what type are they, and how are they distributed across the city; what is there ecological value, their biodiversity potential; who uses or would like to use this land; are there conflicts within these spaces and many other questions related to the challenge of intervening in these spaces located within the city or sometimes on the outskirts, resulting in a porous city, perforated by vacant land and ruins.

The NoVoid project includes three stages:
Stage 1 – Definition and identification of the subject of the study
Stage 2 – Analysis of the subject of the study
Stage 3 – Discussion and prospects
In the first stage three abandoned urban space categories were defined (ruin, ruin yards and vacant land) which were identified and quantified by way of geographical information systems. According to the NoVOID classes definitions:
Ruin – may be described as structures produced by technology and intended for human use or for other purposes that have reached an advanced state of dilapidation, being therefore incapable of performing the function for which they were originally designed.
Ruin yards – correspond to non-built lands surrounding dilapidated buildings that visually can be considered as integral parts of the same property.
Vacant land – is defined in this study as unutilized, non-cultivated, non-landscaped, and non-built up land, with shrub and herbaceous covering showing signs of neglected and lack of maintenance, or presenting bare soil, rubble, and vestiges of razed buildings.
This paper will only look at two cities, Lisbon and Barreiro. Up to now we collected the comparative figures on Lisbon and Barreiro shown in table 1. In Lisbon (84.9 Km$^2$) a total of 2 171 buildings in ruins were identified, which corresponds to 1.1% of the city area, while 772 plots of vacant land were found with a total area equal to 4% of the city. As for Barreiro (6.7 Km$^2$) a total of 377 buildings in ruins were identified, equal to 2.2% of the area under study, along with 169 plots of vacant land that make up almost a third (29.2%) of the city perimeter$^{14}$.

The second stage of the project will examine the potential of the urban spaces classified as abandoned land, from the architecture, landscape architecture, geographic and ecologic standpoints as well as from the recreational, leisure and social standpoints.
The aim of the third stage is to discuss and create innovative urban spaces with landscape architecture and architecture solutions. The range of ruins, vacant land and abandoned ventures will be selected to propose meanwhile or permanent rehabilitation/reconversion programmes for those
Many of the proposals will involve the re-appropriation of public space or the occupation of terrains vagues or abandoned land. In this way, they aim to act as urban zone catalysts and regeneration projects. And the strategies employed will favour greater flexibility and reversibility of access and uses. In order to ensure the spaces are used the proposals will include the organisation of events and activities, such as concerts, conferences and festivals, or gardens and facilities such as allotments, playgrounds, creative workshops, art galleries, community kitchens that can attract the public and bring investment and profitability to the project.

**Final remarks**

From the landscape architecture, viewpoint for which the interventions may be of a temporary or permanent nature depending on the type of space and future town planning, this alternative approach to abandoned urban spaces is acceptable, practical and may even constitute a particularly interesting challenge. In fact it is in line with a naturalist trend in green space design which is not new but has been gaining ground in recent years, and favours spontaneous, organic and authentic solutions, which can also be seen as a tribute to ecology and the wild.

Interest in the type of approach employed in the NoVOID project may be applied both to new areas of the city that are being eyed up by real state developers (so called zones in waiting), both in the centre of the city, in the so called vacant spaces of a perforated city, as well as in dilapidated neighbourhoods or the poorest parts of the city. The aim is to find and create provisional and permanent solutions for the selected spaces in the cities of Lisbon and Barreiro. The methodology employed in this project, together with the different types of intervention proposed, could be used in the future in other cities.
Endnotes


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<th>Built-up area (%)</th>
<th>Classification accuracy (%)</th>
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<tr>
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<tr>
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<td>74.9</td>
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Table 1 – Lisbon and Barreiro: quantification by defined categories (Ruin, Ruin yard and Vacant Land).


Abstract
The Porto Fifth Facade Project, an initiative of the Portuguese Association for Green Roofs in collaboration with the Porto City Council, aims to develop a strategy to implement green roofs in the city of Porto, Portugal. This strategy includes the identification and mapping of the rooftops able to support the installation of a green roof, the identification of priority areas according with the maximization of green roofs benefits, and the design of instruments of implementation of a green roof policy in the city of Porto.

This paper presents and discusses the methodology developed to assess the potential green roofs of Porto. Given the dimension of the intervention area (the city of Porto, around 42km²) and the time available to develop the project, the methodology needed to be cost and time efficient. The developed methodology uses mainly remote sensing data, namely satellite images and 3D modelling of the buildings, both obtained from Google Earth, treated through a geographic information system and by visual inspection. Established criteria to identify the roofs capable of receiving a green roof included: the roof construction material and the inclination of the roof.

From the total area of rooftops inspected (10 km²), about 24.7% was classified as potentially prepared to receive green roofs. While other more accurate methodologies could have been used, this methodology proved to be efficient in achieving the project goals, and can be used in other cities facing the same time and budget constraints.

Introduction
Global warming and the exponential growth of cities have been increasing the need to implement urban planning actions able to mitigate their negative impacts on the urban environment, such as: air pollution, soil destruction, loss of soil permeability, loss of biodiversity, heat island effect, increased surface runoff, and high density and poor quality housing. Green Infrastructures (GIs) represent an effective tool to foster the resilience and sustainability of
the urban environment, improving the quality of life in urban areas due to the vast list of benefits they can offer [1; 2]. At the city scale, the contribution of available ground and rooftop areas should be equally considered when devising alternative approaches to increase the green urban areas and permeability [1].

The European Community recognized that green roofs and green walls can have an important contribute to the reinforcement of urban GIs and biodiversity, providing important environmental, social, and economic benefits [3], such as the mitigation of the heat island effect; a more efficient rainwater management; an increase of the urban biodiversity and the improvement of the aesthetic, climatic, energetic, and economic quality of buildings [4].

No other architectural structure provides such a wide range of positive effects for buildings, inhabitants, and the environment. GRs meet one of the essential conditions of sustainable development: the reconciliation between economy and ecology [5].

**Green roofs categories**

GRs can be classified, according to the use intensity, in three categories: extensive, intensive and semi-intensive [5].

Extensive Green Roofs are suited to roofs with little load bearing capacity (less than 120 Kg/m²) and roof tops which are not meant to be used as roof gardens. These are the cheapest and the least maintenance demanding GRs [4].

Intensive Green Roofs can support the three vegetation layers (herbaceous, shrub, and tree). Pathways, benches, playgrounds and water features can also be implemented in this GRs category. They have high installation and maintenance costs [4], but they provide the maximum environmental and social benefits.

Semi-intensive Green Roof can hold a mixed vegetation cover composed of herbaceous,
sub-shrubs and shrubs, and require moderate maintenance [4].

The maximum load bearing capacity of the roof limits the GRs category that can be installed. Intend use, level of maintenance, level of ecosystem services provided, and available budget are other factors determining the GRs category to be installed [5].

**The Porto Fifth Facade Project**
Policy makers have been recognizing green rooftops (GRs) as an effective planning tool [1], with these being mandatory in cities like Copenhagen or Toronto, and highly encouraged by several municipalities around the world, through different policies and incentive strategies [6].

In August 2016, the Porto City Council (CMP), in collaboration with the Portuguese Association for Green Roofs (ANCV¹), has launched the Porto Fifth Facade Project (Projeto Quinto Alçado do Porto) - PQAP). The PQAP aims to develop a strategy to implement GRs in the city of Porto, northern Portugal, which includes the identification and mapping of the rooftops able to support the installation of a green roof, the identification of priority areas according to the maximization of green roofs benefits, and the design of instruments to implement a GRs policy in the city of Porto [6].

This paper presents and discusses the methodology developed to assess the potential green roofs of the city of Porto, in the context of the PQAP.

2. **Materials and Methods**

1 ANCV is a non-profit non-governmental organization whose objective is to promote green infrastructure in cities, particularly green roofs, especially those that can be installed in buildings (new or pre-existing), and the innumerable contributions they can make to create healthy, sustainable, biodiverse and resilient urban areas. ANCV works in close collaboration with municipalities, universities and professionals.
The methodology to assess the potential GRs of Porto, developed in the context of the PQAP, uses mainly remote sensing data, namely orthophotomaps, Google Earth Pro (GEP) satellite images and GEP 3D models of the city. Data were treated with a GIS and by visual inspection in GEP (Figure 1).

Established criteria to identify the roofs capable of receiving a green roof were: i) the roof construction material; and ii) the roof slope.

**Roof construction material**
In a first phase, rooftops were classified in two classes according to its construction material: i) roofs with orange ceramic tiles; and II) roofs with other roofing materials (fibre cement, non-orange ceramic tiles, metal sheets and concrete). Roofs covered with orange ceramic tiles are dominant in Porto (almost 50% of all rooftops) and do not allow the installation of GRs. Since they can be easily identified and extracted through the GIS chromatic differentiation tools (Figure 2), its automatic isolation reduces substantially the effort of supervised inspection needed to identify the roof construction material of the remaining buildings. The resulting map is shown in figure 3. In a second phase the “All other roofs” class was visually inspected with the 3D view of GEP to extract the roof materials suited to receive a GRs: metal sheets and concrete.

**Roof slope**
Pitched (or non-flat) roofs are more expensive to convert into green roofs, as they require profound adaptations of the entire roof structure. Flat roofs usually present a higher potential for the installation of intensive and semi-intensive GRs, which have a greater ecological advantage and cost-benefit ratio. In PQAP, all the pitched roofs were excluded from the potential roofs. Identification of the flat roofs was made by visual inspection with the 3D view of GEP (Figure 4 and Figure 5).

**Potential Green Roofs**
Figure 6 shows the map of Porto potential GRs.
Potential GRs are those that combine “metal sheet” or “concrete” construction material with “flat” slope. This assessment was made by visual inspection in GEP.

**Building Function**

The potential roofs were subsequently classified according to the function of the building: single family housing; multi-family housing; social housing; and services and equipment (shopping, education, health, sports, etc...). This classification is important to inform the policy instruments to promote the installation of GRs in the city of Porto, as different functions might require different policy approaches (Figure 7 and Figure 8).

The implantation area of 400 m$^2$ was defined to distinguish, in a first phase, single-family housing (below 400m$^2$) from multi-family housing (above

**Results and discussion**

Chromatic differentiation allowed the automatic identification of 4.45 km$^2$ of roofs covered with orange ceramic tiles, from a total of circa 10 km$^2$ of rooftops in Porto. After supervised verification, the area of roofs with orange ceramic tiles increased to 5.11 km$^2$, which means a 13% error in the chromatic differentiation through the GIS (due to non-identified rooftops or rooftops identified wrongly). These numbers (87% of the roofs correctly identified by the software) reveal that chromatic differentiation is an efficient and cheap tool to be used in cities with alike rooftop characteristics.

Potential GRs (Flat roofs with concrete or metal sheet construction material) account for 24.7% of the Porto roofs (Figure 6), with 17.4% corresponding to housing roofs (Figure 7) and 7.3% to services and equipment roofs (Figure 8 and Table 1). Most of the potential GRs occur in multi-family housing buildings (13.7% of total roofs).

The methodology developed to identify the potential GRs allowed the detection of the **existing green roofs** in the city of Porto. For inventory purposes, existing green roofs
were classified according to their function (single-family housing; multi-family housing; and services and equipment), area, typology (intensive, extensive) and location. 131 green roofs were identified in the city of Porto, covering an area of 0.11 km$^2$. 100 green roofs occur in housing buildings (57 in multi-family houses, and 74 in single family houses), and 31 green roofs occur in services and equipment buildings (Figure 9).

**Conclusions**

From the total area of rooftops inspected in the city of Porto (10 km$^2$), about 24.7% was classified as potentially capable to receive GRs in the context of the PQAP. Nevertheless, it is important to mention that the map of potential green roofs generated through this methodology is an approximation of the real potential green roofs of the city, as the potential roofs mapped were remotely and visually assessed. Remote detection does not generate all the necessary information for the installation of a green roof, namely crucial information about the structure and load capacity of the roof. This information is fundamental to ensure the safety and success of the green roof, and to determine the typology (extensive, semi-intensive or intensive) that can be applied. This evaluation must be done case by case, *in situ*, and with teams of specialized professionals in engineering and construction.

A digital model of the city obtained through a LIDAR$^2$ flight would be a more time efficient alternative to the used methodology (based on the use of orthophotomaps), as it would allow us to obtain automatically the information regarding the roof slope and the height of the building (important to distinguish single family housing from multi-family housing). Finally, more sophisticated processes of remote sensing, based on the radiation emitted by

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2 Laser system used to obtain spatial information, producing Digital Terrain and Surface Models through aerial flights, with high precision
rooftop cover material, could allow a more precise and faster identification of the rooftop materials of Porto. However, most of these advanced remote sensing technologies are quite expensive, and not accessible for many research institutions or municipalities. Thus, the methodology presented in this paper can be a feasible and cheap solution for cities facing the same budget constraints.

References
Map of roof materials

- Roofs in orange ceramic tiles
- Other roof material

Map of potential roofs (PR)

- Services and equipment buildings
- Housing buildings

Map of existing Green Roofs

- Services and equipment
- Housing

Fig.1. Methodology Diagram

Fig.2. Chromatic differentiation diagram.

Fig.3. Map of Roof Materials in GIS, obtained by Chromatic differentiation. LEGEND | Orange: Orange ceramic tile, Grey: All other roofs
Fig. 4. Map of Roof Materials in GEP, ready for visual inspection. LEGEND | Yellow: Orange ceramic tile; White: All other roofs.

Fig. 5. Map of Roof Materials with Potential ones in GEP, after visual inspection. LEGEND | Yellow: Orange ceramic tile; White: All other roofs; Blue: Potential Roofs.

Fig. 6. Map of Potential Roofs in GIS. LEGEND | Grey: Non potential roofs; Blue: Potential roofs.

Fig. 7. Map of Potential Housing Roofs, in GIS. LEGEND | Brown: Housing; Grey: All other roofs.
Fig. 8. Map of Potential Services and Equipment Roofs, in GIS. **LEGEND** | Purple: Services and Equipment, Grey: All other roofs.

**Fig. 9. Map of Existing Green Roofs, in GIS.** **LEGEND** | Green: Green roofs in services and equipment, Yellow: Green roofs in housing.

<table>
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<td>Health Institutions</td>
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<tr>
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<td>Cultural Buildings</td>
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*Tab. 1. Number of services and equipment buildings, described.*
Abstract
As both resource and corridor, water has fundamentally influenced human settlement patterns around the world. Through urbanization and agricultural expansion, communities, cities and states have altered water’s function by changing its course, hardening its edges, and filling its wetlands. In the United States the construction of the Erie Canal marked a symbolic change to our relationship with water beyond the east coast. In North America, it catalyzed the development of a network of inland navigable waterways. The highly complex and engineered new hydrologic system facilitated the movement of goods as the United States explored new territories. The canals brought wealth, made cities, industry, and facilitated the movement of natural resources. They continued to alter the landscape beyond recognition and erected an illegible hydrologic system that we have been trying understand ever since. As designers, we have been reacting to this human-made network, cultivating tools, methods, and designs in reference to it as a natural system, gone for over 200 years. Perhaps, we need to frame our approach differently through ‘forensic hydrologies’ - working to establish the sequence of events and their effects on the natural system - rather than reacting to our current realities.

Toward Forensic Hydrology
Forensic hydrology, in simplest terms, is the study of the movement of water to determine the cause of a given incident or the potential outcome of a future event. It is a potential tool for landscape architects to address the complexities of designing with water. As landscape architects, we are skilled at redirecting, pooling, and draining water. Water may be a driving force in a design, dictating program, revealing opportunities and constraints. With cities densifying, agriculture and industrial practices changing, and a more erratic climate, our relationship with water is both critical and challenging. Water remains a finite resource and as designers engage with a growing number of projects centered on hydrology, we must ask ourselves, what do we really know
about water? Perhaps more importantly, what do we really know about the system we have created, neither natural - as we often depict it - or controlled as we imagine it to be? Without the forensic knowledge of our hydrologic history, how can we suggest the best strategies for design?

Forensic is a term not often associated with design, commonly aligned with the sciences, it has in recent years expanded to other disciplines. In the late 1970s, geoscience sub disciplines such as forensic geology, forensic geochemistry, and environmental forensics emerged. Within the latter the specialization of forensic hydrology developed. These disciplines often ‘identify potential sources of contamination’ by testing for the presence various trace chemicals in legal matters. Their methods focus on chemical analysis of water and soil, but can include historic aerial imagery to track the movement of sediments over time. The primary output from these investigations are charts and narrative text that explain a conclusion by means of a process. Often these studies are conducted once an area has been contaminated to determine the faulty party and the extent of the contamination. They can also be used in advance, to test scenarios for a complex site. Although these practices are valuable, they have a limited scope and often concentrate on a discrete site and issue. Additionally, the outputs are conveyed in formats that are legible to a small audience within the geosciences and are not easily understood beyond this group.

More recently, forensic hydrology expanded to engineering, evolving from the broader practice forensic engineering. Forensic hydrology engineers use Geographic Information System (GIS) mapping, hydrological and hydrometerological modeling, socioeconomic, political information, and integrative analysis to determine the final diagnosis. These studies are most typically applied in response to extreme flooding or drought events as a preventative measure. Again, the results of these studies are highly discipline specific. Often conclusions
generated by the study are simplified and shared in tables to be legible to a broader audience. The outcome of this work, either highly specialized or simplified, rarely produce tools which can be deployed by designers to the public, clients, agencies, and other stakeholders.

With the expansion of the term forensic into new disciplines, perhaps we can examine the definition in its potential application to landscape architecture. Early definitions of forensic suggest the following ‘belonging to, used in, or suitable to courts or to public discussion and debate’. Although many of the current applications of forensic hydrology in geosciences and engineering pertain to their use in a court case, it would appear that they are more commonly being used as a means of discussion. However, these are often insular and housed within disciplines. At this time, the complexities of water are not readily available for the public to understand, they exist in silos of expertise. In the United States 77 percent of the population, excluding those with wells, do not know where their water comes from. As landscape architects, we are perfectly equipped to uncover these hidden hydrologies. Trained to understand natural and designed systems, we often work between disciplines and can add clarity to this complex issue muddied by history, politics, ecological, and engineering. If hydrologic information could be more readily available, as a population our collective conciseness would be greater, and as a profession we could expedite the design process.

To apply forensic to hydrology landscape architecture a core understanding of the natural hydrologic system, how it functioned, and the reasons for its alteration are paramount. More specifically, looking beyond the larger hydrologic cycle, to the small-scale interventions, that as a collective, had a large-scale impact. Additionally, examining the cultural shifts in engineering water at various scales and the rapid pace at which we developed a new hydrologic language. Visual
tools must be developed to clearly communicate these histories and current challenges facing water.

**Dismantling Natural Hydrology**

The development of the United States is closely tied to water. The rich network of rivers provided access to resources such as oysters, timber, and fur for settlers and export to Europe. The proximity to and then depletion of these resources drove exploration westward. Expeditions focused on locating resources and finding routes to transport them via the closest river networks. Rivers were ideal for movement of these resources as roads were uneven, slow, and difficult for wagons. Waterways were the fastest most effective form of transportation, but they had their limits. Rivers flow one direction, fluctuate with seasons, and have obstacles like waterfalls, rock outcrops, and beaver dams. In addition, the network of waterways did not always provide access to desired locations. With these driving forces, the natural hydrologic system in the United States began to be altered. First, by altering their natural ecosystems and later by adding engineered solutions to move large vessels and goods easily.

We have altered hydrologic ecosystems through biodiversity loss, habitat conversion, and modification. The beaver serves as an example for how rivers were manipulated to support human economy. The European demand for beaver fur almost depleted European populations to the point of extinction. Settlers quickly stepped in to meet the demand. By the end 1700s, beaver was nearly gone from much of the Midwest and East Coast. In 1804, Lewis and Clark explored the west, in part to document “the number and species of furbearing animals... and to establish ‘the most direct and practicable water communication across the continent for purposes of commerce’.” By the 1840s beaver were nearly extinct, while settlement of the United States had yet to expand far beyond the Mississippi River. The depletion of beaver had a profound impact on rivers and streams. Beaver dams create wetlands,
slow and clean sediment, create ecotones within the forest, recharge aquifers, and manage flooding and erosion. Without the beaver, the primary ecosystem engineer prior to settlement, the character of our inland waterways began to change.

The removal of the beaver was not the only shift in the natural water system. As settlement moved into the Plains, bison, prairie dogs, and the prairie itself, were eradicated. Like beavers, bison altered and cultivated smaller ecosystems within the plains. Bison wallows provided respite for smaller animals within the harsh conditions of the plains and collected water for groundwater recharge. Prairie dog burrows expedited water flow to root zone of grasses and their entrances dotted the prairie allowing birds to find insects with ease. As the Plains were converted to agriculture the water cycle was altered as habitat was lost.

Deforestation for timber and agriculture also changed the way water moved through the landscape. Forested watersheds absorb more water than those absent of trees, decrease silt erosion, and provide shade for adjacent waterways. During the 1800s our population swelled and we lost 60% of our forests. The state of Ohio was once completely forested, until 3 million farmers cleared 75% of the forest between 1800-1880. The conversion of forested land to agricultural land in Ohio aligned with the construction of a series of canals and the rise of the Industrial Revolution. The combination of these events set in motion a series of engineered adaptations to our hydrology.

The Erie Canal, sparked the Canal Era in the United States. The depletion of resources was the first consequential shift to the hydrologic cycle. Followed by small scale manipulations designed to facilitate the movement of resources. Canal success in Europe, had leaders anxious to bring these technologies to the United States. The Erie Canal was conceived of before the Revolutionary War and the new nation needed to create connections through the Appalachian Mountains.
or risk losing the land. At the time the majority of population lived on farms and the proposal for the artificial waterway was implausible. The Erie Canal connected the Great Lakes to the Atlantic Ocean the significance of connecting the Nation’s largest inland waterbodies to the sea did not pass unobserved. In Peter L. Bernstein’s book *Wedding of the Waters*, he states:

> When the canal was complete in October 1825 and Governor De Witt Clinton could celebrate the *Wedding of the Waters* by pouring a keg of water from Lake Erie into the Atlantic Ocean, he opened an uninterrupted navigable waterway through the imposing barrier of the mountain range extending from Maine all the way down to Georgia. The end result would be a historic explosion of commerce, ideas, and technological change. By bringing the interior to the seas and the seas into the interior, the Erie Canal would shape a great nation, knot the sinews of the Industrial Revolution, propel globalization – extending America’s networks outside our own boarders – and revolutionize the production and supply of food for the entire world.

The Erie Canal was the first piece in a national vision for an inland network of waterways. The second major canal work, the Ohio and Erie Canal, connected the two largest hydrologies in North America, the Mississippi River and the Great Lakes. The stitching together of these basins was not limited to the Ohio and Erie Canal. The Wabash and Erie Canal (1843), Miami and Erie Canal (1845), Illinois and Michigan Canal (1848), and the reversal of the Chicago River via the Chicago Sanitary and Ship Canal (1900) all contributed to the connection of the two basins. As the state’s first transportation network, the canals brought economic security to Ohio, the ability to fully utilize its natural resources, develop industry, and ports contributed to the states success from the poorest state to the third richest.

The Canal Era was a catalyst for our current hydrologic system. With the canals came...
more robust cities of industry, expansion west continued with the aid of rail lines becoming new transportation tributaries, with that agricultural goods could move greater distances. Agricultural land in the original 13 colonies was abandoned as agriculture spread into the plains. What was thought of as implausible, we now considered feasible and the manipulation of hydrology became more complex. In cities, we added sewer systems, piped in water, and drained unclean water into adjacent waterways and under agricultural fields we installed tile drains. We continued to dam, channelize, and reroute rivers. We became comfortable redefining the patterns, flow, and ecology of water and developed a new hydrologic system.

Remnant Hydrologies
The transformation of hydrology in the United States has left a confused landscape in its wake. The result is neither natural or engineered, but a complex web that moves water above and below ground, often to locations not originally intended, with laws, jurisdictions, stakeholders, and agencies all suggesting certain levels of control. Various efforts have been attempted decipher the new hydrologic system.

The Fisk map of The Alluvial Valley of the Lower Mississippi is an example of a map that reveals complex conditions. A result of a series of investigations including overlays of historic maps onto aerial photos, site visits, sectional drawings, narrative descriptions, and geologic timelines all catalogued in the report produced for the U.S. Army Corps of Engineers called the Geologic Investigation of the Alluvial Valley of the Lower Mississippi River. The striking visual character of these maps make them accessible to large audiences, prints are widely available. The commercial success of this map was not the goal. While it familiarizes a broader audience with the dynamic path of the Lower Mississippi River, it does little to explain the engineered elements that frame the river.

The Sanitary and Topographical Map of the City
and Island of New York by Egbert Viele overlaid the city grid over the historic topographic and hydrologic conditions. Upon close inspection, this map reveals the erasure of topography, wetlands, streams, ponds, and meadows throughout Manhattan. In their place the city grid becomes the dominant feature. Within this grid, a fragmented sewer system in lower Manhattan and reservoirs in Central Park are evident. At the edge of the island, piers mark a shift from the natural coastline to that prioritizing ships requiring deeper waters. This iconic map, referenced widely by landscape architects, the island’s sectional characteristics. The lack of similar maps for the remaining boroughs limits its ability to contextualize larger changes for the whole city.

The USGS maps aquifers, watersheds, and some groundwater conditions. Data sets are driven by geography rather than hydrology and often stop at city, county, state, or federal boarders. GIS changed the way we gather and organize layered information, but GIS-driven data sets alone cannot convey the temporal qualities of hydrology. The information they provide can be used as a base for visualizations such as sectional drawings, mapping, and animation. Strategies to make this information more accessible will help create a broader awareness of these issues especially to municipalities that lack a planning department.

Diagrams can also be useful tools in unpacking hydrologic complexity. In Kate Asher’s book The Works, a series of illustrations and maps drawn, with a consistent aesthetic, explain topics like streets, subways, freight, electricity, water, sewage, and garbage among others for New York City. This book has become a useful tool for designers, students, professionals, and citizens alike to simplify a complex city. Many standard construction practices exist throughout the country and the ability have a starting point for how something is constructed is meaningful.

The canal, levee, dam, and sewers rarely are
illustrated on our hydrology maps. How are these features that contribute to the movement and quality of water omitted? As landscape architects, we need to stop representing water as something natural, and instead communicate with more specificity and rigor.

**Collecting Hydrologies**

The need for a comprehensive set of graphics that outline the political, ecological, and engineered components of our water networks is needed. Our current practice taught us to understand hydrologic systems in the binaries (natural vs. constructed). Perhaps a result of what is visible to us at a human scale in our streets, cities, and at the water’s edge. Rather than the large-scale at which temporal systems operate, moving in section, and crossing boundaries. A broader graphic narrative will provide the platform to reveal hidden complexities, be ecological, social, or political. A cohesive collection of hydrologic information would include law, environmental and anthropogenic history, and an exploration of both engineered and natural systems drawn using a range of graphic methodologies - sections, animations, axonometrics, diagrams, and maps - with a consistent graphic quality. An attention and application to this collection will increase our national water literacy and facilitate the design process.

Working in landscape architecture, it is critical to communicate systems that interact with a site. It is paramount to decision making to ensure a project approach that adequately addresses the myriad systems in play. Improving the clarity and accessibility of hydrology can redefine our relationship with water as a resource, as we can more effectively communicate its character, dynamics, limitations, and potential by developing designed solutions that a larger constituency can understand.
Endnotes
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Abstract
The relation of architecture and landscape architecture professions is commonplace in everyday discussions of experts from both fields, prejudicial in the sense that these professions clash on projects concerning the open space design, especially the urban space and/or the space predominantly determined by buildings.
In the education of landscape architects (as well as architects) it is important to make a distinction between assignments/tasks that can be predominantly addressed to one of the two professions and those which include (or should include) both professions in a close collaboration.
For the past six years, the School of landscape architecture in Zagreb, has been offering on 2nd year of master programme an elective course mentored by a professor architect and in collaboration with a professor landscape architect. In that course we try to put students in the role of being professionals from both fields at the same time. We have tried this model on a few different design projects. After gaining a basic knowledge of architectural design, in a simplified manner, students need to make a conceptual design of the building and, at the same time, design the surrounding landscape.
In this paper, the authors/mentors will elaborate their views on the benefits and limitations of such an integral approach to the relation of a building with its interior and its surrounding open space/landscape. We will also show the results of this approach on specific examples – students’ projects.

Introduction
Every architecture or landscape architecture project is almost always an interdisciplinary achievement concerned with space. A space created and designed for a certain purpose, dimensioned according to the specific or general needs, constructed and built of adequate materials and with the use of adequate technologies. A space that interacts with the surrounding spaces, be they natural or artificial. A space that in a premeditated and articulated
way, creates a wider more or less coherent and more or less complex whole, or a space that intentionally stands out of its surroundings.

It can be stated that this general description is equally applicable to all articulated spatial compositions regardless of their size and their impact on their immediate or wider surroundings, whether urban, rural, cultural or natural landscape. The spatial and urban planning (also a multi- and interdisciplinary activity, with its own creative artistic merits) put aside, it can very roughly be said that the creating of the inner, closed spaces is primarily attributed to architecture while the creating of the outer, open spaces is primarily attributed to the landscape architecture.

However, this division is (too) rough and inaccurate, which is best illustrated by the fact that an urban landscape is almost always characterized by the architecture itself, often the landscapes’ most powerful „ingredient“ . On the other hand it is also clear that the impact of the articulated landscape is of decisive importance for the experience of the architecture. This is brilliantly illustrated by Vitruvius (2006): „Propriety arises from usage when buildings having magnificent interiors are provided with elegant entrance-courts to correspond; for there will be no propriety in the spectacle of an elegant interior approached by a low, mean entrance“.

Where a landscape actually begins or ends and where the real borders of architecture lie? It seems that Le Corbusier asked himself the same question in his famous drawing of an interior (picture 1a). Permeation of interior and exterior creates an unmatched and inseparable experience, an important theme of many famous historic, modern and contemporary space ensembles (picture 1b).

The need of growing students' awareness of a necessity to functionally connect the outer space with the inner space, and also of the importance of articulating the simultaneous experience of interior and exterior, the landscape in the wider
sense and the architecture, greatly contributed to the introduction of an elective course Architectural design – studio (continuously held at the School of Landscape Architecture in Zagreb, 2nd Ms year, since academic year 2009/10 and is continuously modified).

**Experimental Teaching Concept**

The course was initiated in academic year 2008/09 by the architect prof. Boris Morsan, PhD, a professor at the Faculty of Architecture, Academy of Fine Arts and our School of Landscape Architecture. The intention was to gather students from these faculties with different educational backgrounds to collaborate and work on a (primarily) architectural task.

The education process was loosely structured and predominantly consisted of the practical design work and *ad hoc* (extemporaneus, improvised) lectures tied to the design problems encountered in the process, with the mentor stimulating a peer-to-peer exchange of knowledge. Students of architecture and landscape architecture were given the task to individually design an office building in the city center, design its immediate surroundings and incorporate in it the sculpture made by the Fine Arts students.

The one-semester experimental class took place on the Faculty of Architecture and resulted in students’ projects of reasonable quality, while the mentors gained some encouraging but also unexpected insights:

- exchange of knowledge among students was smooth
- there were no discernible differences in the initial analytical approach (wider and closer urbanistic situation, open space, views etc.)
- as could be expected, architecture students take the advantage in the surrounding architecture formal analysis
- landscape architecture students engage quicker and bolder in the concept development and articulation of the basic building volumes and surrounding spaces
- landscape architecture students demonstrate limited knowledge about (inner) space dimensioning and the need to establish a system of measures (modules), construction requirements and its impact on the form, the awareness of complex sub-systems (technological, utilities). All these issues perplex LA students, leading to standstills and even the will to give up. It can be added that these students are not used to simultaneously consider the functional requirements in several levels or to examine and present a problem in various drawings (plans, sections, facades, spatial representations of parts and of a whole). In spite of this all, it is encouraging that the LA students, with intensive input from mentors, are mostly able to sufficiently overcome these issues in a relatively short time.

- low focus on the connection of interior and exterior is equally characteristic of architecture and LA students – landscape design remains something that is being addressed after the building is designed so the ties between these processes and spaces are often weakly articulated.

- art students – sculptors are mostly not educated enough to read the two-dimensional presentations and visualize ideas and exact dimensions of designed architecture and landscape and are mostly focused on their own sculpturing. The positive side is that they are prepared to interact with other students and to modify their original work and re-examine the variants of its display. Notably, there were no sculptural works which would integrate the inner and outer space.

Unfortunately, the formal frame for this integrative teaching concept was not realized, but these experiences were essential for developing the course at the School of LA.

Repeating Of The Task Under New Circumstances
The preceding experience with the experimental course was built into the new course structure:
a series of lectures on architecture (also urban planning and basic regulation, as far as applicable to the assignment) closely tied to the practical work on the project. Also, some of the technical elements (for example elevators, stairs, ramps, the presentation of elements in architectural drawings, etc.) are presented to students in advance as the semi-finished elements. The individual mentorship is very intensive and occasional problems spotted in the work with individual students turn into ad hoc lectures on a given subject.

All this helps to reduce frustration in students because of their lack of the architectural knowledge. The problem of simultaneous consideration of inner and outer space was repeatedly emphasized, but without full success - a well know syntagm could be paraphrased: landscape follows architecture (with some delay).

The students managed to produce, in a simplified way, rather good quality of architectural designs, but open spaces, in spite of the fact that the authors are the final semester landscape architecture students, remain relatively sparingly elaborated. The fact that there is only one mentor, an architect, was probably the main reason for such a result and the awareness of this fact resulted in the transformation of the course. First through informal participation of a professor – landscape architect, and in the following year through the official transformation of the course into an interdisciplinary one.

The Restaurant Project On The Faculty Campus – Interdisciplinary Approach
The new project was based on the official tender, thus all the elements of the project were given in advance. The location of the project on their own campus in the lavish natural landscape, designing for the purpose that students are familiar with, expected low number of floors, predominantly single purpose of the building, the readiness of a colleague, professor Iva Rechner Dika, Ph.D., a landscape architect, to volunteer in the course
it seemed that the results had to be good. The only weak side of the project was the fact that the urban plan was already given so that there could only be a critical analysis of the given location. Its relatively remote position within the campus could be both: an obstacle and an incentive for its further development. Also, the surrounding architecture analysis and the establishing of the relation towards it was a relatively simple task.

The preparations were done in a way similar to the previous projects. The presence of a second mentor greatly enhanced the students’ focus on the landscape design, so that from the next academic year 2010/11 the course had a landscape architect as an additional mentor, changed the name to Architectural design – studio, and students got another chance to work on the same assignment.

In picture 2 a significant improvement in connecting the architectural and landscape aspect of the project can be observed. The example a (Ivana Tomašević) shows how a relatively modest architecture design can be significantly improved with a high-quality landscape approach that surpasses the mere landscape design and extends to the architecture itself. The example b (Ana-Maria Vašiček) uses lighting and graphic interventions to merge both aspects. The example c (Mihaela Meštrović) in addition to the brilliant architecture design (on the same level as better architecture students) offers an interesting sculptural intervention that integrates architecture and landscape!

School Of Landscape Architecture – Project Of A New Building On The Faculty Campus – New Challenge For Students
The majority of the landscape architecture classes recently take place in spaces not designed for the specific requirements such as drawing and work on computers. On the other hand, the campus location is a high-quality one, immersed in greenness, with a picturesque brook. It originates from an advanced
19th-century bishop’s estate and is part of a protected historic park Maksimir. The task to program and design a building in which the landscape architecture classes would be performed was derived from an idea to examine the students’ visions, based on the accumulated insight and critical valorisation to propose a building and landscape design that might be realized in some indefinite future. This task was given to students for three years and the resulting experiences are interesting on a few different levels and hopefully will be useful in the future.

Contrary to the previous task, the students are required to suggest a location for a building and set the limits to the area around it, which presumes a good elaborated analysis of the entire campus. Students perform this part of the task masterfully and suggest locations that are diverse and mostly well argumented.

The brainstorming follows regarding inner and outer spaces required for the classes and preferable ways of teaching. The first brainstorming takes place under the tree after a lecture held on the stairs of the bishop Haulik’s summer house – students take initiative, carry the schoolboard outside (without a professor being present), they have a lively and loud discussion in which they try to come up with their visions. The mentors are delighted with this unusual manner and the inspiring circumstances.

As a special curiosity, it has to be mentioned that all these direct experiences of the less formal classes in the open space were rarely (and even then mostly initiated by mentors!) reflected in the proposed projects.

The classes unfold through the already established combination of structured and purpose-driven lectures, practical work on the project and ad hoc lectures, with the certain pre-prepared architectural elements.

Here are the conclusions after three years of experience:
- in addition to the leading mentor – an architect, the introduction of a second (and in the academic year 2015/16 also the third,
professor Ines Hrdalo) mentor specialized in landscape architecture significantly improves the landscape design
- the tenacious insistance on the simultaneous considering of architecture and landscape, on emphasizing the need for their functional and visual connection to create a continuous experience bears good results in many projects
- the programming and dimensioning of outer and inner spaces (in spite of it being a familiar theme) emerges as a substantial challenge although the students' general attitude and (obvious) expectations fit into the general research published in the book „Educating the Net Generation“ (Oblinger and Oblinger, 2005) (which was given to them as literature), the majority of them are pretty rigid when it comes to conceiving the unconventional spaces for teaching and learning and manage to do so only with the additional initiative of the mentors
- most of the projects are significantly different, which shows the differences in approach but probably also the motivation to create a space „for themselves“, as well as the positive competitiveness

Some of the projects shown on the picture 3 display a commendable freedom in architecture and landscape design and successfully transpose the experience of landscape architecture's free forms (and also their symbolic character) into the architectural design (a – Andreja Benčić). The others successfully supplement and transform the rather familiar typology of an orthogonal atrium construction by „encarving“ the landscape in it (b – Ivana Bunjak Pajdek). The third one (c – Andrea Baus) does exactly the opposite – cuts the architecture into the landscape thus creating a continuity of landscape over architecture. The fourth one (d – Nikolina Malbaša) creates exemplary architectural design consequently connected with the landscape. The fifth (e – Ana Žmire) wrestles with the demanding theme of connecting the historic heritage, the new architecture and the landscape. There are also
examples with very ambitious building and landscape design including dormitory and other additional functions (f- Valentina Vukelić).

It can be concluded that the evolution of the teaching method through the years, the involvement of co-mentors and the choice of project theme familiar and interesting to the students (although demanding and complex) resulted in a series of architectural and landscape architectural projects of high quality.

**Hot Topic – The Phenomena Of The Ageing Population And Housing For The Elderly – New Interdisciplinarity**

This year’s course was different from previous ones in many aspects:

- a cooperation with professor Boštjan Kerbler, Ph.D., a social geographer from Ljubljana, Slovenia, was established. His immediate interest is the problem of the ageing population, its specific needs, and the appropriate innovative housing models
- for the first time, the school had the incoming mobility (two Polish students and one from Slovenia)
- Croatian students accepted the integrative approach so that most of the classes were held in the English language, with foreign students included in the group work together with Croatian students
- towards the end of the semester, a control presentation was held with the mentors, co-mentors and guest critics

The work on the project commenced with the students’ mini research on the subject followed by brainstorming, a visit to a home for the elderly and field work – the analysis of several relevant buildings and open spaces in town and a visit to the site. The series of lectures by Professor Kerbler on the phenomena of the ageing population and its consequences followed and ended with a practical exercise - moving around in a 1

Along with mentors and co-mentor prof. Kerbler, guest critics were prof. Branka Aničić (head of School of LA, landscape architect) and prof. Boris Morsan (architect and progenitor of the experimental course).
wheelchair and a simulation of a blind persons’ walk.

The site is in the New Zagreb settlement Sloboština, situated on the outskirts of an urban settlement from the 1980’, a newly established business zone, a rural landscape and with several complementary institutions in the immediate surrounding: a diagnostic center, rehabilitation center for children and adults and an elementary school.

The task – to propose the urban concept of a wider area and to design within it one or more housing models for the elderly, supplemented by supporting open spaces. The usual practical design work is accompanied by the lectures on the subject, but due to the later start of the creative process in somewhat smaller scale than in previous years. The complexity of the assignment required simultaneous work in several scales and permanent modifications of the urban planning concept. This integration of knowledge from three different disciplines on the new and rather unfamiliar theme proved to be a challenge for most of the students. The presentation demonstrates great variety of urban, functional and design concepts of architecture and landscape, but also demonstrates erratic levels of project completion, which remains the case in the final results of the course. Along with conceptually very complex solidly elaborated designs (picture 4) there are also projects that show weaker identification with the theme or lower quality of some of the elements.

In general, it can be said that all students successfully finished the task, but its increased complexity was accompanied by a weaker technical elaboration (mainly architecture). The task will surely be repeated next year but with modification of the educational process (a compression of the preparatory phase and alterations in lectures content).

**Conclusion**

The integration of a diverse knowledge in the pedagogical process presumes participation of teachers from various disciplines. The sufficient
reduction of the architectural problems and their simplification down to the essential (along with the growing awareness of landscape architecture students of its actual complexity), is a challenge that needs to be met at every new task all over again.

For the LA students of the final Ms study year, the practical knowledge in the area of architectural design (however simplified) and integrated with previous knowledge accumulated in their home field of landscape architecture (and partly urban planning), enhance the development and growing awareness of specific complexity of each of these disciplines, of their differences and of their interdependence and so prepare the students for the multidisciplinary environment they will face in practice.

For independent landscape design tasks in the complex built or designed (planned) environment, students are additionally trained to recognize the architectural (or urban planning) qualities and their composition principles. They also become more aware of the need to establish and articulate conscious relation towards architecture, especially taking into account the experienced continuity of inner and outer spaces.

The limitation of the applied educational model is that it lacks some elements that were applied in the initial, experimental phase: the multidisciplinary exchange of knowledge among students (mentors included) of various faculties on the same task and a peer-to-peer approach. Let’s hope that in the not too distant future the consciousness of benefits of such teaching practice will grow and that the practical formal frame will be created to make it happen.

References

a - Le Corbusier Exterior / Interior Sketch (Le Corbusier / Boesiger; Willy, ed.), 1947

b - Praça De Lisboa, Balonas & Menano Architects, Porto, 2013 (Photo: Rechner Dika, Iva)

Restaurant on the Campus - Zagreb, student projects, academic year 2010/11 & 11/12
a – Ivana Tomašević; b – Ana Maria Vašiček; c – Mihaela Meštrović

School of Landscape Architecture on the Campus - Zagreb, student projects, academic year 2013/14, 14/15 & 15/16
a – Andreja Benčić; b – Ivana Bunjak Pajdek; c – Andrea Baus; d – Nikolina Malbaša; e – Ana Žmire; f – Valentina Vukelić

Housing for the Elderly - Zagreb, student projects, academic year 2016/17
a – Nora Dimter; b – Ozana Palić; c – Jakub Radolak; d – Katarzyna Skowron
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Picture 1

a - Le Corbusier Exterior / Interior Sketch (Le Corbusier / Boesiger, Willy, ed., 1947)
b - Praça De Lisboa, Balinas & Menano Architects, Porto, 2013 (Photo: Rechner Dika, Iv)

Picture 2

Restaurant on the Campus - Zagreb, student projects, academic year 2010/11 & 11/12
a – Ivana Tomašević; b – Ana Maria Vašiček; c – Mihaela Meštrović

Picture 3

School of Landscape Architecture on the Campus - Zagreb, student projects, academic year 2013/14, 14/15 & 15/16
a – Andreja Benčić; b – Ivana Bunjak Pajdok; c – Andrea Baus; d – Nikolina Malbaša; e – Ana Žmire; f – Valentina Vukelić
Housing for the Elderly - Zagreb, student projects, academic year 2016/17
a – Nora Dimter; b – Ozana Palić; c – Jakub Radolak; d – Katarzyna Skowron
Abstract
Public participation is an increasingly important means of managing landscape democracy processes; however, it continues to fall short of achieving a significant democratization of urban governance. Researchers advocate civic education and active citizenship in order to sustain democracy and suggest that meaningful participation happens when learning is strongly related to participation. More and more games are designed to be used in the field of urban planning, and current studies acknowledge games both as a framework for participation and as a tool for civic learning. Based on the empirical examination of two educational games from the practice of the Hungarian kultúrAktiv Association – an NGO primarily focusing on built environment education for youth –, the authors will examine the relationship of games and the urban planning contexts in which the games were implemented to foster learning about landscape democracy. The game ‘ParticiPécs’ draws the attention to the value of collaboration in shaping urban structures and is an example of a bottom-up initiative that aims to empower youth to propose a positive change in the city of Pécs. The game ‘Urbanity’ opens a debate about urban changes and reflects critically on urban interventions from a pluralist point of view. Urbanity was introduced as a facilitation instrument to structure the dialogue between the municipality and young people, and encourage youth to participate in the ongoing community planning process of a new park in the city of Törökbálint. The comparative analysis of the two case studies focuses on the character of the urban development processes in which the games were implemented and will position game-based learning in urban planning practices. The analysis pinpoints that the game-based learning could be implemented in both bottom-up and top-down approaches; highlights that the learning goal of the game must be harmonized with the goal and phase of the participation process. And finally, the authors argue that the development of universal design principles is key to uphold game-based participatory procedures.
Implementing educational games in urban planning practices
Comparative analysis of the games ‘ParticiPêcs’ and ‘Urbanity’ in the Hungarian urban planning context

Introduction
Public participation is an increasingly important means of managing landscape democracy processes. The definition of landscape democracy given by the European Region of International Federation of Landscape Architects underlines the importance of participation; however, it also implies that current practices fail to meet the requirements of democracy in situations where the rules of shaping the landscape could be defined [1]. Participation structures the relationship between states and citizens but falls short of achieving significant democratization of urban governance [2]. Challenges appear in both established and newly established democratic states [3]; they are present on the various levels of the governmental decision-making processes [4], and vary according to the form of deliberative and participatory processes in which citizens, local communities, and interest groups participate in decision-making that concerns their environment and landscape [5]. The stakeholders involved in the participation process could experience revulsion against participation [6], and this discourages them from learning about plans and alternatives, attending meetings and formulating opinions [7].

In order to solve the challenges of participation, Gordon et al. [8] suggest a qualitative change of engagement processes and draw the attention to immersive planning that deepens involvement through learning about the complexity of urban

1 “Landscape Democracy is a form of planning and design in which all citizens are meant to participate equally, either directly or through elected representatives in the proposal, development and establishment of the rules by which their landscape and open spaces are shaped.” (IFLA EUROPE- International Federation of Landscape Architects of Europe, 2014).
planning. Hart says that meaningful participation happens when learning is strongly related to participation so that citizens can reflect on participation, contextualize their actions and understand the consequences of their participation [9].

Combining participation processes with education seems to be fundamental when it comes to youth participation in urban planning processes [10]. Coming from a built environment education background, the authors believe that education – that is related to youth’s learning and engagement in the context of the urban environment – could address the challenges of democracy and participation, and could equip youth with important competence and enable them to contribute to a democratic society in an aware manner [11].

The intention of our work as built environment educators within the kultúrAktív Association is to create playful pedagogical methods and innovative tools that enable youth to deepen their relationship with the urban environment and encourage them to take ownership and actively participate in shaping their built environment.

One of our playful tools is the so called educational urban games, games that focus on learning about specific aspects of participation in an urban context. We use games because they can be framed as a playful environment for learning [12] that allows exploration of the content as well as experimentation with the relationships of power within the game [13].

Since the number of educational games has increased, several studies started to analyse the effectiveness of games in transforming participation into civic learning [14,15], or examine the implementation possibilities of games in the field of urban planning [16], supporting the idea that games are potential tools for participation.

As we know that participation is only successful when it is combined with learning, and that games are important both in the field of education and participation, the question arises: how could educational urban games be integrated into participatory urban planning processes in order to combine participation with
learning about landscape democracy?

**Methodology**

In order to explore the integration possibilities of educational games into urban planning practices, and to define how, at which stage and with what purpose games could be used in a participatory process, we conducted a comparative study of two games from the practice of the kultúrAktív Association. The two cases were selected by purposive sampling method [17], following the maximal variation relating to the difference between the selected games, as well as between the contexts of their implementation. Although both games were designed with educational purposes and were tested and embedded into urban planning processes, their educational goals are distinct and they were implemented in significantly different urban planning processes (different stages of the participation, different urban contexts, bottom-up and top down processes).

- **Case 1: the game ParticiPécs**: The game was initiated as an informal action by the kultúrAktív Association aiming to empower youth to propose a positive change in the city of Pécs, and was tested in 7 schools with more than 180 students aged 14-18.

- **Case 2: the game Urbanity**: The game was implemented in an urban development process triggered by the Municipality of Törökbálint initiating debate and critical reflection on the impacts of urban interventions, and was played by around 70 students from the two local schools between the ages of 12 and 17.

Each author was involved in the development process of one of the games as well as in its implementation in the urban planning process.² The analysis of the case studies builds on the empirical experiences of the authors gathered during the game development processes as coordinators, and during the implementation of the game in the urban planning process as facilitators and game masters. The comparative analysis is also based on information from

² Anna Szilágyi-Nagy – Urbanity, Tóth Eszter – ParticiPécs
both formal and informal discussions with stakeholders (decision makers, urban planners, educators, participants in the game) about the learning outcomes and the role of games in the urban planning process, as well as selected written resources about existing participation frameworks of the town, such as the strategic development strategies, civil concepts, game descriptions, and articles from local newspapers and online publications.

The selected cases are compared according to a common evaluation framework, in order to assure that the comparison is coherent on the selected dimensions [17]. Considering that the comparison of the case studies focuses on the integration of games into urban development processes, the evaluation matrix developed by Thiel et al. [18] seems to be an appropriate tool for the analysis. Thiel et al. proposed an evaluation framework for eParticipation platforms with game elements, which covers the different aspects of playful participatory tools. Although the framework was developed primarily for the analysis of game-based online tools, it is also adaptable for analogue games. The dimensions of the evaluation framework are:

a) Data collection: indicates the type and purpose of data collected through game sessions (Citizen science, Citizen-sensing, Citizen sourcing, Public deliberation, Participatory budgeting, None)

b) Stage in decision-making: refers to the level of citizens’ influence on the project (Agenda setting, Option analyses, Draft policy, Implementation, Monitoring)

c) Type of engagement: refers to the type of involvement and empowerment achieved in the game (Tell, Ask, Discuss, Decide, DIY, Vote/Sign)

d) Involved stakeholders: indicates the number and type of stakeholders involved in the playful participation process (Citizen-to-Citizen, Citizen-to-Government, Government-to-Government)

e) Communication form: describes the degree of interactivity in the project (One-way, Limited two-way, Two-way, Dialogue)

f) Topic scope: reveals whether the project addresses a specific topic or if it is open for any kind of topic (Yes/No)

g) Spatial reach: refers to the scale and spatial boundaries of the project. (Specific, Local, National, International)

h) Restricted access: reveals whether the game sessions are open for everyone or only for a selected group of people (Yes/No)

In addition, we introduced two new dimensions to Thiel’s framework which link the game with the aspects of landscape democracy challenge and civic learning:

The category “Landscape democracy challenge” builds on Arler’s [5] model which describes the democratic challenges in relation to the landscape procedure. As mentioned earlier in this study, the model builds on the core values of democracy such as ‘co-determination and participation’, ‘impartiality and respect for arguments’, and ‘private self-determination’. The games are going to be analysed according to the landscape democracy challenge they target.

The category “Civic learning” is related to the learning goal of the games and will be analysed according to the four dimensions of the civic competence measurement model developed by Hoskins et al. [19]. The model builds on the values of citizenship across Europe: a) Citizenship values measure the norms related to the concept of good citizens; b) participatory attitudes measure the intention to engage in various forms; c) Social justice measures the belief in equality, respecting diversity and democratic processes; d) Knowledge and skills for democracy contains knowledge and skills that are needed for active citizenship, e.g. critical thinking, autonomous decisions, reading literacy, etc.

3. The case studies
The two case studies are embedded in the Hungarian urban planning context where the
tradition and framework of participation are not yet established. Although there are documents that regulate the relation of the civil society and local government, there is an emerging conflict that derives from the different understandings of the concept of partnership [20]. Kiss criticizes citizen engagement processes that follow regulations and rules but fail to involve the society into real decision-making [21]. The problem with participation is rooted in the underdeveloped self-organization culture in Hungary, and practitioners are methodologically not prepared to change the tradition of current urban planning practices characterized by the short term goals, resources, and deadlines defined by the decision makers [22].

Despite the fact that the trend to use games and gamification in many aspects of life has reached Hungary, there is still no tradition of using games in the urban planning context. There are some initiatives that focus on gamification as a means to create a playful life³, or on games as a tool to create cohesion among communities living in cities.⁴ The kultúrAktív Association builds on the teaching potential of games and started to develop urban games with educational purposes.

Case 1: the game ParticiPécs
The first case study is located in the city of Pécs, the cultural capital of Europe in 2010. The city values the role of civil organizations in transforming society. As a university town, the engagement of youth is important for the city, and therefore the Municipality supports activities that foster active participation of youth and volunteerism [23]. Moreover, the city government strategically considers the involvement of citizens into decision-making processes, which became an integral part of the integrated city development strategy [24]. Nevertheless,  

³ Játékos Lét Kutatóközpont is an institute focusing on gamification and online games in Hungary: http://www.jatekoslet.hu/news.php
⁴ Mind Space is an NGO focusing on smart cities and informal education. It is the organizer of the event ‘Mind the Game conference’: http://smartcitybudapest.eu/news/mind-game-workshop-and-urban-game-2015
meaningful participation in urban development processes still comes short in practice, and there is especially a lack of opportunities for youth to get actively involved. Therefore, kultúrAktív Association launched a bottom-up participatory process, in which the educational game ParticiPécs was developed and implemented, aiming to engage young people in shaping their urban environment. The game ParticiPécs, a traditional board game representing the city of Pécs, was developed between 2012 and 2015 in a collaborative design research process [25]. The game simulates small-scale urban interventions, in order to promote knowledge about alternative tactics and behaviour patterns that could be implemented in real-life situations. In ParticiPécs, players need to collaborate in order to implement interventions, e.g. to repair street furniture, sign a petition, organize sports events, and thus, trigger positive change in their immediate built environment.

In the second part of the game, players have the chance to develop ideas for real-life interventions by identifying a problem, developing a strategy, and determining a specific action. The intervention must keep the small scale, so the players can realize it by themselves with a minimum amount of time and resources needed. The game was implemented in a bottom-up process initiated and organized by the kultúrAktív Association that aimed to generate and implement urban renewal ideas initiated by youth. The game was played in primary and secondary schools in Pécs. Seven schools participated in the process with a total of 180 students. The ideas generated during the games were submitted for a student competition and were showcased in a public exhibition [26]. Ph.D. students of the Faculty of Architecture of the University of Pécs visualized students’ ideas and installed the exhibition. In this way, inhabitants could get to know the ideas of youth and the elected jury – the chief architect, the representative of the Chamber of Architects, and the representative of the Faculty of Architecture and Urban Planning from the University of Pécs – decided on the best ideas to be implemented.
With the support of the urban planners and Ph.D. students, the three selected interventions were implemented. The University contributes to the sustainability of the project by continuing the game sessions and the implementation of interventions in schools.

Case 2: the game Urbanity
The second case study is located in Törökbálint, a town in the metropolitan area of Budapest. Here, according to the Hungarian context described earlier, conventional ways of planning are prevalent with few or no possibilities for citizen participation. Nevertheless, recent efforts have been made to improve the quality of participation in planning processes [27], and in some cases, learning was combined successfully with participation. For instance, the future park site was an arena for involving children into the development process [28]. The civil concept, which is under preparation phase, aims to shift from the practice of representative democracy towards participatory democracy [29].

The game Urbanity, previously developed by the kulturAktív Association, was implemented in a formal urban planning process, initiated by the Municipality of Törökbálint. The development of the game started in 2014 with the aim to foster dialogue between citizens, and public debate on everyday urban issues. The classroom version of the game introduces the city as a magical space that listens to the dialogue of its inhabitants, and changes according to their wishes. In the dialogue-based role play, players build the cityscape together by proposing their favourite public space for discussion. The impact of small-scale interventions is in the centre of the game and players discuss questions such as ‘Would you make a community garden in front of the Town Hall?’ ‘Would you organize a community festival at the cemetery?’ ‘Would you introduce WIFI in the park?’ In each round, the representatives of the site listen to the dialogue of inhabitants played by the rest of the group. Inhabitants share their opinion about the proposed question and receive scores for their arguments. There is no right or wrong answer in the game, and at the
end of the discussion, the representatives of the site can decide whether their space will change or not, on the basis of the arguments of the inhabitants.

The game was facilitated by the kultúrAktív Association and was played during the Public Space Development Day in 2016 [30], which was organized by the Municipality. The engagement process aimed to introduce and discuss the new design of the city’s public space development concept and to promote an open discussion about the future of the open space behind the new town hall. Besides other forms of participation and public hearings, game sessions were organized for secondary school students. More than 70 students from two schools participated in the debate. The ideas which emerged out of game play were documented and will be taken into consideration during the still ongoing planning process of the area.

Findings

1. Figure Results of the comparative analysis

Learning goal and landscape democracy challenge

Landscape democracy challenge and civic learning were tightly interwoven in both games. While ParticiPécs is a transformative game that promotes behavior patterns for changing the everyday environment outside the game world, Urbanity has critical play in its center and aims to promote critical reflection on urban space and participation [31]. Thus, ParticiPécs deals with the challenges of ‘co-determination and participation’ and aims to empower youth to raise their voice. Through the contribution of their intervention ideas, they have the opportunity to influence the way public spaces are constituted. Thus, civic competence is emphasized here through the development of the ‘participatory attitude’ of players. On the other hand, Urbanity aims to influence the decision-making process differently. It encourages players to express their ideas, arguments, and thoughts about the city and to formulate critical judgements about urban interventions. This critical perspective leads towards the civic learning goal of the game, which is to nurture the concept of social justice.
in participants: the acceptance of arguments, and the variety of perspectives the participants share with each other draw the attention on diversity and equality.

Data collection, stage in decision-making and type of engagement
The two games enable the collection of different kinds of data from the players. In the case of ParticiPécs, the data emerging from the game influences urban development processes informally, while in the case of Urbanity, data was collected to directly inform current planning processes.
ParticiPécs focuses on boosting tailor-made solutions for local problems perceived by the players and triggers ideas for small-scale interventions. Players can propose topics and start discussions about issues that might not have been on an official agenda. Though the interventions are meant to be implemented directly by the players, the documentation of problematic sites, spatial problems and solutions can inform local decision-makers about youth’s perspectives on urban development plans and strategies.
In the game Urbanity, players share their personal experiences, stories, behaviors, problems, and opinions about urban interventions and discuss the impact of the interventions on a given place. In this way, the discussions provide rich data for the Municipality about players’ – in this case youth’s – spatial preferences, priorities, and opinions on the usability of selected sites and potential development ideas. The participating players practice option analysis by debating about possible intervention ideas. They experience this through discussing various viewpoints and taking positions through their decisions.

Involved stakeholders and communication form
Both processes involved different stakeholders into the project on different levels. Three levels can be identified: 1) the players of the game, in both cases local primary and secondary school students, who provided input for urban
development processes; 2) the institutions and actors involved in the implementation of the project; 3) decision-makers with power to decide on the integration of the data in formal planning processes.

In the case of ParticiPécs, the project was a bottom-up initiative lead by the Hungarian NGO kultúrAktív Association. The implementation of the game sessions was supported by Ph.D. students of the Faculty of Architecture of the University of Pécs, and decision makers were only involved partially, acting as the jury at the final exhibition of the project. The implementation of the intervention ideas was performed in a bottom-up manner by the students themselves and with the support of kultúrAktív and the Ph.D. students of the University.

In the case of Urbanity, the Municipality was tightly involved in the entire project, and the project can be considered as the first attempt to open up traditional top-down planning. The Municipality invited kultúrAktív to provide support for the ongoing urban planning projects with the game Urbanity. The city organized The Public Space Development Day in order to collect data for the future formal planning process. The game sessions were carried out during this day and provided a framework for dialogue between the municipality and the youth.

The different settings and stakeholders involved in the projects are reflected in the communication strategies. The in-game communication was in both cases discursive, but while in the case of ParticiPécs the communication during the implementation of ideas in real spaces occurred primarily in a citizen-to-citizen axis (between the students and kultúrAktív and the Ph.D. students who supported the practical phase of the implementation), in the case of Urbanity, the overall project communication happened between the Municipality of Törökbálint and the project owner NGO kultúrAktív (citizen-to-government), and the results of the game sessions were also directly communicated to the Municipality (citizen-to-government).

Topic scope, spatial reach and restricted access
The scope of the case studies was also different both in terms of topic and spatial reach. Since the ParticiPécs project was independent of the local Municipality and other official levels of decision-making, the spatial topic was restricted to the scope of the everyday experiences and practices of the players, but not predetermined. Although in the first round of the game there are predetermined actions and interventions, this is meant for sensitization, for the extension of the imaginary capacity of the players, in order that, in the second round of the game, they become capable of identifying relevant problems and creative solutions. The criteria, or limitation of the scope of the ideas developed during the game is that they should maintain the small-scale spatial dimension and scope of the power of these everyday experiences so that they can be implemented realistically by the players themselves.

In the case of Urbanity, the topic of the in-game discussions followed the game rules: random intervention ideas targeted the freely selected public spaces from the urban context of the players. The scope of the discussion was narrowed down during the creative workshop that followed the game. This workshop linked students’ needs and demands to the spatial reach that was determined by the Municipality and connected to current planning projects. This conversion was important because the planning area was out of the use of the students and the community and had a mixed use of parking lot, private gardens, abandoned creekside landscape. The planning goal determined both the spatial reach and the content of the discussion between students and the representatives of the municipality.

In the case of Urbanity, all students from the local schools were invited to submit ideas for the park; however, time limitations determined the number of players that could participate in the process. In ParticiPécs there was an open invitation call for all primary and secondary schools in Pécs; however, there was a limited capacity from the side of the volunteers of kultúrAktív and the University for facilitating game sessions.
Conclusion
In order to position the use of educational games in participatory urban planning processes two case studies were selected to be compared that showed differences between their educational purposes and urban planning contexts. ParticiPécs aims to teach participation behaviour through small-scale interventions and the participatory aim was to implement them as bottom-up, DIY tactics. Urbanity opens a debate about urban interventions in the public space, and the purpose of the participation process was to bring youth and municipality into dialogue to discuss intervention ideas. The analysis provided the following information about the implementation possibilities of educational games in the urban planning context.
Firstly, these cases prove that games can work as instruments of participation, even in contexts where the tradition of civic participation is not yet established. They could be used in both bottom-up and top-down planning processes. ParticiPécs was a process initiated outside of the formal planning processes and can be considered as a bottom-up approach in urban renewal. The kulturAktív Association played a key role in initiating the process by organizing game events and hosting and supporting communication between youth and other actors of the city. The design of the participation process focused on long-term engagement of youth from idea generation to implementation. The collaboration with the University ensures continuous dialogue between youth and decision makers and provides a sustainable basis for the renewal of cityscapes.
Urbanity exemplified the implementation of games in a formal planning process. The participation process was initiated by the municipality of Törökbálint and aimed to open dialogue around the design of a future park. The game served as a tool to facilitate discussion between youth and the municipality, and other tools were implemented in order to reach out to other inhabitants. The game was only implemented once in a specific moment of the engagement process, results were reported back in the form of articles and web page reports, and input from the games was recorded.
in a traditional administrative way. Here the role of the kultúrAktív Association was to facilitate the game event and provide input to the municipality about preferences, problems, and needs of youth related to the site. It is the responsibility of the municipality to ensure that the information will be part of the design process of the space. In this way, the sustainability of the dialogue is questionable.

Secondly, the two cases exemplify the claim that game-based learning goals should be matched with the engagement process in which they are implemented in order to ensure meaningful learning and sustain landscape democracy. As different learning goals require different strategies of learning, so does game-based learning require different game design [32]. Putting this into the urban planning context, different urban planning goals require different engagement strategies. In consequence, game-based participation needs a context-sensitive, adapted game design, and the learning goal and the purpose of the engagement should support each other. ParticiPécs served as a source of inspiration for collaborative urban interventions, and the engagement process was about designing and implementing small-scale interventions in collaboration with other partners and students. In this way, students practiced initiating and successfully implementing individual ideas. Urbanity, on the other hand, was about dialogue among players about potential urban interventions. Discussion within the game reflected the real engagement situation the students were involved in: the moment when it was important to discuss ideas related to the new park. Students learned about the variety of opinions and about the complexity of planning and could share their viewpoint with decision makers through the game. The game provided an entry point for youth to join the discussion about the future design of the new public space.

Thirdly, game-development processes require additional resources in terms of time, finances, and human capacity, and this can be an obstacle for future game-based participation projects. In order to maintain the quality of such initiatives and their additional value, but enable the spreading
of this playful approach in participatory planning processes, more in-depth design research is needed to develop general design principles for different scenarios. ParticiPécs was the example of a site-specific game design that limits the use of the game to a single city, and the design needs to be updated as the city develops. However, the interventions and collaborative actions could happen in any other city. The game Urbanity itself was designed in a way that it could be customized according to the spatial preferences of its players. The focus of the game could also be easily modified by adding or replacing cards from the question set. In this way, the game could be adapted to the spatial focus and scope of the urban planning process, and it could be played in any neighborhood, town, and city. Well-defined design principles can serve as guidelines for practitioners, game designers, and planners, as they provide preset guidelines for suitable game-based participatory tools.

The conclusions above are intended to motivate and inspire urban planners, municipalities, NGOs and other stakeholders involved in participatory processes to experiment with the implementation possibilities of games in urban planning contexts and encourage the integration of game-based learning processes into participatory urban planning processes.

References


[16] E. Tóth, “Potentials of games in the field of urban planning,” in New Perspectives in Game


[28] “Géza fejedelem útja melletti zöldterületre tervezett park koncepciójának bemutatása."

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1. Figure Results of the comparative analysis

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Figure 2. Playing Participiócs (Photo: Júlia Lily Hegyi)
Abstract
In English national parks, new development represents a significant and contentious part of landscape planning inseparable from park conservation ideologies and policies. Park planners negotiate among statutory purposes, landscape values and stakeholder aspirations in defining policy and exercising planning functions. These processes shape both the socio-economic and physical landscape, legitimising (or marginalising) types of landscape change in these ‘special’ places, ultimately defining for whom they are planned. Meanwhile power struggles over the preservation or conservation of natural and cultural heritage regularly divide opinion and communities, and new development can be celebrated as enhancing the landscape or decried for destroying it.

Set in Dartmoor National Park, this paper investigates competing landscape aims and interpretations inherent in an approved masterplan for a 3.86 ha mixed-use residential development on the edge of an historic town. The governing Dartmoor National Park Authority (DNPA) asserts that the scheme’s master-planning process represents ‘one of the most comprehensive community engagement approaches we have seen to a single site in the National Park’. Discourse analysis of semi-structured interviews and planning documents examines the extent to which planning practitioners and other stakeholders were engaged, whether their views were shared or contested, and how these were represented in the masterplanning process.

Findings reveal that an extended process of consultation, from 2009 - 2014, led in distinct stages by community members, the DNPA, and developers, cumulatively paved the way for a large-scale housing development in a sensitive landscape, without the levels of opposition typically associated with national park landscape planning. The landscape values inherent in national and local policy, and the values articulated by local stakeholders, however, appear compromised in the resultant masterplan, bringing the efficacy of the engagement process
in informing landscape change into question.

Introduction
England’s 10 national parks, covering 9.3% of the country, have the ‘highest status of protection in relation to landscape and scenic beauty’ [1], to which all other planning concerns are secondary [2 p.144]. As IUCN Category V protected areas, and home to around 334,000 people, however, landscape conservation aims must be reconciled with the interests and views of local stakeholders [3], including accommodating local demand for new housing. Park management policies are developed through a process of stakeholder consultation, while change of land use, including housing development, is part of public discourse and decision-making. Such debates ‘legitimise (or marginalise) particular developments, aesthetics and actions in rural settlements, emphasising the power relations of different stakeholders’ [4]. To develop a community-based model of landscape change, it is crucial to understanding stakeholder values [5 p.384]. In academic literature, however, ‘scant attention has been given to understanding stakeholder perceptions and interpretations of the physical processes of landscape change and preferences towards accommodating new housing development’ [6 p.359].

Reviews of English national parks by MacEwen and MacEwen [3], [7] and Blunden and Curry [8] reveal a complex history of compromise and inherent tensions [9]. Existing literature on constructions of rurality suggests that residential development in rural spaces is highly contested [4]. In this paper, we extend this literature by investigating how decisions about significant landscape change are made within English national parks, specifically the role and outcomes of community engagement in the planning process as evidenced within the context of an adopted masterplan for over 100 dwellings in Chagford, Dartmoor National Park. We examine how ‘key actors’, namely ‘developers’, ‘regulators’ (National Park Authorities), ‘facilitators’ (including design professionals) and ‘affected parties’ (what we will call stakeholders) [10] negotiate design aims and proposals over several years, within the
context of changing policies and pressures, and the landscape design that results from such a process. We focus on the communication of local housing needs and aspirations, the identification and allocation of potential development sites and the establishment of housing strategies and layout principles during several public consultations.

A shortage of housing in rural areas has been documented as a challenge for decades [11]. It is also one of the most visible indicators of rural landscape change, and one which ‘has either been resisted or accommodated, dependent on political and planning cultures’ [6 p.360]. In national parks, where new development is largely restricted on the grounds of landscape protection [12], there is a compelling case for arguing that this has been instrumental in conserving “natural” beauty [9]. Planners, however, also recognise that park purposes depend on a healthy rural economy [13], and that new housing may be needed to secure community viability [14]. Restricting new development constrains access to affordable housing by raising prices and limiting land supply [15]. “Locals” are priced out by more affluent “newcomers” [16], who are paradoxically attracted to the parks because of such restrictions [17 p.323].

Meanwhile wider landscape planning theory and practice is increasingly moving away from the ‘classic top-down’ expert driven approach (frequently associated with landscapes of high scenic amenity) towards a more ‘public discursive practice’ that acknowledges and mandates community consultation as part of consensus building and representation of diverse values [18 pp.579-80], where government agencies partner with other stakeholders in the processes of policy making and implementation [19 p.596]. In national parks, the Environment Act 1995 acknowledged the importance of ‘collaborative working to deliver National Park purposes and achieve sustainable development’ [20 p.9].

The Act also added a secondary duty ‘to foster the economic and social well-being of local communities’ to the national park purposes. In practice, however, conservation interests tend to
dominate public consultations on park planning [13 p.293], while critics of the statutory duty ‘remain sceptical that the duty is of value and point to the potential ways in which it can be used by developers’ [9 p.68].

Case Study
Description
The Chagford Masterplan sets out the proposed mixed-use development, by two developers, of two adjacent sites on the edge of a historic Dartmoor town (pop. c. 1450). Comprising 103 dwellings, this project is ‘the largest single housing scheme’ ever brought before the Dartmoor National Park Authority (DNPA) [21]. It is also ‘one of the most comprehensive community engagement approaches [...] to a single site in the National Park’ [22].

A lack of affordable homes was ‘one of the drivers for the project’ [23]. Dartmoor planning policy (Policy COR2) identifies Chagford as a ‘Local Centre’, the top tier of its settlement hierarchy, and where ‘appropriate development’ addressing local needs is ‘acceptable in principle’ [20 p.34].

A housing needs survey in 2007 identified a ‘need for 22 affordable homes in the short term’ and a later study (2010) identified a need for ‘up to 25 units of specialist accommodation’, mostly from elderly “downsizers” [24 p.80]. The surrounding landscape, however, is regarded as ‘exceptional in its beauty’, and the town’s ‘open spaces [...] and the views across and beyond them’, contribute significantly to its ‘essential qualities’ [25 p. 6, 35]. This relationship, however, has been ‘somewhat eroded’ by a ‘mushrooming’ of peripheral development [25 p.8].

The masterplan site (total 3.86 ha) comprises Bretteville Field, a 0.47 ha parcel of land adjacent to the main road entrance to the town, and a substantial part of the adjoining Bellacouch Meadow, a large open pasture divided by a stream. The site is ‘prominent’ on the approach into town, and there are ‘distant views’ both to and from the site [26 p.8]. There is existing development on two sides, a narrow lane and protected woodland to the south and open
farmland to the east. The meadow contains extensive earthwork evidence of early tin-working operations, considered ‘rare evidence’ of Chagford’s mining past [26 p.7].

Prepared by Grainge Architects on behalf of developers, the masterplan comprises housing, including affordable housing and retirement housing, a 70-space public car park, and business units [21]. Tight-knit buildings are laid out along a ‘spine like route’ winding through the site, behind which are ‘pockets of looser development’ arranged as ‘a series of courtyards’ [26 p.11]. There is a long (190m) strip of public open space along the existing watercourse. The landscape strategy, prepared in-house, is intended to reflect the ‘transition from urban to rural’, with the watercourse, bridged by the link road, becoming ‘more natural in form’ as it approaches the ‘rural edge’, and connecting to a series of attenuation ponds beyond the site boundary [26 p.14].

Numerous issues are at stake within this masterplan, however this paper focuses on the scale / layout of the development and the quantity / type of housing and how these evolved through distinct consultation stages [Fig. 4]. Discourse analysis of semi-structured interviews and planning documents, supported by site visits, is employed to reveal how planners, developers, stakeholders and facilitators (including design professionals and local councillors) negotiate landscape values, in different forums, and over several years, within the context of changing policies and pressures, and the proposed housing that results from such a process. Fig. 5 summarises the identification and analysis of the key consultation / planning stages, before focusing on the status of housing within each.

**Stage 1: Previous Development History**

Bretteville Field had long been discussed ‘as an area with development potential’ [22]. In the 1980’s a fire station was built there, followed by several planning applications (1988-2006) for affordable and / or sheltered housing on the remainder, all of which were refused [27]. These failed applications nevertheless signalled to the community that Bretteville Field ‘was a site and
that area was being developed’ [31].

Stage 2: Chagford Design Statement
In 2009, a self-appointed group comprising ‘representatives of the Parish Council, business community and residents’, and including design professionals, produced a “Chagford Design Statement” (CDS), based on the results of a questionnaire, public exhibition and public consultation. The aim was to inform the DNPA, which was reviewing its planning policies, about stakeholders’ views on future ‘land-use’ [28 p.3]. The provision of affordable housing, including a care-home, emerged as a primary concern for over 95% of respondents [28 p.14]. It was expected that residential development would be in accordance with DNPA housing development policy (Policy COR15), namely prioritising ‘affordable housing to meet identified local needs’ [20 p.55]. This policy specifies that the proportion of affordable housing in all open market developments ‘will not be less than 50%’, other than in ‘exceptional circumstances’, where this may be varied to enable ‘developments of significant environmental or community benefit to proceed’ [20, p.55]. The CDS acknowledged that ‘some general housing will have to be incorporated into any scheme’ [28 p.10].

The CDS respondents focused on the potential development of the Bretteville Field area [28 p.10]. The published plan, however, shows the proposed mixed-use development not only of Bretteville Field, but also part of Bellacouch Meadow (approx. 2 Ha). The plan was intended to be ‘indicative only’, and neither site areas nor housing numbers are provided, although the boundary with the meadow is indicated (green line) [Fig.7]. This plan was not unanimously supported, however, with some commentators expressing ‘reservations about the scale’ [29]. A considerable number of respondents (12%), moreover, ‘strongly disagreed’ with the notion of identifying land for development at all, ‘believing it to be a “developer’s charter”’ [28 p.10].
Stage 3: DNPA Development Management and Delivery Plan (DMD) (Adopted July 2013)

DNPA planners felt that the ‘rigorous and inclusive way’ that the Design Statement was produced meant that it was ‘appropriate to give it great weight’ in their DMD [30 p.96], a document providing management policies and identifying specific areas for development. The DMD itself was subject to ‘extensive public consultation and stakeholder engagement’ before being adopted in July 2013 with ‘a good level of community support’ [26 p.3]. Under the DMD (Policy CHG2), the Bretteville / Bellacouch site was officially confirmed as ‘key to development in Chagford’ [30 p.99]. Locals registered some surprise ‘that their ideas were incorporated into planning policy’ so readily [31].

The allocated area, at 3.7 ha, is larger than that indicated in the Design Statement, but again the ‘acknowledged priority’ was for affordable housing ‘to provide for local households’ including the elderly [30 p.99]. The inclusion of the site within the town’s settlement boundary meant that in this area development ‘would be acceptable’ to planners in principle. Any development proposal, however, was required to ‘accord with a comprehensive masterplan for the entire site prepared in association with the local community’ [30 p.100].

Stage 4: Enquiry by Design (April 2013)

After allocation, two developers formed option agreements to develop the sites: Blue Cedar Homes for Bretteville Field and C G Fry for Bellacouch Meadow. Realising ‘the importance of working together to develop a single masterplan proposal’ [24 p.2], and the need, as one developer expressed it, ‘to be quite serious about community engagement’ if they ‘were going to get this site through planning’ [32], they commissioned The Prince’s Foundation to carry out its “Enquiry by Design” (EBD) community engagement model. The EBD received ‘quite a lot of positive response’, and from the point of view of the developers was successful in that it alleviated ‘a lot of scepticism’ over the development [31].
The EBD involved a ‘range of stakeholders’ including ‘design and technical experts, LA officers and local residents’ meeting over several days (April 2013) to develop a set of ‘first principles’ to ‘inform’ the masterplan [24 p.2]. In the subsequent report, a proposed site layout, drawing on notions of ‘traditional urban and architectural design principles’ [24 p.4] provides ‘a framework’ for an (unspecified) ‘variety of homes and tenures, with a particular focus on accommodation for the elderly, young people and families’ [24 p.35]. The report also stated that the Bellacouch site ‘extends further than the proposed allocation’ under the DMD [24 p.2].

Stage 5: Chagford Masterplan
Following the EBD, and a draft masterplan presented at a public consultation, a final masterplan – commissioned by the developers – was formally adopted by the DNPA at an Authority meeting in April 2014 (NPA/14/018). The adoption of the masterplan is significant because it represents the cumulation of the consultation process, and ‘sets the template for development of the allocated site as a whole, ensuring that there is a comprehensive approach to the delivery of development and the community benefits that are required’ by the DNPA [27]. In short, it ‘provides the framework against which all subsequent planning proposals must be tested’ [27]. The masterplan however was not unanimously received by the DNPA: one planner ‘felt unable to support the Masterplan due to the loss of a beautiful area of Chagford’, while others ‘questioned the small amount of green space’ with the implication that the site was being-over-developed [21].

The masterplan represents the first identification of the number of dwellings proposed for the site (103 units), which like the EBD, ‘provides for a variety of homes and tenures’ with a ‘particular focus’ on ‘the young, elderly and families’ [26 p.13]. Given, however, that identified need was 20+ units, the scale of this scheme appears to be unlikely to be policy compliant in terms of affordable housing’ (50%). The masterplan explains, however, that while it builds ‘on the
ideas and outcomes’ of the EBD it also must acknowledge ‘the growing evidence base around the site’ and the fact ‘that a scheme needs to be deliverable’ [26, p. 4] i.e. financially viable for the developer to complete, and that the sale of a higher proportion of market-rate dwelling is needed to balance the cost of other benefits including car parking, green space and elderly housing.

The homes for the elderly, however, are not affordable, or indeed restricted to locals, but ‘open market older persons accommodation’, to be developed by a high-end retirement housebuilder (Blue Cedar Homes) [26 p.13]. There are no plans for the identified care home.

The masterplan layout bears little resemblance to the design set out in its EBD predecessor. There is clearly a larger ratio of built / open space. Different too is the increased site area (3.86 ha), which although referred to in the EBD report, was not indicated on its plan, which followed the DMD allocation. In addition, while the EBD is contained within its site area, the masterplan allows ‘for potential future access to the land to the east’ [34]. According to the architects, there are no ‘plans at the moment’ to extend the development, ‘however, it is common practice to ‘future proof’ developments like this, and to give landowners ransom free potential for future developments’ [34].

**Conclusions**

Planning instruments and processes, such as community consultation, “Enquiry by Design” and the development / adoption / exercising of planning regulations, all seek to ensure the protection and enhancement of national park landscapes, representing the interests of wider public (environmental values), while accommodating stakeholder landscape aspirations (expressed primarily as social values). In Chagford, a protracted process of consultation and master-planning have resulted in a proposed housing development which compromises both these positions and instead promotes the private interests of the developers / landowner (economic values).
The masterplan sets a template for development which appears not to comply with park policy on affordable housing, exceeds the allocated site provision, and is laid out in a manner which can potentially be extended in future.

According to previous examples in the literature, such a proposal would typically be highly contested, and indeed the community has ‘been strong in its view that this opportunity should not compromise the very special character of the site and the village’ [33]. The catalyst for this major scheme was not developers, but the community, but paradoxically the community engagement process appears to have incrementally validated certain developer claims, “paving the way” for the acceptance of more landscape change than initially proposed. As a Senior Planner confirmed, the engagement process ‘took a long time, [but] what it did was gradually build confidence and establish principles to bring [the masterplan] forwards’ [23]. Although this Senior Planner reported the that the aim of the public engagement process was ‘to provide an opportunity’ for the local community ‘to influence emerging plans’ [35], in practice the consultation proved more of an “exercise” than a collaboration, as key principles, including limits to the scale of development and the provision of affordable housing, were not carried forward.

This highlights the problematic nature of conducting community engagement where complex stakeholder needs and agendas (including developers’ interests) are undertaken over a lengthy period of time and with an increasingly local focus, such that a gradual consensus, or sense of ‘the inevitable’, as a local architect commented [36], occurs surrounding development, whilst wider landscape impacts and concerns are marginalised, and the overall weighing up of benefits and dis-benefits is vulnerable to revision. As the architect commented, ‘there’s a disjunction between what people think they are going to get’ and what they do get when they’ve gone through such a consultation process [36]. This study of the Chagford masterplan certainly suggests the need for a better way of ensuring engagement results
in change where key landscape values are not compromised and where the aspirational may be more closely aligned with reality, particularly in landscapes as precious as our national parks.

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34. R. Franklin [Grainge Architects]. *RE: Chagford masterplan.* Personal e-mail to author. 5 Jun 2017.


Figure 1 Chagford, Devon, with masterplan site indicated.

Figure 2 Bellacouch Medoww looking north towards Bretteville Field. Photo by the author.

Figure 3 Birds-eye view of the proposed masterplan. Drawing courtesy of Grainge Architects.

Figure 4 Stages of planning and consultation activities, 1988 – 2014.
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<th>CHAGFORD MASTERPLAN</th>
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**DEVELOPMENT AREAS:**
- **Bretteville Field (0.47 Ha)**
- **Bellacouch Meadow (0.8 Ha)**

**PRODUCED BY**
1. separate developers
2. Chagford Design Group (3 self- appointed local officers including architects, Parish Councillors and business interests)
3. Parish Council
4. Chagford Design Group (13 self-appointed local reps including architects, Parish Councillors and business interests)

**DEVELOPMENT HISTORICAL SUMMARY**

**PROPOSED HOUSING**
- Twenty dwellings (2006)
- Affordable housing (young and elderly)
- Sheltered accommodation (care home)
- Variety of homes and tenures with a focus on elderly, young people and families
- Other housing, to include affordable to meet identified local needs

**PROPOSED INFRASTRUCTURE**
- Temporary car park
- Public car park
- Community facility
- Public car park
- Link road
- Coach parking
- Public car park
- Link road
- Coach parking
- Public car park
- Link road
- Coach parking

**PROPOSED GREEN INFRASTRUCTURE**
- Orchard
- Allotments
- ‘Green Finger’ amenity area
- Food design
- Landscape impact mitigation
- Area of recreational open space for community use
- Orchard view
- Integration of water production (ponds and allotments)
- High quality design
- Benchmark for NP development
- Improves views to the site
- Retains existing trees and bridges

**DESIGN VALUES**
- Good design
- Sustainable energy
- Landscape impact mitigation
- Sustainable energy
- Landscape impact mitigation
- Aesthetically pleasing
- Landscape impact mitigation
- Aesthetically pleasing
- Benchmark for NP development
- Improves views to the site
- Retains existing trees and bridges

**Figure 5** Summary of key consultation / planning stages.

**Figure 6** The adjoining sites. Source: Google Maps, with additions by the author.
Figure 7 Plan detail reproduced from Chagford Design Statement. Drawing courtesy of C. Park.

Figure 8 detail of the CHG2 allocation shown in the DMD (with the site indicated by grey cross hatching top right).
Figure 9 sketch plan from the Chagford Vision Report produced by the Princes Foundation.

Figure 10 the Chagford Masterplan, Submission Issue. Drawing courtesy of Grainge Architects.
Abstract
The use of visualisation in landscape planning is very common, however the contribution that visualisation can have for the creation of large-scale scenario studies is underestimated. In the Nature Outlook study several visualisation techniques were used; in participatory scenario building and to inspire stakeholders in thinking about the future of nature in Europe. Photos, icons, thematic maps, artist impressions, posters and films were created and used in different phases of the project. Interactive scenario workshops benefit from combined visualisation techniques, mobilising knowledge and expertise of the stakeholders. Visualisation helped to structure information and keep participants on track during discussions, and to inspire participants to create their preferred future. In dissemination, visualisation helped to explain future storylines in a compelling and attractive way.

Introduction
Scenario projects make the future tangible and provide inspiration for policy makers. In the Nature Outlook project (www.pbl.nl/natureoutlook) new ways of tackling the policy challenge, of halting biodiversity loss, are studied. The basic idea of the study is that taking the variety of people’s perspectives on nature into account, could increase their level of engagement as well as in businesses, and make nature policies more effective. For this study the researchers developed four main scenarios: four perspectives on the future of nature in Europe. Each perspective represents a characteristic way of thinking about nature and society. In the perspective named Strengthening Cultural Identity, people feel connected with nature and landscape, and consider this an integral part of their local and regional communities and as essential to a fulfilling life. In Allowing Nature to find its Way, people feel strongly about the great intrinsic value of both natural processes and species, and nature is defined by dynamic processes and should be left to its own devices. In Going with the Economic Flow, nature suits
people’s lifestyles, and businesses and citizens take the initiative in nature development. In *Working with Nature*, people try to use natural processes and strive for optimal, long-term delivery of ecosystem services, for the benefit of both society and the economy. The perspectives represent distinct visions about the future of nature, describing why people would want a particular type of nature in the future (2050), what this desired nature would look like, and how that vision could be realised (Zeijts van et al., 2017; Dammers et al., 2017).

Visualisation has played an important role in the development of the perspectives in the Nature Outlook study. During the preparation of the project the literature study has shown that visualisation techniques are often used to communicate scientific results for environmental planning purposes and for the development of nature and landscape policy. Visualisation is used to enhance the perception and understanding of scientific outcomes (Appleton and Lovett, 2003; Sheppard, 2005; Pettit et al., 2011) and bring large data sets to life. Moreover it is employed as a method to guide and structure discussions (Herzele and Woerkum, 2011) enabling people to become part of an interactive decision-making process (Stock et al., 2007), and has an important role as a communication and engagement medium (Wu et al., 2010; Drummond and French, 2008; Lange and Hehl-Lange, 2005; Harris, 1989). People can participate more effectively if information is presented both visually and verbally. It is known from experimental evidence that representational devices (e.g. text, diagrams or maps) can shape and channel social interaction (Herzele and Woerkum, 2011). However, the literature review has shown scarce examples of studies that use visualisation for scenario development, and mostly those were scenarios for small areas (for instance Celio et al., 2015; Tress and Tress, 2003; Michel et al., 2016; Larondelle et al., 2016).

This paper intends to inspire scenario makers to make more use of visualisation techniques
– and, vice versa, to challenge designers to get engaged in scenario making. To do so in chapter 2 we present the process of the development of the main storylines of the four perspectives and reflect on the contribution of combined visualisation techniques during the different stages of this development. Chapter 3 shows the visualisation techniques that have been used in the dissemination of results. Finally, in Chapter 4, lessons from the application of techniques in the Nature Outlook are drawn.

Role Of Visualisation In Development Of The Nature Outlook Perspectives

Perspectives were developed together with the stakeholders during three dialogues. Each dialogue had around 30 representatives from European environmental, research and economic sectors, representatives of European organisations involved in nature conservation, forestry, agriculture, hunting, health care and research (for dialogue reports, see www.pbl.nl/natureoutlook). The dialogues took place in Brussels, in 2014 and 2015. During the first dialogue, participants drafted four perspectives. These drafts subsequently were structured and elaborated in storylines by the project team and discussed further in the second dialogue. During the third dialogue, participants used the perspectives to discuss a range of nature-related societal issues. The project team used various sources to elaborate and further enhance the perspectives’ storylines.

Visualisation is used during the whole process and for each dialogue specific visualisations were prepared. Inspired by the examples in the literature study, we defined the overall goals of the visualisations in the Nature Outlook: to inspire the participants, stimulate and structure discussions, and to enhance mutual understanding of the storylines and their spatial consequences. Inventory of broadly used techniques was made and from there a selection was made so to use photos, maps, icons, artist impressions, posters and films. The selection of techniques was based on the needs and purposes
of the different stages of the project.

1. Use of visualisation during the first dialogue
During this dialogue the first prototypes of the perspectives for nature in 2050 were constructed. To generate a large number of guiding ideas for the perspectives, the participants were divided into groups of two or three persons. For this purpose photos of different landscapes were collected throughout Europe. The photos were representing the variety of European nature; and within those coastal, mountainous, urban, and river regions (Figure 1).

Each group of participants had a set of 100 photos from which they could choose and create collages on the empty posters, and describe in words and drawings their vision for nature (Figure 2). This process resulted in twelve guiding ideas such as ‘Sustainable Use of Nature as Conservation’, ‘Wilderness at the heart of society’, ‘Nature, business and innovation’, ‘Connectivity between all citizens and nature’, ‘Boxed Nature’ etc.

The twelve guiding ideas were clustered on the basis of their substantive consistency. This resulted in four combinations: ‘Nature as Foundation of Society’, ‘From the Past to the Future’, ‘Paradigm Shift’, and ‘Nightmare for Nature and People’. Finally, the participants were invited to elaborate the guiding ideas by generating ideas about the image of nature in 2050 and a potential pathway to achieve that image.

2. Use of visualisation during the second dialogue
Building on the first dialogue, this dialogue focused on working out the perspectives on nature. In elaborating the results of the first dialogue, by the Nature Outlook team, the names of the perspectives and some of their content was modified in order to make them more consistent and contrasting. This resulted in four perspectives: ‘Cultural Nature’, ‘Wild Nature’, ‘Boxed Nature’ and ‘Functional Nature’. 
The participants were asked to further elaborate the perspectives. This happened in four rounds in which the participants 1) added information, 2) made the perspectives more inspiring, 3) enhanced their relevance for policymaking and 4) made the advantages and disadvantages of the perspectives more explicit. In these rounds the participants added many relevant ideas. To support discussion, we used posters (Figure 3 and 4) displaying:
Maps of Europe showing main land use types: urban, agriculture, nature, water and infrastructure.
Thematic maps with the same land uses, but zoomed in to an imaginary region, in four types of landscape settings: natural, rural, urban and river area. As the input for these maps spatial characteristics of the perspectives were used, as summarised in the Table 1.
Icons printed on stickers showing functions and activities that can take place in these areas, grouped in five main categories: natural services, energy production, recreation, nature and built environment.

The maps on posters were meant to support the part of the discussion that was related to land use changes and other spatial effects of the perspectives and to stimulate participants to generate their own ideas about these effects. After the dialogue the maps were worked out by the team and the comments and ideas of the participants were taken over in both text describing perspectives and the new versions of the thematic maps.

3. Use of visualisation during the third dialogue
After the second dialogue the perspectives were elaborated by the team using the outcomes of the previous dialogue, additional interviews and literature review. Names of the perspectives were adapted to the latest content and matching icons were designed by PBL (final names and icons are shown in the Table 1).

This dialogue was the last in a series of three. It focused on deriving key messages related to nature policy and other policies from the perspectives. During these discussions, visualisation had an informative role. The posters were hanged on the
walls so that participants could read the summary of the perspectives text and see the photos and thematic maps that illustrate the main characteristics of the perspectives and their spatial impact on regional scale. Also, enlarged thematic maps were displayed on the walls and participants could use them to illustrate or support the discussion (Figure 5). Maps provided the starting point and the basis for creation of the final thematic maps, included in Dammers et al. pp. 57-58 (2017).

4. Evaluation of the use of visualisation in dialogues
Evaluation of the value of the visualisation in the three dialogues was done by analysing participants feedback given after the third dialogue and by participative observation of the team members during all three dialogues.

Participants liked the posters in general, but not everyone used them. According to them, the posters were well-illustrated and helpful, well-organised and clear. The posters gave them a good introduction, the information was used during the session. A critical remark was that posters gave the impression of putting things into separate boxes rather that illustrating connectedness. During the sessions it became clear that participants interpreted them in various ways.

The thematic maps were perceived as a very good idea and nicely presented, well-placed and organised together with the posters. However, they were not used enough; a participant mentioned that some training was needed for the efficient use of them. It was mentioned that groups with spatial planning experience made better use of them. Others mentioned that it was more like sim-city than reality, with an overload of detailed information. Participants said that there was not sufficient time for reflecting and to use and understand maps.

During the dialogues, members of the team were observing and making the notes of the way
participants used visual material. Photos were easily and readily used by all participants of the first dialogue. They were easy to understand and covered a great variety of examples of views on nature. With regard to the thematic maps, participants have added their sketches and comments to almost all maps, although not all groups used them in the same extent. Participants were given the opportunity to voluntarily use the maps the way they think is the best, which resulted in great variation of approaches and styles. The thematic maps seemed to be too abstract for the participants. EU maps were too detailed to be able to work with, and with too many icons. Nevertheless, they were used, but in a rough and sketchy way.

1. Discussion of evaluation results
We can conclude that the photos had a significant contribution in enhancing communication, structuring of the discussions in groups and were source of inspiration for the participants to actively take part in generating of their visions of nature. Although the team spent a lot of energy for creation of thematic maps and they were appreciated by majority of the participants, they were not used in expected extent during the three dialogues. Posters were useful as the source of information and as a reminder of main ideas of the perspectives.

For those who are using maps in similar projects, we can suggest several improvement strategies gained from this experience. To reach their full potential in interactive dialogues the goal of the use of maps has to be clear and simple. The method should be to be introduced beforehand, and the goals and potentials of the maps should be formulated and limited to a few expected results. As the complex visualisation techniques are known to require appropriate guidance (Sheppard, 2001), it is important that moderators are instructed on how to help participants to integrate the creation of maps in the other activities during the workshop. Also involving designers to help stakeholders, during the sessions, might help in this respect. A good
balance between giving participants the freedom of using visual material in their own way and at the same time structuring their task should be found. Before using the maps in the workshop it would be clever to test the material beforehand. Furthermore, thematic maps are abstract; maps with real-life cases (concrete regions) might work better, or, alternatively recognisable examples and references could be added to improve understanding.

**Visualisation Of The Final Results Of Nature Outlook Project**

After the dialogues were completed, the team started to finalise the study, producing main and background reports, website material and films. The intention was to combine text and visual material to present the study on clear, short, appealing, pleasant to read and at the same time scientifically sound way. The aim of the used material was to cover different spatial scale levels, from regional (thematic maps) to local level (photos and artist impressions).

Artist impressions were created for each perspective showing how an urban, rural, river and natural landscape could look like in that perspective. They compose the elements from the storylines translating them into realistic looking images of future landscapes with details such as flora and fauna, activities people do, type of housing, ways of energy production etc. Short films of 2.5 minutes were created for each perspective showing its essence, combining emotion and information. Starting with the personal view, films explain how the future could look like and what is needed to achieve that. Until now we observed that the films are a powerful tool to provoke debate during the presentations of the project. When watching the films, people think about which aspects of the perspectives they like and which of them they do not like. This stimulates discussion between people with different views, and can lead to better mutual understanding; and, possible, even to new coalitions.
In the final stage of the project thematic maps were finalised and got two tasks: to show the consequences of perspectives on landscape patterns and land use (Figure 9) and to illustrate how perspectives can be used for building joint visions among stakeholders (Figure 10). The descriptions and visualisations of the perspectives provided by the Nature Outlook can be used as material to create a joint vision by using *bricolage* (improvisation) technique. Inspired by the arts and design, four different methods of bricolage can be distinguished: making a pastiche, constructing a palette, fashioning a collage and creating an assemblage (for details see Chapter 10 in Dammers et al., 2017). Figure 10 shows how the Thematic maps can be employed to create joint visions using Palette and Assamblage techniques. Constructing a *palette* for instance refers to combining elements from different perspectives in a joint vision by allocating different land uses to *distinct sub-areas* which have no interrelations, while creating an *assemblage* refers to combining elements from different perspectives in a joint vision by allocating the different land uses to the *same sub-area*.

**Conclusions And Recommendations**

The Nature Outlook study has used different visualisation techniques to support and enhance stakeholders participation in the development of the perspectives and to present the results of the study in an understandable and appealing way. A combination of several techniques, namely photos, icons, thematic maps, artist impressions, posters and films were created and used in different phases of the project.

During the development of the four perspectives for the future of nature in Europe, visualisation was used in the three dialogues to inspire the participants, stimulate and structure discussions, and to enhance mutual understanding of the storylines and their spatial consequences. In the Nature Outlook, the easiest to use and the most appreciated visualisation technique were the photos. No surprise as photos illustrated concrete
and desirable sides of each perspective, such as new nature, improved environmental quality and ecosystem services. On the other hand, the participants used the thematic maps, but not as much as expected. This can be explained by the insufficient time for the instruction and clarity about the role of the maps in the process. Therefore suggestion is that if the maps are used for interactive workshops with non-professionals extra effort needs to be put in instructing the participants on how to use them. Informative posters with images and concise wordings, helped to structure the information for the participants and to keep them on track during discussions. Furthermore, visualisations were a powerful tool to inspire participants to create their preferred future. Finally we can say that our experience have shown that interactive scenario workshops certainly can benefit from combined visualisation techniques.

Visualisation in dissemination of results of the Nature Outlook project has two objectives. Firstly, to provide information on the results and how to use them; here, the thematic maps have been used to illustrate how to combine elements from the perspectives. Secondly, visualisations are used to tell the stories of the perspectives in other ways than in words. Information has been combined with emotion. Until now, from the reactions of the public during the several presentations of the project, it can be seen that the visual material is very much appreciated by the target groups. In particular the films have shown to be helpful in stimulating debate on the future of nature in Europe.

So far, visualisations have played a minor role in scenario studies. From our study we have experienced that they are very helpful in participative scenario building and have added value in the dissemination of the results of the Nature Outlook scenario study.
References


Zeijts, H. van, Prins, A., Dammers, D., Vonk, M.,
Strengthening Cultural Identity

Allowing Nature to Find its Way

Going with the Economic Flow

Working with Nature

<table>
<thead>
<tr>
<th>Natural areas</th>
<th>River areas</th>
<th>Rural areas</th>
<th>Urban areas</th>
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<tr>
<td>Infrastructure upgraded for water recreation with special care for cultural heritage</td>
<td>Rivers, lakes, wetlands and coasts have become more natural</td>
<td>Rivers are optimised for navigation, power generation and irrigation</td>
<td>Floodplains are being developed to serve as retention basin during peak flows</td>
</tr>
<tr>
<td>Introduction of landscape elements, maintenance of characteristic landscapes</td>
<td>Separation of farmland and nature network; abandoned farmland actively changed into wild nature</td>
<td>Homogenous production landscapes, dominated by intensive, large-scale farming</td>
<td>Agricultural landscapes designed to deliver services like pest control, pollination and erosion control</td>
</tr>
<tr>
<td>In and around cities many attractive and accessible green and blue spaces are found</td>
<td>Wild nature is penetrating the cities, corridors connect cities with nature areas</td>
<td>Large well-designed parks with restricted access; public parks are scarce and small</td>
<td>In and around cities many functional green and blue spaces are found</td>
</tr>
</tbody>
</table>

Table 1. Overview of the four perspectives on the future of nature in Europe

Figure 5. Posters and thematic maps displayed during the third dialogue

Figure 6. Examples of photos used when presenting the perspectives
Figure 7. Artist impression showing how landscape in urban, rural, river and natural area could look like from a Working with Nature perspective (designed for PBL by AENP Visuals).

Figure 8. Stills from videos all available on YouTube (produced for PBL by DPI Animation House).
Thematic maps showing changes in rural areas

Figure 9. Thematic maps showing changes in landscape patterns and land use in rural areas

Practicing bricolage

Figure 10. Practicing bricolage: thematic maps are used to illustrate Palette and Assemblage technique in forming joint visions
Abstract
The Bratislava Castle is one of the main historical and architectural monuments of Slovakia, listed as a national cultural monument since 1961. It was built on a hilltop above the Danube and has been the main landmark of Bratislava for centuries. In the 1760s, the castle was significantly rebuilt and extended under the supervision of F.A. Hillebrandt, chief architect of the Hungarian Royal Chamber of Construction. Among other extensive building operations within the castle complex, a riding hall, a winter garden and the terraced Baroque Castle Garden were built at the northern side of the palace. The castle complex was massively damaged during the Napoleonic Wars, an extensive fire in 1811 and the two world wars. The castle reconstruction to its 18th century appearance started in the 1950s and lasted till the 1980s, another reconstruction started in 2008. This included restoration of the Baroque Castle Garden based on historical documents and original plans from the 18th century, which started in 2014 and finished in 2016 and since then it has been open to the public. The whole process was accompanied by criticism from activists and the general public, mainly because of the underground garage below the garden and its assumed impact on archaeological findings. Later on, the reconstructed garden also reaped criticism for not being ‘green enough’, although the author of the garden design argues that the reconstruction faithfully followed historical documents and gave home to hundred linden trees and more than thousand other plants, which just need time to grow and more patient users. This paper will provide a historical review and an objective analysis of the garden creation (from design to implementation), in contrast to the public reaction (reflected mainly by mass media and social networks), while evaluating the main targets and reasons of public criticism.

Re-Creation of the Baroque Castle Garden in Bratislava / Reaction of the Public
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Keywords:
landscape architecture, garden design, baroque, reconstruction, restoration, public reaction, criticism, planting design
and architectural monuments of Slovakia, listed as a national cultural monument since 1961. It was built on a hilltop above the Danube and has been the main landmark of Bratislava for centuries. In the 1760s, the castle was significantly rebuilt and extended under the supervision of F.A. Hillebrandt, chief architect of the Hungarian Royal Chamber of Construction. Among other extensive building operations within the castle complex, a riding hall, a winter garden and the terraced Baroque Castle Garden were built at the northern side of the palace. The castle complex was massively damaged during the Napoleonic Wars, an extensive fire in 1811 and the two world wars. The castle reconstruction to its 18th century appearance started in the 1950s and lasted till the 1980s, another reconstruction started in 2008. This included restoration of the Baroque Castle Garden based on historical documents and original plans from the 18th century, which started in 2014 and finished in 2016 and since then it has been open to the public. The whole process was accompanied by criticism from activists and the general public, mainly because of the underground garage below the garden and its assumed impact on archaeological findings. Later on, the reconstructed garden also reaped criticism for not being ‘green enough’, although the author of the garden design argues that the reconstruction faithfully followed historical documents and gave home to hundred linden trees and more than thousand other plants, which just need time to grow and more patient users. This paper will provide a historical review and an objective analysis of the garden creation (from design to implementation), in contrast to the public reaction (reflected mainly by mass media and social networks), while evaluating the main targets and reasons of public criticism.

The original Castle Gardens - a historical review
The gardens of Bratislava Castle formed an organic part of the castle complex and were used as a representative space for garden celebrations, which was connected with the castle through a
The Castle Gardens are significant from the historical, artistic and architectural point of view and represent an important stage in the development of garden art [1], as they belong to the oldest garden designs of Slovakia [2]. Although no picture documentation of the gardens has been preserved from the medieval period, they are mentioned in written records of the magnificent castle reconstruction into a four-winged palace after 1423 [3]. The first reliable depiction of the garden layout dates back to the 2nd half of the 16th century. A wood engraving shows a terraced garden surrounded by walls. Presumably, it was used for wine growing since vineyards on the castle hill slope are marked identically [4]. Another preserved engraving from 1572 shows three parts of the enclosed Castle Gardens, sectioned by high pruned hedges. There was an open lawn without trees at the palace and regularly laid out trees and flower beds on the other two terraces. The castle hill was covered by vineyards with sparse occurrence of trees [5]. A plan from 1683 captures a garden consisting of ten beds and a ruin garden. The regular division indicates its Renaissance origin [4]. In the 1740s, the castle became the residence of Maria Theresa and the garden establishment works began right after her enthronement as the Hungarian Queen. There is evidence of two gardens adjacent to the palace from this time and their design is attributed to architect Anton Zinner [2, 3]. In 1751, Kaiser Franz I. (Maria Theresa’s husband), asked the Hungarian Chamber for establishing the Castle Gardens. Bratislava Castle became the seat of the Hungarian governor in 1766 and on the instruction of Maria Theresa further modifications of the palace and the castle complex were effected. In the period between 1778 and 1780, the garden on the northern side of the palace was extended based on the design by Franz Anton Hillebrandt (figure 1), which resulted in the creation of the great garden (Grand Jardin) in the baroque garden style (the Baroque Castle Garden) [5] (figure 3, left). The garden was symmetrical; its axis intersected the Salla Terrena, which was the highest point of the garden, built on the site
of a former garden pavilion. The sides of the garden diverged downwards (to north), in order to create an optical illusion of parallelism (figure 1, left). The garden layout was spectacular and representative, it consisted of four terraces connected by stairs. The ornamental planting consisted of pruned box trees, lawn and coloured sand. The garden was lined by pruned trees along the walls. The second terrace had a simpler composition. The core of the garden was the third terrace with two rectangular parts with identical internal structures. It ended in an octagonal fountain. The fourth terrace ended the gardens with a semicircle [2, 3].

On the eastern side, Hillebrandt designed a simpler small garden (Petit Jardin) (figure 1, left), which was established on the site of the original Renaissance garden and was not directly adjacent to the palace. The layout of this garden was axial, with four identical beds and a garden pavilion. The interior of the garden was complemented by sculptural works in the spirit of the baroque period. In 1781, Bratislava Castle became a Catholic seminary, which caused significant changes in the use of the gardens. These were gradually adapted to practical teaching of horticulture, fruit tree and wine growing [2, 3].

From 1802 to 1945, the castle complex served mainly military purposes. In 1811, a major fire turned the castle into ruins and severely damaged the gardens. In 1820, there was a fenced-in orchard with regularly planted (8x13) trees on the site of the Great Garden. The Small Garden had preserved its original layout. It was surrounded by trees, which here and there occurred also in the beds. In the middle of the garden, there was a viewing pavilion. The older pavilion had been drawn on its original site [4].

A more detailed plan of the Baroque Castle Garden dates back to 1856. The regular beds on the northern terrace had the original baroque layout. The original axis had been preserved, but it divided the garden into two uneven parts. A cadastral map from 1894/95 records the garden in sufficient detail and provides evidence of vegetable plots in Grand Jardin [3].
The castle complex was again massively damaged during the two world wars. The castle reconstruction to its 18th century appearance started in the 1950s and lasted till the 1980s. During the past century, several adjustments were made to improve the semi-natural environment in the castle premises. However, none of them had the ambition of a historical reconstruction. In the 1950s and 60s, an open air theatre was situated on the northern terrace (on the site of the former Grand Jardin), which was removed in the 1970s and replaced by an extensive lawn. Gradually, thanks to the presence of old preserved 19th-century trees; the area acquired a landscape park composition. The decision to reconstruct the exteriors of the castle was influenced by the inconformity of plantings and the absence of professional maintenance (figure 5, left). Plantings were infested with weeds and spontaneous vegetation. The complex reconstruction of the castle palace started in 2008 and the reconstruction of its gardens in 2014.

**Reconstruction design of the Baroque Castle Garden**

Restoration of historical green spaces is an important issue in contemporary Slovak landscape architecture [6]. Many historical green spaces have already been restored in the previous decades, but the Castle Garden, being perhaps one of the most important garden heritage sites in Slovakia, had to wait for its reconstruction till 2014 when the works started. The reconstruction had two main aims - 1) to create representative exteriors at the Bratislava Castle and 2) to reconstruct the historical composition of the space from the period of the Hapsburgs [7]. The knowledge of the original garden composition and its layout gained from a comprehensive archive research and review of preserved historical documents has been extended by archaeological research and historical survey conducted from 2009 to 2014 [7]. The existing green spaces and woody vegetation (trees and shrubs) were inventoried, documented and evaluated in 2009. The design
concept builds upon available period plans, the findings of the archaeological and architectural research and appropriate analogies. It aims to emphasise colour, water, art elements and the overall atmosphere and emotions of a baroque garden [8]. The Monuments Board of the Slovak Republic regulated the reconstruction design, so that the garden would be fenced with a plastered wall with pilasters, architectural features and artistic decoration, in accordance with the original design. The ground plan of the garden is axially symmetrical. At the top of the garden, there is the reconstructed baroque pavilion (originally orangery or ball games hall). The axial symmetry is slightly disrupted due to specific local spatial patterns, as it was in the original gardens. The garden has one central longitudinal path and two perpendicular ones. The terraces have supporting walls and are connected by stairs and ramps. The original gardens were only accessible from the palace through the winter riding hall and the orangery and the wall served to separate them from the utility parts of the castle complex. The reconstructed gardens are accessible also from the surrounding areas by openings in the wall, which connect to the transverse garden paths. The surface of the relatively wide garden paths is made of rolled fine crushed stone. In summer, they are lined by small pruned trees in mobile containers along both sides. The other surfaces are made of geometric green spaces with pruned shrubs and flower beds. There is a fountain in the centre and many baroque sculptures, which underline the historical atmosphere of the garden space [8]. Outside of the wall, there are tree plantings, which are supposed to compositionally enhance the interior symmetry of the garden. The three-lined alley between the garden and the wall is a characteristic feature of historical gardens. In this context, it creates a contrast to the Baroque Castle Garden, while offering the possibility of resting in a quiet, shaded green space. The most impressive plantings are located on the northern terrace, under the riding hall. It is a characteristic terraced baroque garden with a strictly regular composition, typical for royal gardens of the 18th
In addition to the Baroque Castle Garden, there are lawns with high solitary trees, which correspond to the palace and other buildings of the castle complex with their substance. The Baroque Castle Garden, being partly on the roof of underground garages, is constructed as a roof garden. Its composition is based on a system of regularly shaped hedges, which organise the garden space into subspaces. The inner areas of pruned hedges (bosquets) are covered by lawns and rich floral plantings. Hedges are made of different plants, according to their final size - the lowest embroideries and the medium hedgerows are created from *Buxus sempervirens* L. and *B. sempervirens ‘Sufruticosa’*. The higher hedgerow under the second terrace is created from *Taxus baccata* L. and high hedges along the walls from *Acer campestre* L. The tree plantings in the historical pattern are created from cultivars of *Tilia tomentosa* Moench with a compact spherical crown. It is planted directly into the water-bound surface of the paths, in order to achieve a visual unification. The view is ended by *Aesculus x carnea* in the northern arch of the castle wall.

The first parterre is connected to the orangery. Ornamental beds are complemented with surfaces of decorative red and white gravel. Flower plantings are annual, perennial and combinations of bulbs and biennial plants. In addition to the castle wall, fruit trees (apples, pears and vine) and climbing woody plants (clematis and rose) are planted next to wooden treillages. On the first terrace, subtle forms of Mediterranean woody plant species (*Ficus carica* L., *Nerium oleander* L., *Laurus nobilis* L. *Punica granatum* L. and *Citrus* sp.) are planted in 44 period white mobile containers [8].

Along the western wall and in other parts of the garden, there are open lawns with a minimal number of trees, in order to emphasise the former defence character of the castle complex. There is a stylised orchard behind the western castle wall represented by regular plantings of ornamental fruit trees - *Pyrus calleryana ‘Chanticleer’, Malus x ‘Golden Hornet’* and *Prunus x gondouinii ‘Schnee’*
(figure 3, right). It is a reminiscence of the former orchard behind the castle walls. Along the eastern wall, the new alley planting of *Acer campestre* ‘Elsrijk’ with a compact crown has been chosen to prevent crowns from occupying too much of the garden interior. The wall will be gradually covered with *Parthenocissus tricuspidata* ‘Weitchii’ for its vivid summer and colourful autumn aspect. Other green spaces, including the area covering the Roman excavations, are covered by lawn.

This extraordinary restoration project is an accurate historical reconstruction of one of the most important historical gardens of Slovakia. It faithfully followed the available historical documents and tried to recreate the baroque style garden as precisely as possible. The reconstruction design is spatially accurate. Exact positions, lines and shapes were geodetically defined on site. Reasonably, several compromises had to be made to address the needs of current users and acknowledge the existence of contemporarily available materials and solutions that are more cost efficient and less demanding on management than the historical ones, such as shaped cultivars of trees instead of original species requiring regular pruning; perennials complementing annual flowers; metal kerbs instead of wooden ones; automatic watering system instead of manual watering; barrier-free accessibility and the openings (entrances) in the walls. All these compromises followed the overall aim to create a functioning contemporary space for present users and not just an open-air museum.

The reconstruction received many critiques from the public through social media and online discussions. During the reconstruction process (figure 5, middle), a group of activists and a certain part of the public assumed that the underground garages and the garden above them will destroy valuable archaeological findings from the Celtic and Roman period. This presumption was not based on objective archaeological facts, but on mere subjective, in many cases even exaggerated presumptions, supported by a series of hoax extended through
online discussions. Critics of the reconstruction assumed that the garages and the garden will completely erase the ancient excavations. They did not comprehensively study the design concept and expert reports and failed to realise the multi-layer and multi-functional character of the reconstruction design. After the garden reconstruction had been finished (figure 5, right), the garden was criticised for an alleged disproportion between artificial elements (stairs, paths and statues) and green elements (trees, lawns and flower beds) as perceived by some people. This criticism was presumably caused by the lack of public debates and insufficient communication from the investor towards the public, in which experts working on the reconstruction – archaeologists, architects, landscape architects and other professionals – could have argued for their approach. The archaeological findings have been preserved and are now represented to the public on site, while the natural elements of the garden just need time to grow and gain on volumes [8]. More than 100 trees and more than 1,000 herbaceous plants will make the garden appear greener and greener with time. Considering the garden design, neither the history of the garden, nor the aim of a faithful period style reconstruction was well communicated towards the public, which led to a series of misunderstandings by many people. This was also widely supported by some online news and social media debaters. The concept of a garden is by many people interpreted very conventionally as only green surfaces with large trees, i.e. garden = green and nothing else. They tend not to show understanding for stones, gravel, exotic container trees and statues which have a period significance in baroque gardens. Nonetheless, since its opening in May 2016, the garden has become a well visited landscape architectural artwork and a valuable part of the castle complex. It can be assumed that the ideal state of the garden will be fully achieved within 3 to 5 years after its opening to the public [7]. Many people still see the ‘white’ in the garden (crushed stone surfaces, statues, stairs), but the author of the reconstruction design (co-author of this
paper) – Eva Wernerová – already sees the ‘green’
trees, hedges, green treillages, flower beds) in her design vision and imagination [8].

References

Figure 1. The ground plan (left) and an axonometric view (right) of the original 18th-century Baroque Castle Garden (Grand Jardin) to the north of the palace [1, 4], compilation by the authors.
Figure 2. Visualisation of the reconstruction design [7].

Figure 3. Comparison of the original Baroque Castle Garden design (left) and the contemporary reconstruction design (right) [5, 7], compilation by the authors.

Figure 4. The reconstructed Baroque Castle Garden is now open to the public and has become a well visited attraction of the Slovak capital [9, 10], compilation by the authors.

Figure 5. The reconstruction process documented by satellite images – the state before the reconstruction in 2004 (left), during the archaeological research and realisation in 2009 (middle) and after the reconstruction in 2017 (right), source of satellite images: Google Earth Pro, compilation by the authors.
Abstract
Like Newton’s Third Law, the creation of any new landscape generates reactions, positive or negative, immediate or thereafter. Present needs are more easily predicted than those of the future however, and use, regard, and levels of care all change with time and ownership. Landscape architects undertake each project with the best of intentions, attempting to address the full range of concerns needed to create an ideal design. In response, most new works are welcomed with enthusiasm; others, however, perhaps those strange in form or material, may be unappreciated by their audiences, setting in motion public reactions. Even the best landscape designs, even those deemed successful at the time of their making, may be poorly treated, allowed to decay, and demolished within a relatively short period of time.

This paper examines the aftermath of four lauded landscape designs, each affected by conditions that could not have been predicted by their designers. The formal exuberance of George Hargreaves’s 1984 Harlequin Plaza in Colorado disappeared in less than a decade, replaced by a banal substitute. Dan Kiley’s stunning 1989 NCNB Bank Plaza fell into ruin stemming from a owner/city disputes over maintenance responsibility. The hemispherical earthen forms of Peter Walker’s 2008 Children’s Park in San Diego fell victim to political decisions and the police call for clear surveillance. Left untended, Georges Descombes’s 1991 Voie suisse has been subsumed by the vegetation of its setting; even its striking belvedere of metal mesh was left to rust and ultimately removed.

These projects were in no way failures when tested against their original briefs, and their decline in no way reflects on the quality of their design or their social performance. Instead, they show that without maintenance, with changes in governance or social policies, any landscape can fall victim to decay and disappearance.
Aftermath: Landscape Creation and Its Reactions

Like Newton’s Third Law, the creation of any new landscape generates reactions, positive or negative, immediate or thereafter. Present needs are more easily predicted than those of the future however, and use, regard, and levels of care all change with time and ownership. Landscape architects undertake each project with the best of intentions and attempt to address the full range of concerns needed to create an ideal design. In response, most new works are welcomed with enthusiasm; others, however, perhaps those strange in form or material, may be unappreciated by their audiences, setting in motion public reactions that in time may undermine their integrity or perhaps their very existence. Sadly, even the best landscape designs, even those deemed successful at the time of their making, may be poorly treated, allowed to decay, and demolished within a relatively short period of time.

This paper examines the aftermath of four lauded landscapes, each affected by conditions that could not have been predicted by their designers. The formal exuberance of George Hargreaves’s 1984 Harlequin Plaza in Colorado disappeared in less than a decade, replaced by a series of banal substitutes. Dan Kiley’s stunning 1988 NCNB Bank Plaza fell into ruin stemming from a owner/city dispute over the responsibility for its maintenance. The hemispherical earthen forms of Peter Walker’s 1996 Children’s Park in San Diego fell victim to social issues, political decisions, and the police call for clear surveillance. Left untended, Georges Descombes’s 1991 *Voie suisse* has been subsumed by the vegetation of its setting and natural forces; even its striking belvedere of metal mesh was left to rust and ultimately removed. These projects were in no way failures when tested against their original briefs, and their decline in no way reflects the quality of their design or their social performance. Instead, they show that without maintenance, with changes in governance or social policies any landscape can
fall victim to decay and disappearance.

Many of the world’s most significant landscapes were instigated by a strong political or sacral force. Whether a king, a dictator, a mayor, or a citizens’ action group, individuals acting alone, or in concert, pressure for the making and shape of the new landscape—and for its continued existence. That so many of the great eighteenth-century estates of England have been subdivided or disappeared completely testifies to the need for continued stewardship and funding. Others great landscapes such as Versailles or Sceaux, may be sustained by the state as historical documents or converted to popular uses such as sports fields or rowing courses. Repeated time and time again throughout history, this is a story well known. The question is whether in the end, the landscape architect can truly design for a future in which the social, economic, and political conditions are to some degree unpredictable, and how these may affect the design. Spoiler alert: I see no way in which he or she can.

**Harlequin Plaza, Inglewood, Colorado, 1984**

Harlequin Plaza, a landmark office landscape, was the early poster child for postmodern landscape architecture [figure 1]. To those who had suffered under the analytical design methods that had gripped the American landscape profession since the late 1960s, this innovative project by George Hargreaves signaled a new formal vocabulary filled with freedom and joy, and a return to landscape design as a creative enterprise. The site in Inglewood, Colorado—a suburb of Denver—was completely unremarkable: a basically flat terrain subdivided into tenant parcels; in all, an office park typical of its times. Two office blocks sheathed in black glass, completely inert and unrelated to any context, define the plaza between them. Parking was situated to the rear of both buildings. A curving retention pond greeted office workers on the way to and from their offices in the southern block. The planting, which relied on local species such as birch, was naturalistic and unremarkable. Like the oyster, the pearl was invisible from the...
The architecture, by Gensler + Associates, was hardly welcoming in itself. Its curtain wall, awash in a world of reflections that concealed the interior spaces, provided no hint of the buildings’ scale. The landscape architects, SWA, with George Hargreaves as lead designer, were commissioned after the site plan and design of the buildings had been determined [1]. The plaza of about half a hectare roofed a parking garage whose structural system was insufficient to support any major construction except along its midpoint. Therefore, any major architectural elements would need to be concentrated along that line, leaving the areas on either side relatively free of major loads. In response, the landscape architects proposed a walled planted zone down the center of the site, with passage between the two sides restricted to limited points.

The visual effect of entering the plaza came almost as if the explosion of an artillery shell. The ground plane was paved in a distorted grid of black and white parallelograms, some four feet in width, whose impact was both energizing and disorienting. The feeling induced a state of at least mild vertigo—and intrigue. Two parallel walls contained a planting bed between them and concealed the exhaust ducts from the garage below. On one side their alignment aimed at the Rocky Mountains in the distance. The brilliant colors of the wall echoed the architecture of the Mexican architect Luis Barragán, while the total effect of the plaza recalled the haunting spaces, sense of void, and melancholy of the ‘metaphysical’ paintings by Giorgio de Chirico [2].

Despite the innovation and the attention the landscape design first received, within ten years Harlequin Plaza had been dismantled and replaced by a project designed by EDAW that completely erased the spectacle of the original design [3]. A further renovation in 2007, executed by Consilium Design, was intended to make the plaza more ‘usable’ [4]. It is today sedate, retaining some of the original checkerboard
motif (if executed in different materials), and the original metal harlequin sculptures from which the plaza received its name. The show is over.

Harlequin Plaza was a product of the spectacle characteristic of the 1980s and the demand for instant landscapes. It was also an bold attempt to break beyond the confines of normal practice, to create a plaza that would stun and possibly inspire. It was fresh, bold, and soon out of fashion. Rejecting the extremes of our youth, in later years and middle age we become more conservative. The subsequent renovations of the plaza became less and less of their moment and more and more ordinary and unremarkable. It has been said—was it Charles Baudelaire?—that ‘the most up to date, is the soonest out of date.’ Regardless of who said it, in this case the adage is particularly apt. There was little chance that Harlequin Plaza could survive the years it was out of fashion and to thrive again in a classic phase. Especially in the competitive market of office parks.

NCNB Bank Plaza, Tampa, Florida, 1988

If the Harlequin Plaza represented innovation by borrowing from modern painting, Daniel Urban Kiley’s 1988 NCNB Bank Plaza in Tampa, Florida, achieved elegance and beauty from a modernist reinvigoration of classic and Spanish precedents. Although Kiley’s earliest projects incorporated a number of modern shapes, his encounter with the work of André le Nôtre through military service in WW II led to his discovery of the beauty of order and its ability to structure—and humanize—space [5]. In the classical allée and bosk he found the means to configure the landscape and modulate its space and scale; yet in his designs he adapted rather than adopted those historical forms.

The four-and-a-half acre (approximately two-hectare) NCNB landscape was built on the roof of a parking garage and stands a full floor above street level. In designing the bank’s 33-story tower and banking facility architect Harry Wolf relied on the Fibonacci series, the mathematical progression in which the sum of the two prior numbers yields the next number in the series.
Kiley applied the Fibonacci progression into the terrace landscape, using it to determine the proportional interweave of zoysia grass with slabs of concrete paving [6].

The Kiley terrace interlaced water, paving, ground cover, flowering shrubs, and trees, using their heights and formal properties to create a richly patterned spatial tapestry [figure 2]. The glass roof of the garage served as a canal from which a number of narrow rills that pierced grass and paving, and terminated in round basins with bubblers that recalled those at the Alhambra’s Court of the Myrtles. While there is little question of the terrace’s modernity, a suggestion of historical precedent remained, however softly.

Upon that “bed of precision,” as Kiley termed it, a grid of sabal palm trees provided the garden terrace’s spatial superstructure [7]. With trunks tall in relation to their diameters, palm trees were an appropriate choice, especially since they bend, rather than break in high wind, and have root balls that remain quite small. Key to the terrace’s spatial composition was a middle “story” composed of crape myrtles (Lagerstroemia), whose spacing was based on the same Fibonacci progression. The play between these lower, dense, more natural-looking plantations, and the upper one—taller and more regular—yielded a landscape of structural and spatial complexity. The effect was brilliant, the garden beautiful; it would not last.

The original agreement stated that the bank would construct the terrace but that the city would maintain it thereafter. The city did not. Left untended and unrepaired the NCNB Plaza withered and became quasi-derelict [8]. The trees, especially the crape myrtles thrived, and without due restraint, their roots buckled the paving, cracked the roofing, promoting water infiltration into the garage below. In spring 2006, the crape myrtles were completely removed [9]. A major “restoration” took place in 2010 under the direction of landscape architect Ron Sill: the paving and grass panels were renewed and...
repairs to the garage roof implemented. While the original sabal palms had survived, the crape myrtles—a critical element of the design—were not replanted due to budget limitations [10]. Out of respect and the national attention the project had received in professional quarters, the terrace was renamed Kiley Garden. Today, the site is only a shadow of its original, but has nonetheless become popular as a ceremonial site, especially for weddings.

**Children’s Park, San Diego, California, 1996**
The renewal of the surrounding’s of San Diego’s convention center included a series of new landscapes implemented in 1996. The redevelopment, instigated to some degree by the arrival of the Republican National Convention in the summer of that year, centered on the landscape for a new tramway along Harbor Drive that followed the edge of the bay. A new children’s museum, designed by San Diego architect Rob Quigley, was proposed as an invigorating element of the project over the long term, although it would not be constructed until a decade later [11]. Peter Walker Partners won an invited competition to design the tramway landscape, known today as the Martin Luther King, Jr. Promenade, as well as a park to its north. Fronting the convention center a shallow circular pond conjoined the planting on either side of the tracks and linked them to the new Children’s Park.

The Walker scheme featured a grid of grassed hemispherical mounds, set in a geometric composition typical of the landscape architect’s manner at that time [figure 3]. Pine trees, irregularly planted, increased the spatial definition begun on the ground plane [12]. Seating units of blue-painted concrete block read as lines inserted into each of the hills, lines conceived with a nod to the vocabulary of minimalist art. Buffering the park from the adjacent street was a curving allée of Italian cypress topped to form a tall dense hedge. At first, the scheme was well received, lauded as a design that spanned art and landscape
architecture, and won several awards. Then social issues arose, and over time, appreciation turned to derision. While no fault of the landscape’s design—which had successfully addressed its original brief—Children’s Park soon became a home for the homeless and an unattractive place for other segments of the downtown population, especially for young for children.

By 2006 pressure to modify the park’s design was already afoot, and in 2011 only the lack of funding prevented the implementation of revisions by the Schmidt Design Group [13]. It took additional five years, but in 2016 the Children’s Park was renovated: the mounds were removed in all but the four corners of the site, leaving a pattern of circles and independent concrete block seats on land now essentially rendered flat [14]. The reason? To facilitate the surveillance of the homeless who used the park as their habitat [15]. The intention—not uncommon in American cities—was for the landscape to become ‘visually porous,’ that is to say, easily observable from the sidewalk or from a police patrol car. Peter Walker himself was sympathetic to the issues, although he stated that he never understood why the site was called Children’s Park as children were never part of the park’s original brief. The landscape, in fact, was primarily a set piece for the convention center, almost in the manner of a three dimensional, shaded parterre. No playground was called for in the brief [16]. Through the renovation, what had once been an intricate formal essay was reduced to a mere schematic vestige of its former state—not because of any fault in the design in relation to its original brief, but because the demands on the landscape, in this case social demands, had changed. Perhaps certain issues could have been addressed through management and increased police surveillance, but the central location of the park certainly contributed to its adoption by the homeless and thus its eventual demise.

*Voie suisse, Brunnen, Switzerland, 1991*

In contrast to the three landscapes discussed above, the *Voie suisse* (Swiss Path) was intended
from its origins to be ephemeral, to exist as an identifiable landscape for only two years [17]. Created as a segment of a greater effort to commemorate the 800th anniversary of the founding of the Swiss Confederation, the project—designed by Georges Descombes—turned to the renovation and intensification of the landscape as the commemorative “monument” for the segment of the lakeside path assigned to the Canton of Geneva. Descombes noted that the design approach was ‘to use a broom,’ that is to reveal what had become hidden or overgrown over time, or to replace features that had been lost. The path and elements of a Napoleonic road were uncovered and restored, drainage channels to thwart erosion installed where necessary, road edges replaced and marked, and certain slopes terraced and reinforced [figure 4]. The artist Carmen Perrin, working with a team of art students, scraped away centuries of dirt and moss that had concealed the erratic boulders carried by glaciers far beyond their normal points of deposit. Now a gleaming white, they stood out as sculptural objects within the forest. Native wildflowers were periodically planted twenty meters to either side of the path, reinforcing the existing vegetation. In all, the act of commemoration was enacted by directing visitors not to some architectural construction, but to that which is essentially Swiss: the Swiss landscape itself.

Although it took more than two years to retreat, the identity of the Voie suisse dissipated, as was predicted, with time. Moss retook the boulders; dirt now hides the precision of the road edges; even the cylindrical belvedere structure, constructed of two layers of wire mesh, succumbed to the elements and lack of maintenance. One may still walk the path of course, but the aesthetic impact of the designed project has softened with time. Fair enough given its original charge of being a temporary landscape, yet still disappointing considering what has been lost, and what could have been preserved with relatively little maintenance and expenditure of funds had the canton so desired.
In Conclusion

It is only very rarely that a landscape can exist without continued maintenance, even if designed to require minimal maintenance. These four landscapes demonstrate that changes in ownership, changes in social values, and changes in aesthetic tastes all affect not only the original form of the design but also limit its lifespan. Of all the landscape types, it is the cemetery which tends to be possess the longest life, perhaps because it is a landscape intended to be eternal. Yet even the cemetery may fall before natural forces and urban development. It is said that nothing last forever, an adage especially applicable to the designed landscape. Yet in the best instances, with good initial construction and materials, continued maintenance, renovation, the great design may endure and even thrive despite changed conditions. But it won’t be easy.

6.1. Treib #1, Kiley, Dan, NCNB Bank Plaza, Tampa, Florida, 1989

6.2. Treib #2, Kiley, Dan, NCNB Bank Plaza, Tampa, Florida, 1989
6.3. Treib #3, Walker, Peter, Children’s Park, San Diego, California, 2008

Abstract
Responsible landscape practices will be adopted at broad scale only resentfully through legislation, or more happily, from the public’s acceptance of landscapes it deems attractive. The resistance to responsible landscape design derives in part from the confusion of aesthetics with ethics, i.e., equating moral values with beauty. Elizabeth Meyer, for example, has claimed that the “particular beauty” of one landscape was “found in the re-use of tons of on-site demolition rubble” [1]. Beauty doesn’t automatically derive from using recycled materials, but from its form and disposition. Philosophers of “contextual beauty” claim that our appreciation of a flower will disappear should we learn that the species is invasive: this is an ethical assessment probably of little influence on no one but the specialist [2].

Confusing ethics with aesthetics muddies the pursuit of a beautiful expression for sustainable landscapes. A landscape must do more than perform responsibly or use recycled materials if it aspires to achieve an attractiveness appreciated by a major segment of the population. Beauty does not result from ethics, but instead from a skilful interweaving of form, space, proportion, light, and color, the embrace of seasonal change, growth, a knowledge of vegetation, and a host of other natural processes. Stressing performance alone abrogates the landscape architect’s responsibility to truly design landscapes.

Among the possible vehicles is Joan Nassauer’s “messy ecosystems” structured by an “orderly” frame [3]. However, the Japanese practice of mixed formalities, shin-gyo-so (formal, semi-formal, informal), offers a more advanced aesthetic for sustainable landscapes [4]. In Japan these modes are not juxtaposed, but in which ordered forms are mixed and embedded with those more natural. The application of these principles to the design of sustainable landscape promises works of intricate beauty. Having high morals is laudable yet insufficient; one must learn a language in order to write poetry.
Notes [Abstract]

Ethics ≠ Aesthetics; Beauty and Responsibility
Responsible landscape design practices will be adopted at broad scale only resentfully by legislation, or more happily from the public’s acceptance of landscapes it deems attractive. Experience and history have shown that changes in taste and acceptance result only gradually, however, and that any proposed changes must be regarded as beneficial to the individual as well as society. Sadly, to date, continued arguments and proposals for a sustainable aesthetic by a select group of academics and professionals have been unconvincing, with limited influence even within the landscape architecture profession itself. A significant stumbling block resides in the confusion of aesthetics with ethics, a confusion that equates moral values with beauty. In reality, however, ethics and aesthetics reside in separate camps standing at considerable distance from one another. In her article “Sustaining Beauty: The Performance of Appearance,” Elizabeth Meyer claims that the “particular beauty” of an urban landscape by her University of Virginia colleague Julie Bargman “is found in the re-use of tons on on-site demolition rubble” [1]. I would dispute that claim however, and argue that it is not the use of recycled material from which beauty automatically derives, but from the shape and disposition of the material in its
new configuration—which may be experienced as ugly or beautiful depending. In a 2016 article published in *Landscape Research*, Susan Herrington identified—but not necessarily embraced—three concepts of beauty current in discussions by aestheticians [2]. One of these, contextual beauty, asserts that our pleasure and appreciation for a flower we find beautiful for its form or color will dissipate—or disappear completely—should we learn that the species is invasive. I do not believe this to be true for any but the most avid botanist or native plant enthusiast, however. For most of us the admiration of the flower’s beauty will remain, although we may chose not to continue planting this species if we consider the threatening ecological consequences. The immediately loss of appreciation for the flower is an ethical assessment that probably would have little influence on the pleasure of the non-specialist.

This confusion of ethics with aesthetics muddies the pursuit of a suitable, hopefully beautiful, expression for sustainable landscapes. A landscape must do more than perform responsibly, or use recycled materials, if it aspires to achieve a state of attractiveness or its embrace by more than a small segment of the population. Beauty, to my mind, does not result from ethics, but instead from a skilful interweaving of form, space, proportion, light, and color, paired with the embrace of seasonal change, growth, a knowledgeable selection of vegetation, and a host of other natural processes that will guide the evolution of the new landscape. Stressing performance alone abrogates the landscape architect’s responsibility to truly design landscapes. A functional stance assumes that if the landscape performs well or uses the correct species it will be deemed beautiful. However, declaring that we need 10,000 new trees to combat air pollution, or the heat island effect, says nothing of which species of trees should be used or how they should be disposed—the qualities from which beauty derives. Sustainability is a functional measure not an aesthetic property.
Some believe that it is through the widespread appreciation of a landscape that its endurance is assured [3]. This appreciation may derive from differing factors. Perhaps a significant historical event occurred on the site, an event that should be commemorated in some way. Perhaps the site is the sole remaining landscape to support a certain species, like the Joshua Tree in the southern California desert [4]. Or perhaps it is a site deemed critical for maintaining a balance within a greater ecosystem. Acceptance for the first two reasons is more easily won than for the third, whose immediate value is less apparent. We may then ask: Is there some way that we can enfold the ethical and environmental issues of the third category with the appreciation more easily secured for the first two?

We have already legislated the establishment of protected landscapes regarded by the public to be of great scenic value. In England, the Peak District has been legally established as a national park although, in fact, existing villages and farmland are included within its boundaries [5]. Japan has nominated sites considered to be of outstanding scenic value, and of course the United States national park system is more than a century old. Forces must be garnered for the nomination and election of these places. And a key ingredient of any such declaration is beauty.

Admittedly, there are no universal standards for beauty held by all peoples in all places at all times; universality exists only perhaps as an aspiration. History has shown that the appreciation of a particular form or color or space varies with location and time, and that what might be held as beautiful by one group of people can appear as ugly to another. Consider the term Gothic, originally a term of derision by Renaissance humanists who had rediscovered classical aesthetics of order, proportion, and the architecture of ancient Greece and Rome. Today, it is primarily an art historical categorization free of any negative connotation. Early Western visitors to Japan were mystified by the reduced
vocabulary of the elements in the country’s dry gardens; little within their earthen walls suggested the coeval floral abundance of Victorian gardens in England and America. They were termed “curious” rather than beautiful and a broader appreciation of their “peculiar” aesthetics came only after decades of exposure, experience, and education.

Beauty is more than places pretty to the eye. While Immanuel Kant defined beauty as a surplus quality derived from disinterest, and suggested that only objects or situations removed from use could be called beautiful, over time, scholars have disputed Kant’s definition [6]. And even if his definition remained true for art, it seems inapplicable to architecture and landscape architecture, where function is an inherent aspect of the work. While I must leave the final word to philosophers and art historians, to me beauty involves a pleasure or inspiration derived from spaces and forms, perhaps supported by light, thermal properties, color, fragrance, and other factors. However, my mention of the word beauty is intended primarily to encourage design professionals to seek a level of quality surpassing mere function—that is to say, satisfying function is only a base camp in the quest for a mountain summit of beauty. The American photographer Edward Weston once wrote: “Do not photograph for what it is, but for what else it is” [7]. That something else is the elusive quality to be sought, whether beauty, or some other word is used to describe it.

In the mid-eighteenth century, the British philosopher Edmund Burke proposed two distinct appreciative categories: the beautiful and the sublime [8]. Things of beauty, he believed, please the senses, perhaps comforting us, perhaps even edifying us. The sublime, in contrast, stands beyond immediate human comprehension; it is often characterized by an immensity of scale and a sense of the unknown that may instill in us a sense of mild awe or even terror. However, at the century’s end, and into the decades that followed, landscape philosophers such as Richard
Payne Knight and Uvedale Price confronted the landscapes characteristic of Capability Brown by proposing a third category: the picturesque [9]. The derivation of that word, of course, related to subjects worthy of being portrayed in paintings, but when enacted in the landscape the term took a different, more particular turn. Now the roughness of the overgrown or incomplete subjects of the picturesque replaced the smooth and pleasant surfaces of the grassed meadow or mound, or the composed clumps of trees characteristic of the Brownian landscape. With properties such as these, picturesque subjects were deemed more likely to instigate a deeper engagement with the landscape and perhaps induce contemplation. Seeing imperfection as worthy of note, the picturesque was, without doubt, also the product of a Romantic age.

Of course, a beautiful landscape is not the only course for the appreciation of a sustainable landscape. The fear of natural disaster might also have a powerful effect. But in this paper I will look only at beauty. One of the key elements, as several authors have noted, is the question of perceived intention. The viewer must read and understand in some way that a landscape that departs from an established norm must “argue” that there is an intention behind the new look that it is not the product of neglect. Egoz, Bowring, and Perkins have described how farmers in New Zealand have had difficulty in accepting organic farming practices which, among other environmental benefits, support resident bird populations [10]. The uncut hedgerows and shrubbery that provide better avian habitat counter the established practice of neatly clipped shrubbery as a sign of caring. How can the ethics of sustainable practice be reconciled with divergent aesthetics? And can they be brought into accord?

Not all sustainable landscapes need be messy, but they do need to be thoughtful. Sustainable is not antithetical to beautiful, nor is beautiful antithetical to sustainable. Carefully designed and detailed landscapes can also represent...
sustainable practices, an approach well represented by the Patio de los Naranjos (Courtyard of the Oranges) in Seville, Spain [figure 1]. To insure that the orange grove—which occupies the former forecourt of a mosque—would thrive in Seville’s hot climate, its makers devised a system of narrow channels to irrigate the trees with minimal evaporation. The design was not a question of irrigation alone; the pattern of the functioning rills constructed of tawny brick also structured the courtyard in an ordered and elegant manner.

Other possible vehicles proposed for achieving an appropriate aesthetic for the sustainable landscape might develop from Joan Nassauer’s idea of “messy ecosystems” structured by an “orderly” frame. Here the frame signals that any aspect of the landscape that appears unkempt is intentional [11]. This idea, although intriguing, has not always been successful. In their 1977 landscape for the Federal Reserve Board in Washington, D.C., Oehme van Sweden used grasses and flowering plants to invigorate the boarders of a triangular site with a lawn at its center [figure 2]. The intention, in this case, was artistic rather than sustainable. Although each of the plants was tagged with its common and scientific name, to many passersby the look of the landscape was read as resulting from lack of care. While I was taking photographs, one passerby, thinking I was surveying the site in some way, told me: “Good, it’s about time they did something about that.” Adjusting public tastes to those accepting of roughness and visual disorder will not be easily achieved, even if carefully framed and captioned.

One possible vehicle for attaining a visually attractive sustainable landscape is the historical Japanese aesthetic use of mixed formalities, in Japanese termed shin-gyo-so [12]. Historically, this intermixing of formalities has informed Japanese arts from calligraphy to flower arrangement, to temple planning and garden design. Rather then a simple juxtaposition of the crude against the orderly, shin-gyo-so practice
embeds the three degrees of formality within one another, often resulting in landscapes of impressive richness. *Shin* describes a formal mode, for example the upright stem of a flower arrangement or writing executed in a block style: for example, the Roman letters of architectural inscriptions. So elements, in contrast, are informal and fluid, the free cursive form of handwriting, or the garden’s more natural areas of planting. These informal elements are set against the wooden structural bays of temple or residential architecture that in themselves comprise a *shin* framework. The *gyo*, or semi-formal mode, lies between the two and is most difficult to categorize. Most often elements termed *gyo* are simply those that are neither *shin* nor so.

Examples of this aesthetic manner can be found in both the large-scale planning of Buddhist temple complexes and at the small-scale within a single garden path [figure 3]. At major Zen complexes such as Daitoku-ji and Myoshin-ji in Kyoto, the principal buildings and gates are axially arranged and induce an air of rigor and symmetry. The plans of the individual sub-temples depart from this *shin* severity with a semi-formality signaled by entry gardens that eschew the rigidly straight path by employing a bent walkway or stones set on a diagonal. Within the temple garden, which is essentially an informal *so* zone, shrubbery clipped into geometric volumes contrasts with the irregularity of the natural rocks; paths may curve and wander, or follow a straight line. Stepping stones often mix orders to facilitate movement within the garden while choreographing views. The landscape, and especially the pathways, of the seventeenth-century Katsura Imperial Villa in Kyoto is rife with this interplay of mixed formalities. One path may be completely formal, formal in overall aspect and formal in its constituent parts. In contrast, another uses semi-formal and informal stones although its overall order is formal. Or the individual stepping stones, almost all of them left unworked, may comprise the path.
In Japanese garden design these mixed modes interplay with the more natural greater landscape, creating an equilibrium while visually energized through simultaneous contrast. Of course, I am not suggesting that the broad environment of the West be treated as a Japanese garden; obviously, some of these practices are only applicable at small scale. But the use of shin-gyo-so suggests an approach beyond the formal frame with a messy infill. If correctly executed, that informal infill can itself contain ordered elements that add greater complexity and richness to the design. The application of these principles in the design of sustainable landscape also promises to produce works of intricate beauty.

The renaturalization of the River Aire by SUPERPOSITIONS has used a number of these principles without any conscious reference to Japan. The existing canal provided the primary formal structure; within it, the existing and augmented vegetation supplied its informal properties. The poplars growing along one bank of the former canal provides a shin structure, as do the periodic insertions of concrete steps, terraces, and other architectural features. And the landscape is sustainable. The challenge then, is how to achieve beauty within an ethically planned environment. The primary force behind the renovating of the Aire to was the address of potential flood threats and accommodating the recreational use of its riverbanks. Yet in the execution of the program, George Descombes and his colleagues created a new, designed, landscape of considerable beauty—not because the river is now more ‘natural’, but because a topographic structure lay beneath the existing and implemented vegetation, enhanced by the superimposition of architectonic elements [figure 4]. It is the integration of these aspects, and the care with which they were designed, that make the project notable—and to many people, beautiful.

To many landscape architects, the ethics of sustainability demands a recreation of natural
conditions existing prior to human habitation. But the conditions of both the immediate site and the world around it have changed, and so too must the design and its aesthetic. Working with mixed formalities may provide one approach to joining ethics and aesthetics, with results beneficial to both. Having good morals is laudable yet insufficient; one must learn a language in order to write poetry. Having the vocabulary and urge to write are insufficient. Having the ethics without a suitable design aesthetic may be unacceptable. To succeed, one needs the intentions, knowledge, and means to enact the beautiful sustainable landscape; any of these taken in isolation is insufficient.

Endnotes
[5] This inclusion may be due to the late creation of the Peak District National Park as late as 1951. Removing a resident population would no doubt have met with great resistance.


Figure 1: Patio de los Naranjos, Seville, Spain, 12th C+ (rebuilt 1930s). [Marc Treib]

Figure 2: Oehme van Sweden, Federal Reserve Board, Washington, D.C., 1978. [Marc Treib]
Figure 3: Katsura Rikyu, Kyoto, Japan, 17th C. [Marc Treib]

Figure 4: SUPERPOSITIONS (Georges Descombes, ADR, et al), Renaturalization of the River Aire, Geneva, Switzerland, 2001+. [Marc Treib, August 2012]
Abstract
Landscape is a system that changes and evolves according to information continually being received from an environment that includes itself (Barnett, 2013). It reflects the dynamic flows of the intertwined temporal cycles. While we aspire to stability, transformations and modifications are constantly in place creating more or less obvious changes and sometime radical shifts.

Material fluctuations take place and traverse the landscape [everyday] through dynamic flows (Johnson and Gattegno, 2016); mass migration and accelerating urbanization dissolve the old and create new boundaries and related socio-political assets.

A network of displaced people’s flux is drawn everyday between the north and the south and the East and the West of the World. UNHCR Global Trend report finds 65.3 millions of people worldwide are forcibly displaced and 24 people are displaced every minute. The news and contemporary debates quotes the difficulties the hosted countries are passing through and how we are unprepared to accommodate to the new arrivals. Millions of people, re-allocated in new contexts, are determining new physical and temporal processes and new relations between the existing and the newly inserted structures. These flows may well be the merest beginnings of new histories and geographies made by men, women and children in desperate escape from unsustainable conditions. (Sassen, 2015).

In order to provide all humans with an environment that is viable and worth living, new planning models and approaches have to be developed, both strategically and systemically, that consider landscape as a tool to re-establish the lost connections, to identify new characters and begin planning processes of integrated design with effects on the landscape at different spatial and temporal scales. Landscape architecture must become the essential game changer in terms of not only reshaping the earth’s ecological systems in practice but in transforming the fundamental habitation of the planet through
broader systemic thinking (Shannon, 2016).

The research paper reclaims the role landscape design and spatial planning could play for the establishment of social cohesion between locals and news comers, by maximizing internal and external protection and security, by managing natural resources sustainably and by contributing to local livelihoods. It will address the concepts of time, disturbance, instability, equilibrium, inclusiveness, resilience, self-organization, adaptivity asserting the power of landscape architecture in reshaping ecological systems and transforming forms of living (Kelly Shannon, 2016).

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My research indicates that there is a dire lack of academic studies investigating landscape planning in relationship to the quality of life within legal refugee camps or in informal settlements. While it is true that provision of emergency shelter to satisfy immediate needs is crucial, I believe there must be consideration in program planning for maximizing the potential for displaced persons to begin to re-establish their own livelihoods in some form, to promote dignity and self-respect, and to reduce the possibility of a dependency culture. Because of the need for resilience in the face of disaster, and the increasing visibility and importance of disaster planning, leaders in global cities as well as health and humanitarian experts around the world are focusing attention on disaster preparedness as an activity where there is great need for improvement and much opportunity for innovation [4]. I believe this to be especially true within the realm of landscape architecture. There is an urgent need to re-discuss the meaning of ‘good’ landscape planning. Different studies, conducted in refugees camps located in various part of the word, report how the ‘urban’ strategies employed in setting up and planning spatial structures for refugees, create implications on the level of violence and new internal conflict.

This paper investigates the role of landscape design in envisioning scenarios at varying scales and phases of intervention to address the
emergency created by displaced movement. It reports the experiences carried out last year by the Landscape in Emergency research group working in two Lebanese Syrian Informal Settlements (ITS). This paper further argues for the development of a strategy that considers landscape as an infrastructural device able to play a critical structuring role in the sustainable reorganization of the contemporary migratory territories. It will answer to the above questions asserting the peculiar character of landscape as relational, socially meaningful and processual place [5].

Syrian Refugee Crisis In Lebanon

Five years after the war started in Syria, 4.5 million refugees have fled across borders, 7.6 million are displaced within Syria and more than 212,000 people are trapped in besieged areas without access to humanitarian’s assistance. ‘The countries in the region hosting Syrians do not grant proper refugee status to those fleeing violence in neighboring countries, but instead they give refugees an ill-defined denomination as “guests”. These “guests” are sometimes generously hosted and protected, but most of the time they are denied all the basic rights that would make settlement an option (work, access to services, etc.), even though history shows that guests may wait a lifetime and never return home’ [6]. Currently, Lebanon is host to nearly 1.2 million legal Syrian refugees, representing around a quarter of the country’s total population. The massive influx, since the start of the Syrian crisis in March 2011, has settled refugees in every corner of the country, putting a huge strain on stretched services and infrastructure [7].

Many refugees are living in communities that are among the poorest in the country. About 35,000 illegal tents (ITS) are scattered in the country with a total of 1,942 informal settlements (ITS), with at least 4 shelters, throughout Lebanon mainly concentrated in the North and the Bekaa Valley [8].
The country represents a particular case study if compared with the other countries affected by the Syrian migratory afflux, because it is the only one that, since the beginning, did not adopt a clear strategy of intervention and, still today, refuses to allow the establishment of formal camps.

As a result, the millions of displaced persons are transforming the landscape of Lebanon by introducing new patterns, new processes, and new rhythms that require responses to the new conditions. The Lebanese government has resisted establishing formal refugee camps, fearing a repetition of the country’s experience with Palestinian refugee camps. But the deterioration of the situation calls for the immediate development of a strategic plan at the national and regional level, one which is able to address the issues of transitional settlements and the needs of the displaced population.

Erected in different areas of Lebanon, the informal settlements are enclaves of migrants seeking to establish communities and ground connections. In their movements and relocations, the Syrian communities are trying to meet their housing needs in an accelerated and hostile process that considers individuals merely as numbers and living simply as an occupation of the soil. As a result, a dynamic landscape system is evolving and, under the Syrian informal settlement pressure, is generating new geography patterns that are evident in the urban and rural Lebanese landscapes. The new typology of borders is building up a layering of landscapes whose existence and mutation over time is readable in its materialization of the limit. Bricolage and pastiche are the expression of the presence on the land of migratory fluxes that are readapting a space to adjust it to the needs and demands of everyday life and to the material and symbolic aspiration of the refugees. Marking out the space, tracing the boundaries, the new comers organize their landscape redefining the thresholds and adjacencies, the inside and outside. The limits play on one side the role of demarcation and...
appropriation of a space and on the other hand the role of protection from the outsiders and from all the forms of invasion. The clotures make invisible the space that they circumscribe and the exact physical and numerical size of the informal settlement. The choice of materials depends on the need and desire to create and show a more or less settlement’s stability and on the availability of resources on site. Plastic, metal, carton, truck tires, are drawing new languages and unexpected effects characterized by transparency, assembly, combination, height, weight, heavienss, repetitiveness, exception, color (fig.1)

**Landscape In Emergency Research Intervention**

Three events took place last year [2015] at the American University of Beirut. The first was an academic studio/research on site design (LDEM 228) I conducted with the third year undergraduate landscape students at Faculty of agricultural and food sciences –American University of Beirut (AUB), in Sarafand ITS, in South Lebanon. This time and place was our moment to investigate the migration and refugee phenomena at an international and local scale, as well as to start to define the role of landscape architects in the design and implementation of refugee settlements. The second event was the research workshop ‘e-scape refugee settlement’ I organized at AUB, which led to the creation of the Landscape in Emergency research group. Over five days, we held group discussions, met with NGOs, and toured ITS sites all over Lebanon. As a result, we shared our understanding of the Lebanese situation with the shelters responsible of UNHCR Beirut, the majors of some involved Lebanese municipalities and students at AUB; we individuated our role as landscape architects and we delineated a strategy of intervention for an operative workshop that was later held in May. As we collected the necessary materials and information we decided to choose Al Tyliani in the Bekaa Valley as the ITS to intervene on during the upcoming workshop.
We also drafted structure of the workshop to ensure effectiveness.

The International Operative Landscape Workshop, ‘e-scape refugee settlement’, was the third event. Here we physically intervened on the ground and created public spaces on the open areas of the ITS using a participatory approach. Fifteen students and ten international professors spent eight days in Al Tyliani ITS (fig. 2). Many donors and partners collaborated and helped us during this intense experience: Kayany Foundation, Center for Civic Engagement and Community Service /American University of Beirut, United Nations High Commissioner for Refugees, Katib and Halami, Cedar Environmental, and the International Federation of Landscape Architecture.

**Methodology**

The methodology was based on fieldwork, semi-structured interviews, landscape use determined in guided walkthroughs, readings and interpretations of the traces founded on site, time evolution. We based our examination on Lewis’ guiding words: that landscape ‘provides strong evidence of the kind of people we are, and were, and are in the process of becoming’ [9], we spent time in situ, looking around, talking with women, in search of indicia and answers to the many problems that a displaced situation presents. The first part of the methodology focused on the assessment of the character and quality of the spaces through the observation of appropriation and construction of lived space in the study areas. The second part was based on readings and interpretation through mapping. The mapping exercise was our powerful tool for grasping the socio-cultural realities of communities, landscapes and ecosystems involved. We mapped the situation of the area looking first at the spatial component: the materials on site, relations between open and built space, vegetation and its role in the space. Then we focused on the use of the open areas with the aim to understand the everyday rhythms, the activities taking place, the social
constraints, the desires of the people, their memories and way of living. We tried not to express aesthetic or pre-formed judgments, and to pay attention to every event, including the seemingly trivial ones. Our findings show that residents engaged in a variety of landscape practices in the interstitial spaces of their proximity areas, such as growing medicinal and ornamental plants, collecting recyclable materials to re-use or to sell, and organizing small spaces for recreational activities.

Results
The experience of these fifteen third-year landscape students permitted us to begin understanding and determining the landscape architect’s role in a displaced by disaster situation. At the end of the semester, we had generated a list and categories of all the possibilities of intervention in an ITS in Lebanon. Site observation allowed us to learn from the inhabitant’s way of dealing with everyday needs and problems and to seek to upgrade it, using our skills and knowledge. Students applied and adapted technical solutions to complex situations taking into account the community’s poor capacity and realistic possibility for maintenance. The students’ projects were site specific and directed to respond to precise requirements. Most aimed to alleviate the impact of the new illegal residential compounds on the agricultural land and make people aware of the risk the new structures are having on future environmental and productive assets in the area. Our studio did not implement the design produced in class, rather we applied the methodology to a small-scale intervention with the aim to facilitate a) community and social interaction, b) children’s interaction, and c) youth’s interaction.

The ‘e-scape’ workshop was the moment of the implementation on site. A strategy of intervention was defined and grounded in a network of three open spaces with allocated and differentiated activities (as seen in figure 3): Space A, the children’s playground; Space B,
the pedestrian connection; Space C, the water garden. With the purpose of designing small projects, which are relatively easy to implement in eight days (especially in the participatory process and using recycled materials.) we were able to transform the three chosen open and discarded spaces in public places. We offered, to the community, shaded areas to gather during the day, equipped with simple and colorful structures for children to play and enjoy (fig. 4). We provided a technical solution for a pedestrian path among the tents, leveling the ground, creating a drainage channel and planting a rain garden (fig. 5). Space C was transformed into a vegetable garden, using a vertical structure, and a game area for children to play with water (fig. 6).

The community participated in the implementation giving advice, helping in the construction phase, carrying materials from one site to another, sewing, coloring, planting, etc. The built process was not linear and a lot of adjustments were made during the construction. The realized landscape projects were not merely makeup of camouflage, but rather the operative test of a design methodology based on the immanent character of the landscape, using it directly in the creative design process. One of the most evident results of the experience is the shift in attention from the physical space, considered by itself, toward the interpretation and creation of a sense of community. In the case of displaced by disaster condition, individuals are forced to live together, day by day, and share restricted areas without knowing each other, without freedom in choosing neighborhood, quality and typology of space, etc.

The first attempt in our research and practical experience on the ground was to define and formulate a definition of community that could fit to the particular situation we encountered, so that we were able to design and implement public space projects to enrich the collective imagination and memory. While we were not able to impose a sense of community per se, we worked on the physical characteristics to establish connections and relationships among
the individuals and the groups in the settlement. We adopted the Jean Luc Nancy definition of community as: ‘a network of singularities itself as being-in- common, a structure of shared life that is not ‘produced’ but which evolves – emerges – in much the same way as the assemblages that species form in ecosystems – by drift’ [10]. We tried to develop a landscape architectural strategy in a way that enables communitas to evolve as an open system through the making of shared landscapes that are themselves open and evolutionary [11].

The inhabitant of the ITS were involved in the decision-making process from the beginning in the attempt to encourage them in the control and maintenance of the public milieu. Workshops, meetings and day-to-day discussions, helped designers and inhabitants understand each other and work together. The final products were the results of eight working days during which we learned from them and we taught them how to solve technical problems with the available materials.

The fragmentary and unstable nature of the territorial structure, in particular under the pressure of massive migration flows, leads us to consider the reality not as rigidly and statically defined, but as dynamic and evolving. During the workshop the landscape approach has proved its value as a new design paradigm, inclusive and procedural, changeable and undetermined. The structures we built on site were pilot projects aimed to start a process able to accommodate future changes, and additions. Subsequent visits, to the workshop locations, allowed us to monitor the success of our actions. The inhabitants continued the initiated process building new and targeted interventions at the scale of single tents and/or communal areas. Proudly, they showed us the new realized interventions and invited us to replicate last year experience. Meanwhile, other groups of architects, landscape designers, and other university summer courses have launched new initiatives/workshops in other informal settlements in Lebanon, mostly targeting children entertainment.

In addition, the International Federation of
Landscape Architecture and CIVILSCAPE \[12\] with the Landscape Architecture Without Borders task forces I’m part of, are working to disseminate awareness towards the active role landscape design could play on migratory issue. Our aims is to demonstrate the peculiarity of landscape and planning component on the refugees crisis through practical and effective interventions on the ground and defining best practice and its adaptability to the specificity of the different contexts in order to be implemented on site by targeted institutions groups.

The experiences, carried out last year by the Landscape in Emergency research group working in two Lebanese Syrian Informal Settlements (ITS), demonstrated how a new network of well-taught open spaces, services and facilities could forge the base of a renewed landscape caring for a sustainable territory development.

Landscape then is becoming a ‘mediator’ between people and the places where they live \[13\], an infrastructural device playing a structuring role in the sustainable re-organization of the contemporary territories.

References
(Endnotes)


3 [ ] Ibidem

4 [ ] Janneck, L. and Bidding, P. 2015. ‘Disaster Preparedness and Response


8  [] Lewis, P. F. 1979. Axioms for Reading the Landscape. The Interpretation of Ordinary Landscapes, New York: Oxford UP


12  [] CIVILSCAPE, is an international association of civil society organizations. These are non-governmental organisations (NGO) which dedicate their work to landscape protection, management and planning, according to the “European Landscape Convention” (Florence, October 20th 2000).

Figure 1. Typology of border on Syrian informal settlement in Lebanon

Figure 2. Syrian informal settlements, Bekaa Valley, Lebanon

Figure 3. The three open spaces of intervention, Al Tyliany informal settlement, Lebanon
Figure 4. Space A, the children's playground

Figure 5. Space B, the pedestrian connection

Figure 6. Space C, the water garden
Abstract
In design disciplines, learning from earlier projects by analysing plans is common practice as a way of acquiring new design knowledge. In that context the case-study method is frequently used as a research method. Since the case-study method was originally developed for social science research, it has to be adapted for use in design disciplines by developing an analytical framework that is used as a guiding principle in the analysis of precedents. It comprises scope and limits, presuppositions, definition of terms, approaches, methods and techniques that are needed for the analysis and decomposition of plans. Moreover an analytical framework is needed to structure premises, viewpoints and approaches in such a way that the results of the analysis of different plans can be compared.
Analytical frameworks are also used in precedent analysis in other disciplines (law, medical sciences, engineering). Precedent is a general term for any earlier project, event or case. The main goal of the analysis is to analyse plans in a systematic way with regard to program, design means, functioning, use and performance, enabling comparison between different plan types and within each plan. The premise is that it should ‘mirror’ the design process. Design and analysis are similar in structure of the steps in the process, only the goal is different; in both cases the design means are important aspects. The core of the paper is to discuss what an analytical framework is, how it can be used in precedent analysis in landscape architecture and its role as a research tool.
One conclusion is that a key issue in such an analytical framework is how to deal with the dynamics of landscape form and design. There are only a few examples of studies in landscape architecture that make explicit use of an analytical framework. A lack of a theory that is coherent and consistent might be one of the reasons.
Introduction
While the natural sciences base their research approach on reduction and the scientific method, in research in design disciplines there is a focus on ‘real life’ situations. To tackle the complexity of real life situations a different research approach is needed, based on the principles of case study research, an analytical framework and triangulation (Zeisel, [33]). Research in design disciplines is geared towards the development of explicit design knowledge, as well as generic knowledge which is needed for design. Design knowledge comprises declarative knowledge (knowing what), procedural knowledge (knowing how) and tacit knowledge (personal knowledge) (Fig. 1). In this paper we focus on one aspect of research in design disciplines: the use of analytical frameworks in precedent analysis. Precedent analysis is an existing term and is distinguished from analysis of plans by being based on an explicit analytical framework enabling to compare different plans, approaches, methods. Any research project always needs to make clear at the very start what are the goals, what is the scope and how the research being done. In research terms; what is ontology, epistemology and the methodology and how are these concepts related in the research project? Since research in design disciplines is not a ‘clear cut’ and well-defined approach, to put it mildly, I have developed an analytical framework as a conceptual synthesis to guide research. It does explain its origin in presuppositions and approach.

Analysis Of Plans
Analysing plans is common practice in all design disciplines, both in practice and in education, where use is made of learning from earlier examples. In teaching, in lectures, studio’s and seminars teachers use examples, and case studies of projects that are either historical or contemporary. The general idea of learning from earlier examples — apart from gaining historical insight — can be found in the term ‘plan analysis’. Plan analysis is quite common practice both in architecture and landscape architecture. In
plan analysis the analysis is mostly based on an implicit approach where criteria are not clear.

**Precedent Analysis**

Precedent analysis is a relatively new term but the use of the principle is not (Tzonis, [28]; Toorn & Guney, [26]; Donadieu et al., [6]). In precedent analysis the basis for the analysis is predefined so that the method is explicit and the results can be compared with those of other projects. This explicit approach is contained in an ‘analytical framework’. In the methodological sense, precedent analysis makes use of methods used in case-study research adapted for use in design disciplines. Precedent analysis is also used in other disciplines like law, engineering and medical studies. The goal of a precedent analysis in design is to search for explicit design knowledge. The working out of a precedent analysis for a given project is the search for explicit and coherent design knowledge based on an analytical framework.

**Analytical framework**

An analytical framework is first of all a conceptual tool for analysis and it used as a guideline in the research process. In all research one always needs an analytical framework in some or another form. In many cases it is implicit. So far, for landscape architecture there have been few examples of use of analytical frameworks. In this paper it comprises phases in the design, design process (perception, analysis, synthesis) related to different levels of intervention. These levels comprise: element (design of new elements and materialisation of form), structure (the structuring of different types of land use by access, opening up and the organisation of the water system), process (the strategy for the landscape development in the long run). At each level of intervention specific design means can be distinguished as being made up of: design principles, types used and materialisation. In the research approach for precedent analysis there are usually three steps in plan development that are distinguished and compared; the situation before intervention, the plan
(intervention), and the situation after realisation. The key issue of precedent analysis is to analyse how the existing site, program and the design means have influenced, or not, the functioning of the plan after realisation.

**Analytical Frameworks**

- **Analytical framework in other disciplines**
  
  Analytical frameworks are used quite commonly as a research tool in the social sciences, law studies, medical sciences and engineering. In all cases the generic background of precedent analysis in these disciplines is based on the case study method (Yin, [32]).

- **Analytical framework in design disciplines**
  
  Zeisel [33] did elaborate on the case study method in the context of design disciplines. He mentions the different research techniques such as observation studies, Post-Occupancy Evaluation (POE) but he also goes further into the backgrounds of the differences between research in design disciplines and empirical research. The declarative knowledge domains (physics, chemistry) focus on reduction, modelling and prediction while design disciplines keep the complexity of ‘real life situations’ in the research process thus always having to deal with multi-dimensional entities with different forces influencing form and use. Results of Environment - Behaviour studies but also design itself do contribute to this multi-dimensional aspect. An interesting aspect of Zeisel’s study is also that the cognitive aspects of design and design thinking are taken into account [33].

1. **In architecture**

Rowe [19] puts forward the term ‘analytical framework’ in design thinking and theory development, which he calls ‘a concept as basis for analysis’. He distinguishes between normative and procedural theories. For normative theories he considers an analytical framework as a necessary research tool. For architecture, an analytical framework comprises a ‘taxonomic construct’ made up of three aspects; production, architectural devices and orientation. He regards
these aspects as a ‘line of argument’ which means that there is a certain sequence starting with orientation and ending with production; in fact following the line of a design process. It results in four normative positions as reflecting architectural ways of thinking that are visible in the contemporary practice and theory of architecture. The four positions are: functionalist, populist, conventionalist and formalist. This makes clear how Rowe designs a ‘mental construct’, a ‘concept’ as a basis for his analysis.

In the last decade Guney [9] developed the concept of precedent analysis for architecture students at the Faculty of Architecture in Delft (Fig. 2). What is new in this precedent analysis is the basis for the analysis, what is called an ‘analytical framework’. Guney [9] uses three architectural references: Ching [4], Steadman [21] and Clark & Pause [5] as a basis for his analytical framework. In fact he uses all three studies as a basis for an analytical framework. In integrating the results of these three different types of analysis, he elaborates on the work of Tzonis [28], creating what he calls ‘a semantic network’. Even though this paper builds forth on the approach of Guney, in this study, contrary to Guney, ‘a semantic network’ is not worked out. To make the analytical framework applicable for landscape architecture, the dynamics of landscape form and design have been incorporated. This enables not only the analysis of plans but also allows the comparison of different plans from the viewpoint of design means and functioning, use and performance from a dynamic point of view.

2. In landscape architecture
The question needs to be asked: what makes an analytical framework for use in landscape architecture different from other design disciplines? Apart of different objectives, the difference is in the object; the dynamics of landscape form and secondly in the design process that requires a different approach from architecture (Margolis & Robinson, [15]). Next to the difference in object there is also a fundamental difference in design approach;
unlike architecture, there is always an existing landscape before intervention that heavily influences the plan making. The program is imposed onto an existing situation with its resources, possibilities and limitations. Finally, the planning and design of landscapes always implies the long term. Apart from different levels of intervention there are also different scales in time and differences in the phasing of processes. The existing situation before intervention also has a distinct development over time and a history (Motloch, [16]).

• How can an analytical framework be developed?
Starting with presupposition
Presupposition underpins all design and research, thus influencing approaches and methods. In landscape architecture, the landscape is the object of planning and design and we consider the landscape as a system. This is a key general presupposition in landscape architecture and in this paper. The following presuppositions are starting points for the development of an analytical framework (Fig. 3).

3. The ‘mirroring principle’ as basic principle for the analysis
The ‘mirroring principle’ is a presupposition specifically used for precedent analysis, where the analysis ‘mirrors’ the design process. Design and analysis are similar in the structure of the steps in the process and only the goal and sequence are different. In both cases the design means, the way ideas on how to impose the program on to the site, form the basis for plan development and are the core of the design process. It is a conceptual scheme. In design you work towards synthesis, and in analysis you follow the opposite direction, trying to figure out the way the plan is conceived, constructed, realised and evaluated. The plan is thus decomposed; that is, laid out in parts that are also used in the design.

Unwin [29] is explicit on the principle of mirroring. He considers analysis of architecture as a necessary step for learning to design. In his study ‘Analysing architecture’ an analytical
framework is used as ‘a structured analysis’, as a guiding principle for analysis.

Analysis of Stowe as example of use of analytical framework
The study of Turner [27] is an example of using a systematic and explicit approach for the analysis of historic gardens and from this an analytical framework has been derived (Fig. 4).

The main focus of the study is on ‘garden theory’. Turner [27], starts with the studies of Vitruvius and Gothein, which he considers as classic examples for landscape architecture. Turner considers a theory as ‘a system of ideas explaining something’, especially one based on general principles.

In the study, the chronological development refers to how gardens are shaped over time and describe the development of styles from Ancient Greek to modernism (Fig. 5).

Content Of An Analytical Framework
The use and elaboration of an analytical framework can be viewed as a line of thought in the research process that works similarly as the concept in a design process. We start with the basic presumptions, first of all following the subsequent steps in the design process and secondly distinguishing between the different levels of intervention.

- The main structure of an analytical framework in relation to the design process; levels and steps
  The earlier mentioned presumptions have been incorporated into a matrix (Fig. 6). On the y-axis the subsequent steps in the design process are represented and on the x-axis, the levels of intervention. Applying the matrix a first insight into the design process and its backgrounds can be traced. Each field representing a relation between a level of intervention and a phase in the design process. Such a matrix can be applied to projects to make explicit what design means have been used and on what levels what interventions took place.
The design process and its steps; perception, analysis, synthesis (Fig. 7)
The earlier discussed ‘mirroring principle’ of design and analysis implies that an analytical framework has to be a reflection of the design process that is used after the plan is realised to research how the design means have affected the functioning, use and performance of the plan. For landscape architecture, the concept of time and process is the core of design thinking. To distinguish the different steps in the design process, we have used two key sources that discuss design methods (Jones [11]; Archer, [1]). In the design process, Jones [11] distinguishes between analysis, synthesis and evaluation set within a triangular relationship. This generic distinction has been slightly adapted for use in landscape architecture. Since there is always an existing situation before intervention, I have distinguished a phase before analysis, what I call ‘perception’, in which the viewpoint is a key issue. ‘Evaluation’ has been left out as a separate phase since it is assumed to take place in all phases, not only in the last.

Three levels of intervention and design means; element, structure and process (Fig. 8)
The size and scale of most landscape architectural projects requires to distinguish between different levels. We distinguish three levels of intervention; element, structure and process. The three levels refer to a generic distinction; the level of context of the plan and its processes, the plan and its internal structure and the elements within the plan that are either part of the structure or not.

1. Levels and scale
For different levels of intervention, the scale can be different depending on plan type and size of the plan area. For a small garden and a landscape at the regional scale, the levels are identical but the scales differ.

This short characterisation of the subsequent steps in the design process is provided to better
understand the matrix as a whole. Speaking about the ‘subsequent steps in the design process’ includes the feedback loops that take place regularly in the design process despite the overall direction of the process from program to plan. The principle of feedback refers to the systems approach and explains why the design process is an iterative process in which problems and (intermediate) solutions are constantly interchanged and reworked towards a plan. Thus, the design process is not a linear process but iterative and always dynamic in nature.

The design means at each level of intervention Design means are ways how design ideas and concepts are materialised into form at different levels. They comprise design principles, types used and design materials. At the level of context, the design means comprise the direction of development, the location of the main types of land use and the density of use. At the level of structure, the issue is how interventions at a structural level are related to the structure of the existing landscape. Finally, at the level of element, the materialisation of form and the creation of new elements; design principles, types used and design materials occurs.

• Design means and use; before intervention, plan, after realisation

After realisation, the effects of the intervention are analysed in functioning, use, performance (Fig. 9)

How a plan works in practice is dependent on functioning of the landscape as a system, use by people and performance after realisation. Functioning refers to how the landscape works as a system; the natural, socio-economic and cultural system. Functioning creates conditions for all types of (land) use. Use refers to how the landscape is used by people; different groups of people, main types of use and densities of use. Performance refers to the quality of use; this can comprise multiple use, the ability to assign meaning to a place and in general whether the intervention contributes to the identity of the place. In precedent analysis the research question is how functioning, use, performance of the plan
are related to the design means at different levels. In distinguishing different levels of intervention each with different design means, the problem emerges how these levels are synthesised in a plan. For achieving coherence, unity, the ‘conceptual approach’ forms the basis for the design process (Vrijlandt, [30]). The complexity of the system is such that unity, coherence cannot be calculated, optimised or in other quantitative ways achieved; it needs to be designed in order to transcend to a new unity. The conceptual approach forms the core of design knowledge as a basis for the creation of meaningful order and contributes to the performance of the plan after realisation, not only in landscape architecture (Faro & Giordano, [7]; Vrijlandt, [30]).

At the end of the analysis the three phases in plan making are compared; before intervention, the plan, and after realisation as shown in Figure 10.

Figure 11, summarises the different components of the analytical framework presenting a diagrammatic overview of development and headlines.

**Application Of The Analytical Framework; Comparing Two Projects**

Two similar regional projects in Holland are compared by use of the analytical framework; the landscape plans for the Brielse Meer and Veerse Meer. The projects are former river branches transformed into large scale leisure areas; the Brielse Meer (1950s) and the Veerse Meer (1960s) (Toorn, [24]). The steps in the design process are not worked out here.

**Brielse Meer; facts (Fig. 12)**

**Veerse Meer; facts (Fig. 13)**

Comparing the two on what design means have been used?:

- Brielse Meer (Fig. 14)

The two plans after realisation compared (Fig. 16)

One of the results of the analysis is, that in both
cases the structural level plays a key role in regional design, albeit very differently. In both cases the water, the former branch of a river in an estuary, forms the main structure of the plans. In the Veerse Meer the core of the intervention at the structural level was the creation of new points of activity in the water and at the borders. At the Brielse Meer at the structural level the main intervention was the materialisation of a green buffer in the north bordering the river, thus creating a more or less an autonomous object that leaves less possibilities for change in the future. This results in a difference in flexibility; the plan for the Veerse Meer is more fit to changes that might occur in the future.

Conclusions

• Use as a guideline in the research process that enables comparison

The use and elaboration of an analytical framework can be viewed as a line of thought in the research process that works similarly as the concept in a design process. It is developed in a series of steps from facts to results of the analysis to interpretation. It can be seen as a guideline that is dynamic and develops during the research while working in an iterative way. It is necessary to always keep in mind that an analytical framework is a mental construct and a tool, not a goal. Comparative studies are one of the most informative and interesting examples for gaining insight into plans and the design knowledge that is used.

Another technique for comparison is redrawing plans on the basis of the same legend that enables comparison. In this case the legend is in fact the analytical framework that has to be followed precisely. Both the study of Rotterdam parks (Goossens et al., [8]) and Reh [18] in his historical analysis of Stowe; in the morphological study of the settlements in the polders by Wal, [31] and in the study of European gardens by Turner [27] we find this technique applied in an abstracted form.

• Efficiency and efficacy of design means

In these type of regional projects it is remarkable
to see what landscape architects as designers can contribute to the creation of atmosphere, intimacy with relatively few means as in the case of the Brielse Meer. The plan for the Veerse Meer shows what design can contribute to the creation of new regional entities in the landscape at large.

• Analytical frameworks and theory
Developing an analytical framework is dependent on the level of theory and theoretical backgrounds in a discipline. The lack of theory and theory development in landscape architecture makes it also more difficult for setting up an analytical framework.

Further research
A new dimension to this comparative studies emerges in the redesign of existing plans which is quite common in landscape architecture and will become even more important in the future, as more and more plans are being made. Analysis of plan development over time is — next to the analysis of contemporary plans — a key issue to understand the design history of a site. Reh [18] did such an analysis for the plan development of Stowe in a sequence of six stages from 1675-1749. Turner [27] compares the original situation at Stowe with the contemporary situation, so between 1675-2011 and shows convincingly that it (...) lacks cohesion (...).

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References


Fig. 1
Three types of knowledge that underpin design knowledge

Clark &Pause, 1979  
Ching, 1996  
Steadman, 1989

Fig. 2
The semantic network, representing F (function), M (morphology) O (operation) and P (performance) as developed by Guney [9] to be used in design

landscape; time is dominant over space, In landscape architecture, time is dominant over space, process over pattern (Spirn, [20]; Bell, [2]). Even if man does not interfere, landscapes still change. This dynamic view or landscape and design is based on the principle that living organisms — including humans — are transforming and metabolising nature. So, not only ‘landscape’ and ‘design’ are dynamic but also their interrelations and interactions.

Fig. 3
Three presuppositions could be seen as ‘axioms’: they can also be seen as part of generic design knowledge in landscape architecture. These presuppositions form a starting point for the development of an analytical framework.
Fig. 4
Overview of analytical framework for the study on historical gardens by Turner [27].

Fig. 5
Example of use of an analytical framework by Turner [27] for the garden of Stowe. Garden design theory should explain the 'what (garden types), where (locations, sites), why (garden objectives) and how' of making gardens. Questions about 'when and who' are also discussed. Note that Turner uses the term 'garden' quite loosely and even landscapes are included. Responses to these questions guide composition of the six elements used in making gardens and landscapes. These are listed below and are represented on the plans and diagrams in his book by the colours and symbols shown in the legend (1.4): landform (contours); water (blue); vertical structures, e.g. buildings (black); horizontal structures, e.g. paving (yellow for pedestrians, grey for vehicles); vegetation (pale green for grass, bright green for ornamental shrubs, dark green for trees, blue-green for non-garden vegetation); and climate (indicated by a north arrow).

Fig. 6
The headlines of the design process, represented in a matrix used in the analytical framework in this study.

Perception: from image to form
In the phase of perception we analyse processes as visible phenomena; the image of the landscape. There are two ways of working in this phase; fieldwork to research horizontal relations that are visible and map analysis in which the vertical relations are analysed. The core of perception lies in the distinction between typology & morphology; typology being referred to the similarities, morphology focuses on differences.

Analysis: from form to formation
In the analysis we search for the forces behind the form, which are sometimes invisible. In the phase the result from perception is developed further on the basis of the forces behind the form. Here, we also look beyond the visible and try to relate the visible with the invisible processes. For instance the vertical relations between ground / water / vegetation and plantation in the existing situation.

Synthesis: from form, formation to giving form
In the phase of synthesis we consider process as a basis for a strategy for landscape development. Synthesis is the core of all design thinking contrary to the natural sciences where the analytical approach is dominant. In the phase the structural concept is further developed into the materialisation of form; the form concept where design materials play a key role.
Fig. 8
The levels of intervention; element, structure, process

level of element
The level of element comprises both elements as objects in the landscape and material form. A key element in the rural and urban landscape is the parcel and plot. Not all elements are directly visible in the field, think of plots in the city that are only visible on the cadastral map. Elements can be part of the structure or not. The pumping station in a polder is part of the landscape structure, while a lighthouse is not. Material form of the landscape is defined by design materials (ground, water, plants), metalling and pavement, transitions.

level of structure
We distinguish three aspects of structure. First of all the structure as a system of flows of people, matter, information and energy. Secondly structure as form, what we usually call ‘pattern’. Pattern is the static part of structure. Finally we distinguish structure as organisation of processes reflected in patterns, it says something on hierarchy. In landscape architecture the level of structure is always related to infrastructure enabling people movement and transportation on the one hand and on the other hand to the water system that organises flows of water, drainage or irrigation.

level of process
Process is the quintessential aspect of landscape and landscape architecture; it relates directly to the dynamics of landscape form and design. It plays a dominant role in any project but is not always easy to distinguish even though it is always there. Some processes are invisible either because they take place underground like the movement of groundwater or they have such a long time scale that we can only determine them indirectly such as the erosion of bedrock. A last aspect of process which makes it difficult to analyse, is the difference in time scales and phasing and how they interact with each other or not.

Fig. 9
Dimensions for evaluating the plan after realisation; functioning, use, performance

Fig. 10 The steps in plan making in landscape architecture as part of an analytical framework
Diagrammatic overview of the development and application of an analytical framework as research tool.
Fig. 12
From Btielse Maas to Brielse Meer; the existing situation before intervention, the plan, the situation after realisation
Fig. 13
From Veerse Gat to Veerse Meer; the existing situation before intervention, the plan, the situation after realisation
situation in the 19th C; the city of Brielle (fortified) is located on the island of Voorne. The Brielse Maas gives direct access to the sea.

Fig. 14
The Brielse Meer; design means at different levels of intervention
The plan for the Brielse Meer is part of a larger regional plan providing new leisure for the Rijnmond area. The plan was conceived in different phases in time; after the development of the Europort area as part of the Port of Rotterdam, the idea of a buffer became more important. Thus later on a linear plantation between Europort and the leisure area was added on the north side of the newly created lake.

At the level of strategy for landscape development in the long run, the creation of new leisure facilities for the urban population of Rotterdam and the southern Randstad. The function as buffer zone became more important later.

At the level of structure, the existing landscape structure of the former river branch was largely used as a basis for the plan as a whole giving it a linear character. Treating the two river banks differently is another characteristic; the north edge is oriented towards the sun and for a large part on the old port of the city of Brielle.

At the level of materialisation of form, new plantation is the dominant design material; while water is passively used.

The dam is not really part of the area in terms of use; it forms a barrier and is for the leisure area only a visual element. The plan is primarily conceived at the level of material form; at the structural level a zone of surrounding plantation around the water creates a certain intimacy as soon as you are on the lake or around the water. Note how narrow the width is of the north bank of the lake compared to the Port area. Even this relatively small plantation creates a certain intimacy and atmosphere.

The Brielse Meer can be considered as a 'self-contained unit', with very few, if any relations to the surroundings except for boating eastbound.

Lörzing [14] describes the design approach as 'neo-romantic'. He not only refers here to the landscape style, still prevalent in this plan but also more implicitly to a 'fear of modern landscapes': an approach he wrote a book on earlier (Lörzing, [13]). He considers this plan as an example of this fear albeit adapted to contemporary time, thus ‘neo-romantic’.

Note that the Brielse Maas is part of the Dutch delta and that the river branch was dammed just before the National Disaster of 1953.
situation in the 19th century; three islands: Noord-Beveland, Walcheren, Zuid-Beveland with four settlements Veere, Kamperland, Kortgene, Sint Philipsland

Fig. 15
The Veerse Meer; design means at different levels of intervention

The plan for the Veerse Meer deals explicitly with three levels of intervention.

First of all a strategy for landscape development based on the direction of "development a newly created water body as basis for leisure, the defining of the main types of land use and the densities of use.

The level of structure is based on the landscape structure of the river branch and defines the spatial structure of the area as a whole; edges, 'points of development' and access. So the structure has a linear character with existing elements along it such as the settlements and newly created elements such as nature reserves, forests, areas for second homes, leisure ports.

At the level of materialisation of form, these new elements form the main intervention; some parts are worked out like beaches, waterfronts, islands.

It is this structure of different elements that create the potential of flexibility. The plan can be regarded as a new 'inner space' in the form of a lake; created by the 'Veerse Dam' in the west and the locks in the east. The man-made character is not concealed but shown and contrasts with the natural landscape. Its main form as a contour still refers more or less to the former situation of the river branch.

The designers have used existing elements but also created new elements like islands, forest plantations and new nature. Existing and new elements are brought into a new unity around the water body as focal point.

The plan has been made on the basis of long term perspective; new developments are still possible along the lake. At the regional scale the plan offers a structure that enables new developments but still offers a strong identity of its own for the three former islands. The structure allows for different types of land use coexisting in a meaningful order around the water body: agriculture, nature conservation, leisure, second homes etc.
Fig. 16
Similarities between the Brielse Meer and the Veerse Meer
Both projects have much in common; similar layout at the masterplan level; a similar setting, a former branch of a river that has been cut off the sea by a dam. Roughly designed in the same time period and both having the same function for the project as a whole; leisure. Both have been extremely successful in providing leisure facilities at a regional scale, the former landscape structure as a river branch has been maintained as the structural element at the regional level in both plans and works as a unifying principle (Kepes, [12]). In both cases the river branch has a linear character both morphologically and functionally as former shipping route. The design intervention transforms this linear character into a focal one; the focus being the water body both functionally and visually.

Differences between the two
The design intervention has a different approach in both cases. The Brielse Meer is designed as a self-contained unit that also functions as a buffer; the Veerse Meer as new regional landscape that integrates different surrounding parts inland. This is especially clear at the structural level, where at the Brielse Meer the function of buffer between the Port of Rotterdam in the north and the rural landscape of Voorne in the south, has created an almost continuous plantation. The Veerse Meer has distinct areas as more or less independent units with different functions and use around the water body. Yet these parts still make part of the larger whole. The contact with the surrounding landscape is maintained whereas at the Brielse Meer this is visually and spatially almost completely cut off the surrounding landscape. The Veerse Meer is still used for shipping, the Brielse Meer no longer. In the case of the Veerse Meer, the structural level is a the key level for the plan as a whole. In the design approach the main focus was on the design of a framework that would allow for different types of uses even in the future. At the same time this framework offers a basic landscape structure that allows for historical continuity and an ecological basis; characteristic for the design approach of Nico de Jonge (Paysage, [17]; Boekhorst et al., [13]; Steiner, [22]; Toorn, [23]).
Abstract

In 2003 Milburn and Brown published the paper “The relationship between research and design in landscape architecture”, this has since been the classic locus for many students to classify and describe their work process. In 2013 Lawson and Dorst introduced another way of representing the design process which also point to the role of reflection in design represented in a non-linear scheme. In this paper I would like to propose a variation of the analysis-synthesis model of Milburn and Brown which offers a linear representation of a design process that includes clear moments of creative action and reactive reflection. The proposed model offers an insight into a design process for complex questions, which need to be approached with academic rigor. The model can be used to clarify the academic character of a part of the landscape architects assignments.

The non-linear representation of Lawson and Dorst offers some advantages, relating to the complexity of design problems. Wicked problems as defined by Rittel are of a kind where an initial question must be reflected upon given preliminary answers during the process. However the proposed linear representation can be useful in the first stages of design teaching. Students often simply fail to start designing and the offered model is very clear on where to start. The iterative character must be made clear at a later stage.


Introduction

In 2003 Milburn and Brown published the paper “The relationship between research and design in landscape architecture”, this has since been the classic locus for many students to
classify and describe their work process. In 2013 Lawson and Dorst introduced another way of representing the design process, which also point to the role of reflection in design, represented in a non-linear scheme. In this paper I would like to propose a variation of the analysis-synthesis model of Milburn and Brown which offers a linear representation of a design process, which includes clear moments of creative action and reactive reflection. Whereas simple intuitive processes may suffice for designing a garden, the proposed model offers an insight into a design process for complex questions, which need to be approached with academic rigor. The model can be used to clarify the academic character of a part of the landscape architects assignment to other academics and outsiders.

The basis of the model is an addition of the analysis-synthesis model and the concept-test model as described by Milburn and Brown (Milburn and Brown, 2003 p.49), which together are used to build a divergence/convergence model. The model is a reflection of design processes as taught in studios at our university. Figure 1 shows the scheme. The scheme starts with an analysis. The next step in the scheme is the step of finding prototypes that address the design question and by applying these to the location(s) turning them into models, variants, alternatives or conceptual designs. Here the word model is not used in the sense of a physical model, but as a rough design, that nevertheless is site specific as opposed to a non-located prototype. Once the models are formed they need to be evaluated as to whether they meet the requirements of assignment and site. One of the models is the developed into an idea which is detailed and worked out into a plan, representations and construction drawings. All of this is done within a theoretical contextualisation and within a framework of narration. The different steps in the model will be discussed in the following paragraphs.

Design phases

Analysis

The analysis is broken down into three parts: an
analysis of the assignment, an analysis of the site and the practices of people on the site and a landscape analysis of the site, through classical McHargian and modern layer approaches. Possible entry points for analysis are: the assignment/brief/program, stating what should be done, the site/location, indicating where things could be done and or the behaviour of people in response to a current site, indicating where things are going wrong or what is missing to accommodate behaviour indicating how things could be done. In matching the different parts of the analysis critical questions can be asked whether the site is suitable for the assignment and whether changes in the physical lay-out of a site are necessary or whether behaviour needs to be changed in different ways than through design. The analysis is a clear locus for the input of scientific knowledge into the design process.

Prototyping
From the analysis different prototypes for solutions might suggest themselves. One can rummage through the different design clichés: The island, the metropolis, the suburb, the park, the desert, the forest, or the Ur-types: Cosmos and chaos. One can incite ideas independent of a specific location like: freedom, openness, shelter, peace and quiet, excitement or ideas that stem from a type of location: mountain hut or beach villa, path or promenade. These prototypes are also places where links can be found to outsiders in the design process as these images are simple cultural ideas that are familiar to many. By inciting them one can entice the audience. Inspiration for prototyping comes from studying the history of landscape architecture or other design disciplines like architecture, urban or even industrial design. By marking this phase clearly in the design process a crucial task of design education also becomes visible it is to fill the store of prototypes in students. Teachers have to urge them to find designs and designers, to explore, draw, read, collect and store ideas. And in their career as designers to revisit, regroup, reorganize these ideas. This can be done by teaching students about history of design, about
landscapes and about contemporary design, but then also to abstract them to the level of a usable prototype in criticism.

**Modelling**
The task of the designer is then to develop these basic ideas into models through application on the site. In modelling the abstract ideas need to be translated and fitted to the specific character of the site. In the process of modelling depth can be acquired by the development of the models in competition between themselves. By opposing choices or varying ideas all options can be explored and bias towards already known solutions can be avoided. Using design principles or guidelines can help to construct viable models. By evaluating the models against the insights from the analysis one can see whether the assignment can be met and or the choice for the site is appropriate. Often this will include a step back into the analysis of the site as more specific questions about the site are raised in the application of the prototypes to the site.

**Building one idea**
Out of the wealth of possible models a choice must be made which model will be developed into the final idea for the site. This can be done by the choice for one model or by combining aspects of different models. However the final idea also needs cohesion of its own. By detailing parts of the idea the idea can be further tested, adapted and refined. The design for the detail follows the same procedure as the general scheme. The design process thus has a fractal character. Reflection on the final idea might deliver more abstract design principles that can be used in a more general way beyond the specific site.

**Representing an idea**
The final idea then needs to be represented through maps, illustrations and, in a final stage, construction drawings. In making these drawing sometimes a step back into the idea process and even the analysis might be necessary. In practice the designer might also start here with a vision of what he or she wants to achieve and work their
way back to the scheme.

Theoretical and narrative contextualisation

The theoretical contextualisation is the context of non-designerly scientific literature, on for instance ecology, environmental psychology, energy transition knowledge or the findings of micrometeorology, depending on the design assignment. As one is probably not the first person to work on an assignment, this ensures that one takes into account the learnings of others. The context of narration is that the scheme not just aids in running the design process, but also in representation of the design and in doing so making the design process accessible for participation. The designer is rarely the only one involved in the design process. To include others in the process the different steps need to be shared with others. The scheme provides a way of placing different bits of information.

Conclusions

Divergence and convergence

The scheme clearly demarcates an area where divergence is important and an area where convergence is needed. As one cannot be sure that the first idea of a designer is the right idea, one needs to develop different ideas, by using for instance functional, stylistic or formal differentiation. The different models then need to be narrowed down, either by selection or merging, into one idea. In the divergence part creation is more important than judgment and one can ask question like how many different ways do I know to solve a certain issue. One can study the canons of design for interesting solutions but one can also be inspired by art or even by a conceptual analysis of certain words like freedom etc. The idea is to develop many different solutions and through opposition etc. cover the field of possible options. In the area of convergence and evaluation one has to ask questions of effectiveness and efficiency. Here one can use different indicators to qualify and possibly quantify the output of the design. Does it deliver the desired level of biodiversity or produce enough renewable energy as needed or offer
microclimatic niches for all audiences? Systems theoretical checks can be done to look for depletion or accretion of materials, by checking input and output.

*Linearity of the model*

Though the scheme and the main arrows suggest a linear process, the many feedback loops make it possible to start from any point in the process. Students are advised to run their analyses only to 80%, keeping in mind the Pareto principle and to use the feedback loops to finalise their analyses in a later stage, when the desired information has become more clear in the co-evolution of problem and solution. By using this scheme the students are able to reflect on their position in the design process and think about whether to take the next step and or to backtrack and use the feedback loops to refine their analysis for instance. The scheme can also be used to indicate which kind of question is relevant in which stage of the design process. The scheme can be run in different levels of complexity and for instance the number of prototypes and models is just an indication. For an experienced designer it may seem as though one prototype model idea plan sequence is right. However even though this can lead to quick design results, in a process where there is an involved audience, it may be necessary to sketch the wider process of reasoning to contextualise the desired design.

The non-linear representation of Lawson and Dorst offers some advantages, relating to the complexity of design problems. Wicked problems as defined by Rittel (Protzen and Harris, 2010) are of a kind where an initial question must be reflected upon given preliminary answers during the process. Problems and solutions co-evolve. However the proposed linear representation can be useful in the first stages of design teaching. Students often simply fail to start designing and the offered model is very clear on where to start. The iterative character must be made clear at a later stage. At that stage more freedom could be allowed on the order of design process steps. The scheme as represented here offers clear areas of creation and reaction. Design is building
ideas on paper and testing them, figuratively kicking them to see how they kick back. Much of design education these days is focussed on the quality of what is produced and how that meets up with all kinds of criteria. The scheme offers a way for the students to discuss how things are produced, to represent how they have worked and to show even when the end result may fail to accomplish the design brief the exploration has been thorough and possibly worthwhile. It offers teachers a way to discuss designing rather than just the output.

References
Figure 1: The proposed design scheme
Abstract
The making of landscape plans for large infrastructural projects - not only for motorways but also for large waterways and for the Deltaworks - is quite common in Holland. In the 70s of the 20th century one of the last projects of the Deltaworks was the Philipsdam, an inland dam to separate the fresh water from the rivers from the salt water in the Oosterschelde estuary. The landscape plan was designed by Frans Halenbeek who worked from the very beginning of the project closely together with the civil engineers who did the technical construction of the dam.
First we will give an overview of the functions of the dam and its technical construction. Secondly we will analyse the landscape plan, its approach, design concepts and materialisation.
In the last part we will investigate how the original design concept is visible now, roughly 30 years after realisation.
One of the striking conclusions after fieldwork is, that the original concept of Halenbeek and his team - distinguishing between the two sides of the dam, fresh water and salt water - has worked out really well, supported by consistent differences in management of the vegetation of both sides of the dam.

Introduction
The landscape development 30 years after design and realisation of the Philipsdam is the main reason to revisit this project.
The landscape plan was designed by Frans Halenbeek as landscape architect of the Department of Landscape architecture of Staatsbosbeheer (State Forestry Service), who worked from the very beginning of the project closely together with the civil engineers who did the technical construction of the dam.
The making of landscape plans for large infrastructural projects - not only for motorways but also for large waterways and for the Delta Works - is quite common in Holland.
In this paper we will investigate whether and how the original design ideas behind the plan have been accomplished and how they can
be observed in contemporary experience of the realised plan after 30 years. The following research questions have been formulated:
- What were the design concepts?
- How have they been worked out in the landscape plan?
- What is the experience in the field?
- What are the design means that influence this experience?

The research is based on different sources: texts, plans, maps, results of fieldwork. The method is based on the principles of case study research and comparative analysis of the source materials.

**Description of the project**

After the disastrous flood in 1953 [fig.1], when 1836 people lost their lives and 100,000 lost their homes, the Delta Works were started to better protect the lowest parts of the Netherlands against the sea.

The original plan separates the estuaries from the North Sea by building dams, where possible. The entrances of the harbours of Antwerp and Rotterdam, the Westerschelde and the 'Nieuwe Waterweg' were kept open. By doing this the length of the Dutch coast line is shortened with 700 km. [fig. 2]. This results in more safety against flooding and another advantage is that after some time a huge amount of fresh water becomes available.

In the 1970’s resistance came up against closing the Oosterschelde from the North Sea.

The salt water estuary is important for fisheries and oyster culture. It also functions as a breeding place for aquatic life in the North sea. In the end a compromise was found in building a barrier that allows for salt water and tidal movement, while at the same time providing protection in case of storms and extra high tides. This political solution was a tremendous challenge for the civil engineers and resulted in a very special sea barrier [fig. 3, 4].

This decision also had consequences for the eastern part of the Deltaplan. In order to separate
the salt water from the fresh water from the rivers two new interior dams were needed; the Philipsdam in the north east and the Oesterdam in the south east (Oldenburger–Ebbers et al. 2000).

Nowadays oyster culture is still there in the Oosterschelde [fig. 5] and the water quality is so good that a very rich aquatic life developed. The water is very clear and is frequently used for diving sports.

The Philipsdam was one of the last projects of the Delta Works, completed in the 1987 and commissioned by the Ministry of Public Works and Water Management.

The challenge for building this dam was huge, because of the different water qualities (fresh and salt) on both sides of the dam and the shipping route that crosses the dam. Special solutions with 2 basins and large pumps where necessary to prevent salt water to leak through the locks. This hydraulic construction is based on the principle that fresh water floats on salt water. The salt water can therefore be pumped away from the bottom of the locks and stored in a reservoir. Salinisation is a major problem in the coastal areas in the Netherlands. [fig. 6]

The Philipsdam makes a new road connection between West Brabant and the former islands of Schouwen-Duiveland and Goeree-Overflakkee [fig. 9].

The situation before intervention
Comparing the situation before intervention with the landscape plan will give a first idea of the scope and levels of intervention of the project. In this case the existing landscape before intervention was open salt water with tidal movement of the Krammer with mudflats [fig. 7].

The natural forces before intervention were influenced by fresh water, that originated mainly from the rivers. The Grevelingendam connects Goeree - Overflakkee with Schouwen - Duiveland.
and was finished in 1965. Before the Philipsdam was made, a ferry between St. Philipsland and Schouwen-Duiveland was the only connection between the islands. The shipping route between Volkerak and Oosterschelde was open, without locks. There was a special fairway for large ships [fig. 8, 9].

The landscape plan, design concepts and realisation

The main design concept
From the plan documentation (Excursie. 1981; Excursiegids. 1984) we can derive that the main design concept behind the plan was to show the functioning of the dam as hydraulic element in the landscape. There was also an explicit idea to consider the dam as a new landscape and a new landscape experience in its surroundings and not as a necessary evil or as a disturbance that should be camouflaged as much as possible (Vroom. 1992).

The landscape plan for the dam was completely integrated with the technical plan. The design approach is based on three principles:
- Show the difference in character of the estuary with dams and the islands with dikes
- Show the technical construction of the dam itself and its parts.
- Use materialisation to show the functionality of the dam

Show the difference in character of the estuary with dams and the islands with dikes
The dams of the Delta Works are built to protect the South-western part of the Netherlands against the sea. This results in very large dimensions of the dams. They belong to the landscape of the large estuaries. There is almost no relation of the dams with the more intimate landscape of the isles that they connect (Excursie. 1981).

This is very different from the dikes around the isles, that are closely linked to the inland landscape. The dam should have a distinct form as autonomous hydraulic engineering work in the water. The atmosphere can be harsh and rough
depending on the weather and season. Dikes have an atmosphere of the intimacy of the land behind the dike and have two different sides, land and water. This difference is reflected in the landscape plan for the Philipsdam. The landscape of the Philipsdam is not designed as an extension of the isles, but as a more or less independent element with a linear character. Unnecessary widening of the dam should therefore be avoided (Excursie, 1981).

The tracing of the dam is related to the existing water depths. The dam is built on the mudflat while the shipping route is perpendicular to the mudflat. The S-shape of the line of the dam is designed to enable ships to approach and cross the dam perpendicularly to the dam. We see this form principle also applied in motorways crossing rivers or large waterways. This relation of the dam to the large patterns of the existing mudflats and streams is different from the dikes that are closely related to the local landscape.

In the landscape plan special attention is given to the entrances at both ends of the dam. For example the road that approaches the dam from the island in the south is not traced upon the island dike but right next to it. The road rises as late as possible to the level of the Philipsdam, so there is a clear experience of going from the polder onto the dam [fig. 10, 11, 12, 13].

Show the technical construction of the dam itself and its parts

The dam as technical construction is one of the finest examples of civil engineering in Holland. The landscape plan has added qualities to the dam as technical construction that creates new experiences in a subdued and minimalistic way. Oldenburger–Ebbers et al. (Oldenburger–Ebbers et al. 2000) remark that the design intervention is so well integrated into the technical design of the dam, that it is hardly visible for first-time visitors that there has been a design intervention on this point at all. They mention this aspect as one of the qualities of the functionalist tradition in landscape architecture. As a design quality it is
totally opposite to the so-called ‘star architecture’ which can be seen in architecture of buildings that show off — sometimes even ‘scream’ off — at first sight.

The landscape plan is not an extra layer above the technical construction, but shows the functionality and beauty of this hydraulic project. The primary design goal is to discern between the simple linear form of the primary dam and all the complex additional parts like the locks, the buffer basins and the buildings. This is effectuated by making the main dam higher than the auxiliary dams and by using different materials [fig. 14].

Cross sections of the dam that have no attached parts are the only places where the water is visible at both sides of the dam. The dam is as narrow as possible to have the water close to the dam.

In the landscape plan much attention is given to the cross sections of the dam. In the original technical cross section a small secondary dam was proposed, raised above the main dam. This secondary dam obstructs the view from the road on the water. Therefore it was removed in the final plan [fig. 15].

Use materialisation to show the functionality of the dam

The salt and fresh sides of the dam are covered with different materials to protect against wave erosion. The dynamic salt side is protected by concrete blocks and the fresh water side has a stone-asphalt coverage.

In the landscape plan the dam itself is visually open without any planting by proper management of the vegetation. The sand banks on the salt water side are also kept open as much as possible. The inner courtyard of the technical buildings is the only planted area in the entire project and creates an atmosphere of shelter and even intimacy in the windy climate of the open landscape [fig. 16].
The development of the landscape of the dam 30 years after realisation

An important design concept is to emphasize the function of the dam as a separator of the salt water of the Oosterschelde estuary and the fresh water of rivers.

Much effort is given in the technical construction to keep the salt water separated from the fresh water. The question that we focus on: ‘Is it possible to visually distinguish between the salt and fresh water side of the dam, when driving on the dam with 80 km. per hour?’

An important condition for distinguishing between both water sides of the dam is that the water surfaces are both visible at the same time. This was one of the design principles for the dam and it succeeded in today’s image of the landscape.

There are many places on the dam where we have a view towards the vast water surfaces on both sides of the dam, despite the many side structures (locks and basins with dams).

There is no direct clue in terms of sea and land side as is the case on dams lying directly on the coast of the North Sea. Driving on the Philipsdam general orientation is a bit difficult. Orientation towards the sea side and the land side is not always clear. In comparison: the Oosterschelde barrier has a clear orientation, directly located between sea and estuary. But the Philipsdam misses this clear orientation, because it is located 20 km from the seashore lying behind other dams. In the field a map is needed to get a clear idea of the position of the dam between salt and fresh water.

The Philipsdam is constructed between the Grevelingendam and St. Philipsland. The Grevelingendam has the salt water side on the south-east. This is not what you expect, because the North Sea is lying in the west direction. The Philipsdam starts from the Grevelingendam, but has salt water on the west side. So this is a bit confusing, driving on these dams.

The salt and fresh water surfaces have the same colour. The only difference is the tidal movement (ca. 2 m.) of the salt water, that is only indirectly
visible in the emerging of the mudflats when the water level is low. On the other side the fresh water also has some isles. That causes the characters of the two water surfaces to be very similar.

In the design concept there is much attention for the materialisation. Different materials are used for protecting the dam depending on the salt and the fresh water side. But this is a very subtle difference, that is not visible when you drive on the dam with 80 km. per hour. And also some knowledge about the materials is needed to distinguish between the two sides of the dam.

The design principle for the vegetation management was to keep the dam and the surrounding sandbanks and isles open as much as possible to keep a clear view on the water. This succeeded only partly 30 years after realisation. On the fresh water side an irregular and half open vegetation pattern has developed by grazing management in contrast to the salt water side of the dam that has mainly short mowed grass. But unexpectedly it is this contrast that gives us the opportunity to distinguish between the fresh and salt side of the dam [fig. 17].

The natural vegetation pattern is associated with the more intimate and quiet character of the inland milieu. The half open structure leaves enough views on the water. It is important to keep these views open for example by regulating the grazing intensity.

The clean mowed grass of the salt side of the dam nicely responds to the rough and dynamic milieu of the Oosterschelde estuary.

**Discussion and conclusions**

Evaluation of plans after realisation

Learning from realised plans is a firm basis for building up design knowledge both in practice and education.

Studies in which landscape architectural projects are evaluated on explicit criteria are rare. In this case the evaluation is specific on whether some of the original design ideas can be experienced after some 30 years after realisation.
Post-occupancy evaluation (POE) is a formalised form of research on the effects of the plan after realisation in general (Zimring & Reizenstein, 1980). In most cases it focusses on whether and how original goals of the plan have been achieved. So far, post-occupancy evaluation has only been applied to buildings.

*Technical complexity transformed into a readable form*

This technical very complex piece of engineering work is designed with a minimalistic approach that results in a beautiful addition to the landscape (Vroom, 1992). The close and productive collaboration between the hydraulic engineers and the landscape architect from the very beginning of the project, has been the basis for the quality of the plan. The simplicity of the linear dam is not cluttered by all the necessary attachments. The materialisation works very well in not hiding the primary form of the different parts. The main function of the dam is separating the salt water of the Oosterschelde estuary and the fresh water of the rivers. General orientation, the characteristics of the water surfaces and materialisation of the dam do not give us clear clues for distinguishing between salt and fresh water side of the dam. But striking conclusion is that the development of vegetation patterns in contrast to the clean mowed grass slopes on the salt side do reveal the difference between the two environment types.

*Perception and experience of landscape*

Static perception of the landscape is rare; landscapes are nearly always perceived while moving (Appleyard, 1965). It is one of the reasons behind the dynamics of landscape form and design. These dynamics have three origins:

- The dynamics of the landscape as such; even if man does not interfere, the landscape will change by abiotic and biotic forces, that make these changes mostly autonomous.
- The dynamics of landscape experience; most of the time we experience the landscape while moving through the landscape.
The change of viewpoints on landscape over time also contributes to this overall dynamics of the experience of landscape. The experience of the landscape of the Philipsdam is typically an example of a landscape that is experienced while moving over the dam, except from the view tower next to the locks.

Technical interventions in the landscape
The Philipsdam is typically a project where the technical intervention is imposed on to the existing landscape. Making landscape plans for technical interventions has a long tradition in landscape architecture both in Holland and abroad. Examples are the design of motorway landscapes (Crowe. 1960), design of landscapes of reservoirs (Gibberd. 1967) and the tracing and site design of high tension lines in the landscape (Vrijlandt et al. 1980).

For the Philipsdam the form and choice of location definitely has some logic relating to the future functioning as part of the Deltaworks but its design and materialisation can hardly be understood from the experience on the spot alone, without some knowledge about the Deltaworks as a whole.

The conceptual approach
The core of all design is the search for meaningful synthesis, unity and coherence. In case of technical interventions, such as the Philipsdam, this is not only a matter of creating a synthesis between existing landscape and technical intervention but due to the large scale also between the different levels of intervention. The conceptual approach is the key to achieve this synthesis, coherence and unity (Vrijlandt. 2000). For example, in the case of the Philipsdam the concept of ‘linearity’ results in a clear distinction between the primary dam and its additional parts.

The role of management after realisation
The landscape of the Philipsdam has developed in a very positive way 30 years after its realisation. This example shows the importance of a good maintenance strategy that supports the initial design goals. In this sense landscape
architecture differs from architecture because living materials need time to grow. A landscape plan is not finished when it is realised. It is more like starting a process, that needs continuous attention.

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[fig.1] The disastrous flood in 1953, when 1836 people lost their lives and 100,000 lost their homes (source ANP PHOTO).

[fig.2] The plan shows a first version of the Deltaplan; the principles of cutting off the branches of the rivers except the Westerschelde, which gives access to the port of Antwerp and Flushing and the Nieuwe Waterweg, which gives access to the port of Rotterdam (Stuvel. 1956)
[fig. 3] The situation after the realisation of the Oosterschelde storm surge barrier and with the Philipsdam that separates the salt estuary and the fresh river water milieu.

[fig. 4] Oosterschelde sea barrier with slide-valves that can be closed when necessary (source: Rijkswaterstaat).
[fig. 5] Oyster culture in the Oosterschelde near the Grevelingendam/Philipsdam.

[fig. 6] The locks in the Philipsdam, the pump buildings and the basins.

[fig. 7] The existing situation before intervention was open salt water with tidal movement of the Krammer with mudflats (source: Topographic Map, 1968).
Before the Philipsdam was made, ferries existed between West-Brabant, Schouwen-Duiveland and Goeree-Overflakkee.

The Philipsdam makes a new road connection between West Brabant and the former islands of Schouwen-Duiveland and Goeree-Overflakkee. The shipping route crosses the Philipsdam.

The entrance to the dam from St. Philipsland (Excursie, 1981).
[Fig. 11, 12, 13] Driving onto the Philipsdam from the polder on the island. The road rises as late as possible to the level of the Philipsdam, so there is a clear experience of going from the polder onto the dam.
Different cross sections for the main dam and the attachments (Excursie. 1981).

In the original technical cross section (1) a small secondary dam was proposed, raised above the main dam. This secondary dam obstructs the view from the road on the water. Therefore it was removed in the final plan (5). (Excursie. 1981).

The inner courtyard of the technical buildings is the only planted area in the entire project (Excursie. 1981).

On the fresh water side on the left an irregular and half-open vegetation pattern has developed by grazing management in contrast to the salt water side on the right of the dam that has mainly short mowed grass. It is this contrast that gives us the opportunity to distinguish between the fresh an salt side of the dam.
Abstract
Public roads are important open spaces used as part of the everyday life of the community and they also play an important role in the appreciation of the quality of the landscape. Each road has its own scenic character, landscape value and history (Junta da Andalucia 2009). During the Soviet era in the 1960s-70s the Latvian architect Velta Reinfelde, together with engineer Peteris Dzenis, developed a road landscape design theory. Complex road and landscape design projects which applied this theory were prepared by the Latvian Road and Transport Design institute and carried out during road reconstruction (Slēde, Vikmanis 1980). The aim of this study was to assess the current status of a section of one of the first Soviet era experimental road landscape design projects in Latvia, carried out along 60km of road between the towns of Pļaviņas and Madona, and to suggest future actions for road landscape improvement in the light of current theories (as there is a lot of reconstruction with EU funds at the present time). The study reviewed literature from Soviet times on the subject of road design theory and actions; a field survey of part of the Pļaviņas - Madona road was undertaken and interviews with landscape architects and road users about the landscape perception of certain road sections was carried out. The literature revealed how much attention was paid to road landscape design in Soviet time when compared to the current practice – quite a surprise! The field study showed the changes since Soviet times including lost views and the deteriorating status of roadside tree planting. The interviews showed that designers and non-designers alike noticed negative features and mismanagement in the road landscape and were concerned about this.

Introduction
Roads are important public open spaces where some of the everyday life of the community occurs and they play an important role in the appreciation of the quality of the Landscape. Each road has its own scenic character,
landscape value and history. Junta da Andalucia, *Roads in the Landscape: criteria for their planning, layout and project design* [1]. The road landscape as we see it today in Latvia is the result of historic road development and Soviet-era road planning, which started in 1952 after the Latvian Highway administration established a road design group. Spatial design principles for roads appeared in practice after new technical regulations entered into force in 1962. This was initiated by engineer Peteris Dzenis. Almost all the roads of the country were designed following this method, regardless of the technical category and administrative affiliation.

During the Soviet era in the 1960s-70s the Latvian architect Velta Reinfelde developed a road landscape design theory together with the engineer Peteris Dzenis mentioned above. Complex road and landscape design projects which applied this theory were prepared by the Latvian Road and Transport Design institute and carried out during road reconstruction. Slēde E., Vikmanis E. *Latvijas PSR autoceļu būves pieredze* [2]. In the postwar years roadside tree plantings, including allees, were intensively implemented along the state roads. Planting of fruit trees along the roadsides was proposed in the new projects. *Latvijas Auto un Celu Darbinieks* [3].

As a result of this around 126 000 apple, cherry and other fruit trees were planted in the 1960s. Fruit trees constituted one fifth of all roadside plantings. Some remnant of the apple tree rows are still present along many roads. Another element which has remained from Soviet time in some places are spruce tree hedges, which were planted to protect the road from drifting snow in winter. Andrejsons V., Sviķis H., *Latvijas zemes celi un autoceli* [4].

Almost 50 years, the age of a mature tree, have passed since the beginning of the road landscape design practice in Latvia. The aim of this study was to assess the current status of a stretch of one of the first Soviet era experimental road landscape design projects, which was carried out along 60km of road between the towns of Pļaviņas and Madona, and to suggest future actions for road landscape improvement.
According to the original plan, the main objectives of this first road landscape design project were:

- to remove bushes that restricted landscape visibility, taking care of trees of great value, river banks and vegetation in ravines;
- planting new ornamental plants in farmyards;
- to maintain existing avenues, to cut out dead trees, take care of tree crowns and plant new trees of the same species;
- to rehabilitate former quarries for agricultural use or forest;
- to demolish derelict buildings, to cut down orchards which had lost their practical and decorative value;
- to improve the visual flow of the road by planting groups of trees or shrubs;
- to tidy up bus stops, add decorative planting, erect bus shelters, place benches;
- to build rest areas with tables and benches, fireplaces, toilets etc.;
- to reconstruct exit roads according to technical requirements;
- to carry out roadside forest maintenance cutting down and removing dead trees;
- to maintain the facades of buildings close to the road. Latvijas Auto un Ceļu Darbinieks [3].

Our objectives were to check if the results of the project are still present in the landscape, how the landscape has changed, what are the current landscape values and how road users and experts see and evaluate this landscape.

**Literature review**

The main ideas of Soviet era road landscape theory were as follows: taking care over the preservation and improvement of views during road reconstruction and building and planting trees in harmony with the surroundings. Planting groups of trees was recognized as good for traffic guidance. It was recommended to use species which are common to the area, like birch, oak, lime, willow, maple, pine and spruce. The practice of replanting large trees in winter was developed. Road design projects aimed to cut bushes screening the landscape, to screen the views to
unsightly buildings with tree and shrub plantings, to improve the decorative effect of avenues. It also included restoring quarries for agricultural use or for afforestation, to take down half collapsed buildings, clean the forests, design the resting areas. Andrejsons V., Sviķis H., Latvijas zemes ceļi un autoceli [4].

Until 1960 roadside planting was considered only as roadside decoration. Later it changed significantly. Dzenis wrote in the magazine ‘Latvian Auto and Road worker’ that greenery in the USSR is used the same way as abroad in order to indicate the direction of a road, thus increasing car traffic safety in conditions of poor visibility and at night, as well as to prevent the monotony of the road and save drivers from fatigue. Latvijas Auto un Cēlu Darbinieks [5].

In comparison to the current time more attention was paid to providing rest areas along the road. Places for temporary parking when vehicles had broken down, short term and long term resting areas for passengers and tourists were designed. Rest areas were sited in attractive places and, depending on usage, were equipped with facilities. Special attention was paid to the size, configuration and architectural design of rest areas. Autoceli [6].

Roads were provided with a targeted information system, comfortable bus stops with shelters, intersections, green plantings and designed recreation and parking space. Road design improvement reached its maximum development by the mid-1970s. The first road landscape design project was only partially implemented. Andrejsons V., Sviķis H., Latvijas zemes ceļi un autoceli [4]. The reconstruction project for the Riga- Pskov road landscape was carried out with reference to the Plavinas Madona pilot example. There were plans to prepare such projects for all highways which needed reconstruction Latvijas Auto un Cēlu Darbinieks [3]. However, after Reinfelde retired and due to changes in the structure of the road service organization, road landscape
improvement work declined sharply, only the improvement of recreation places continued.

**Materials and Methods**

The object of the study was to assess the landscape of a section of the regional-level road between Pļaviņas – Madona – Gulbene (P37) in Latvia. The total lengths of Pļaviņas – Madona – Gulbene road is 91.4 km. We carried out a field survey and analyses on a 2 km section of the road from the 37th to the 39th kilometre between Sauleskalns village towards Madona. This section (Fig.1.) was chosen due to availability of materials about the Soviet era road reconstruction project.

Analyses of the history of the road, comparison of the Soviet era and the current road plantings, analyses of built structures and land ownership, biological diversity, vegetation, waterbodies and tourist infrastructure was carried out. Scenic assessment of the road section was carried out using the Vermont scenic road assessment method. Vermont Scenery Preservation Council, *The Vermont byways program Program manual* [7]. The surveyed road was divided into 1 km long sections. Positive features such as vegetation, presence of water bodies, historic and cultural elements etc. and negative landscape features such as landscape scars (timber harvest sites), utility lines, buildings and manmade structures - unattractive, dilapidated buildings etc. were counted and assessed in each section. The inventory led to the total amount of positive and negative landscape elements. This method enables the road assessment to compare the results of different road landscapes.

Interviews with landscape architects and road users about the landscape values of the road section under investigation were carried out. Respondents watched a video of the road taken using a GoPro camera mounted in the front of the car (average driving speed 80 km/h) in the summer of 2016 and gave their comments on positive and negative features, their feelings about the road landscape aesthetics.
Results and Discussion

There are four main landscape character types based on land use in Latvian countryside - agriculture landscape, forest landscape, mosaic landscape and urban landscape in built up territories and more variations such as flat mosaic, rolling mosaic, hilly mosaic etc. if relief and soils are taken into consideration. Bell S., Nikodemus O., Rokasgrāmata meža ainavas plānošanai un dizainam [8]. The road in our chosen section passes through a hilly mosaic landscape where forest is mixed with agriculture fields providing a mix of open and closed views as well as generally winding alignment fitting among the landforms.

The section we analyzed is a part of the historic military road running from Pskov in Russia through Aluksne - Cesvaine - Bērzaune - Kalsnava and Koknese in Latvia and is mentioned in historical records from the 11-12th century. Apskates objekti Bērzaunes pagastā [9]. After Sauleskalns village the road passes an ancient Latvian castle mound where a wooden castle stood 800 years ago. The castle was burned down by crusaders in the 13th century. Later the castle mound was used as viewpoint and gathering place for different cultural events.

After comparing maps from 1791-1798, 1839, 1914 - 1921, 1933, 1945 - 1991 and today we see that details of the road in the older maps are shown only approximately. The map of 1914 - 1921 shows that the location of the road had slightly changed, the curves being replaced by straight sections. The map of 1933 shows a larger number of buildings in comparison to the present time. The names of farmsteads in older maps are in German or Russian, but after Latvia became independent in 1918, in the map of 1933 they are in Latvian.

Analyses of present built structures and land property show the current farmsteads and abandoned buildings which are not demolished yet. All farmsteads are surrounded by groups of trees - both fruit trees and other typical trees of the region. The map of 1945 - 1991 shows
topography and forest areas rather precisely, while place names are written in Russian. This is the period when the road reconstruction and landscape design project was carried out. Maps of the 21st century – the most up-to-date - show the current placement of the road and access roads, vegetation cover and names of farmsteads that still exist.

In the beginning of 20th century the entire Plavinas – Madona – Gulbene road was still surfaced in gravel. The section from km 37 to km 38 was difficult for travellers, especially in winter, due to steepness of Sauleskalns hill. The gradient was reduced in the second part of the 20th century by cutting the road into the terrain of the hill. No more radical reconstruction work was carried out to date. The slopes of the roadsides of this section need better design today and work on the vegetation to open and improve the view.

The reconstruction project aimed to remove some of the existing snow and wind protection plantings along the whole distance from Plavinas to Madona and there were some in the sampled section too. This aim was accomplished: they do not currently exist. In Latvia there are still many snow protection plantings along roads dating from the Soviet era which are not managed properly. They block views and diminish the aesthetic quality of the road landscape.

Vugule K., *The Latvian landscape as seen from the road* [11]. Planting several tree groups was also an aim. Two poplar (*Populus tremula L.*) groups still exist on both sides of the road (Fig.3). One group has amalgamated with the forest behind it, the other remains a dominant feature against the background of open fields.

A group of oaks (*Quercus robur L.*) on the slope next to the road could have been planted at the time when the project was implemented, but they are not listed in the project description. It is hard to identify how many trees were planted according to the project, as forests have expanded since then.

A new bridge over the Arona river was built during the road reconstruction project. It is a simple bridge with standard metal railings which do not fit into the surrounding landscape and the
cultural heritage. Such a bridge would fit in an urban setting but not the countryside. This was mentioned by several interviewed experts. The front part of the Arona castle mound is overgrowing with bushes and pine trees while the slopes of the castle mound are also being slowly overtaken by vegetation (Fig.4.). The castle mound is a private property at the moment and its management depends on the owner. Objects of historical value should be preserved and taken care of in the road landscape and it is sad that we are losing places with a historical and cultural value. Vermont Scenery Preservation Council, The Vermont byways program Program manual [7]. Analyses of biological diversity show the presence of protected species such as the sprouting house-leek (*Jovibarba globifera*), snowdrop windflower (*Anemone sylvestris L.*), hemlock parsley (*Conioselinum tataricum Hoffm.*) and moon carrot (*Seseli libanotis (L.) W.D.J.Koch*) on the slopes of the hill and oak forest which are necessary to be preserved. Part of the area belongs to the Vestiena protected landscape area, which is included in Natura 2000 listing for species and biotope protection. In future it is necessary to clear the slopes of taller vegetation and to build tourist infrastructure in order to preserve the valuable biotopes and to give access to the mound.

The main tourist attraction is the Arona castle mound. There is a parking and rest area next to the road in front of the castle mound. According to the 20th century design standards the resting areas should be screened from the road but at the moment it is a problem as it is hard to see the place at all, as was mentioned by almost all interview respondents. There is a more than 10m safety zone between the rest area and the road, but there is no vegetation on it, the area has no facilities as it was planned in the original project; there are no tables, benches, litter bins, fire places, drinking water sources or information signs about tourist attractions nearby. There is rubbish in the area and in the forest next to it although it is a property of ‘Latvian State roads’. The place needs reconstruction and better
management.

The scenic assessment of the road shows that the landscape is interesting, varied, has both nature and objects of cultural and historical value. Straight stretches are no longer than 1km, which is good for safety reasons so that drivers do not get psychologically tired. There are more positive than negative elements along the road. The main positive elements from the field study are the long open views to well managed agricultural areas, changes in the road topography and possibility to see some landforms, tree groups and individual trees in the fields. Changes of relief were noticed by some of the respondents as a positive and interesting feature. Both landscape architects and other road users noticed the castle mound. The most negative feature is the electricity line, which disturbs the aesthetics of the road and some overgrown ditches along the road. Most of respondents mentioned bushes and trees and long grass too close to the road as negative features. In several places the dense vegetation blocks valuable views. Many repondents noticed the bridge over the Arona river. Analyses of water bodies and vegetation show that the Arona river is not visible to the road users due to dense vegetation in the river corridor. Views to water raise the aesthetic quality of the road landscape. Junta da Andalucia, Roads in the Landscape: criteria for their planning, layout and project design [1]. Cleaning sections of river bank close to the bridge would open views of the river from the road.

According to the Vermont Byway methodology forest is a positive feature. Vermont Scenery Preservation Council, The Vermont byways program Program manual [7]. But respondents were more happy with the open views and appreciated forest less, with the exception of where it was far ahead after an open field and gave a feeling of mystery, which can be found there. Some landscape arcitects mentioned that over-long views to open fields become boring. Both landscape architects and some of other road users considered this to be a typical mosaic
landscape. This type is under threat in regions where agriculture is not profitable. Forest already covers 47% of the territory of Latvia and it is important to keep open views in order to ensure the aesthetic quality of the road landscape.

Non designers paid more attention to the road infrastructure, its surface quality, traffic signs, coming and passing cars, bus stops and less to the landscape. The interviews showed that designers and non-designers alike noticed negative features and mismanagement in the road landscape and were concerned about this.

Conclusions
The literature reveals how much attention was paid to road landscape design in the Soviet eras. After the architect V.Reinfelde retired one period of road landscape design ended but there have been no followers and the results of the work which started in the 20th century are slowly disappearing. Some of the road reconstruction and landscape methods from the 20th century are not suitable today but many of them are good bases for further development. A surprisingly large amount of good work in road landscape design was done in the Soviet era which should be re-evaluated and taken care of.

The work carried out during the road reconstruction and landscape design in the 20th century is partly visible in the section studied – open views, the rest area and some tree groups are still present. Lack of management gives a feeling of degradation and oblivion. We believe that the aesthetic landscape value has diminished. The historic values of objects along the road are underestimated and are endangered. More attention should be paid to information and signs for visitors.

The present status of land property makes any large scale landscaping difficult compared with times when all land was owned by the state, while only the road and 13,5 m on both sides of the road and the rest area in this section currently belongs to the state. There is no established practice at the moment how to work with private land owners in order to improve the road landscape quality. The
road has a potential to be scenic and represent one of the traditional Latvian landscapes but it needs a management plan and the involvement of all land owners.

The next step of the project is to prepare design and management guidelines for road landscape development.

References
[3] Latvijas Auto un Cēlu Darbinieks (02.03.1960) (Latvian Auto and Road Worker) Riga, Nr.18. (In Latvian)
[5] Latvijas Auto un Cēlu Darbinieks (05.1960) (Latvian Auto and Road Worker) Riga, Nr.32.
Fig. 1. The reconstruction project for the Arona river valley landscape in a section of road Sauleskalns village – Arona river valley. Latvijas Auto un Ceļu Darbinieks [3].

Fig. 2. Arona Castel mound ~1930. Postcard [10].

Fig. 3. Poplar groups. Vagolins 2016

Fig. 4. View to Arona Castle mound. Vagolins 2016
Abstract
Current open space is interactive. Its process of transformation is no longer linear and dual, but is instead fragmented and apparently influenced by everyday use. Production of space as urban theory and practice has experienced transformation too. Current readings of multidimensional open space indicate the importance of including the ideas of Henri Lefebvre in order to reveal the circulating relationship between physical space and social practice. In the 1970s Lefebvre thus revolutionized the relationship between the individual and the spatial product. We are now renewing an understanding that does not reflect society, but rather architectural space in its social connotation. Understanding space as a social entity means putting space and actors in touch with one another. These relationships are named as ‘practical relationship, as part of an interaction between „subjects“ and their space and surroundings’ #1. What does this interactive understanding of space mean in terms of challenges for design of open spaces, for further spatial practices in and with open space and for the active capacity of open space itself?

Lefebvre’s dimensions of the production of space has been translated into three spatial dimensions that draw attention to the interplay of actor’s networks, spatial practices and the morphology of space. Conceived space, generated space and used space identifies manifestations of the interactivity of space with different intensities of actor-space relationships which also characterizes the empowerment of the urban commons. They demonstrate an historical and an ad-hoc visibility of social relations, and a kind of balancing between the state interventions, designs and norms as well as projects and tactical forms of everyday urbanism. In this lecture this will be discussed by examples of open space production in European cities and in terms of housing strategies and organization of open space in an informal settlement in Rio de Janeiro.

#1 Lefebvre, H. (2008 [1974]) The Production of

The interactivity of open space

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interactivity, open space production, urban informality
The interactivity of open space

Current open space is interactive. Its process of transformation is no longer linear and dual but fragmented and influenced by everyday use. Production of space as urban theory and practice has also experienced transformation. Current readings of multidimensional open space indicate the importance of including the ideas of Henri Lefebvre in order to reveal the circulating relationship between physical space and social practice. In the 1970s, Lefebvre thus revolutionized the relationship between the individual and the spatial product. We are now renewing an understanding that does not reflect society, but rather architectural space in its social connotation. Understanding space as a social entity means putting space and actors in touch with one another. These interdependencies or in Lefebvre’s words ‘codes’ are named as ‘practical relationship, as part of an interaction between „subjects“ and their space and surroundings’ (Lefebvre, 2008 [1974], 18).

With the theory of production of space, Lefebvre built not only a unitary theory but also an interdisciplinary concept and a methodological approach to understand space in all dimensions as a social space and therefore as mutual relationships. He has concretised these relational characteristics in his double named triad of perceived space or spatial practice, conceived space or representations of space, and lived space or representational spaces (Lefebvre, 2008 [1974], 30-53). What does this interactive understanding of space mean according to Lefebvre (see Figure 1)?

Firstly, the social space as space of real social practice contains both actions and knowledge of space. It is related to nature or physical space (as initial basis [...] of social space‘; Lefebvre, 2008 [1974], 402), to society and to the times of production.
Secondly, space contains the social contradictions between the society, the state, the economic interests or the urban reality (macro level) on one hand and on the other the ideas and imaginations of the citizens as individual reality in terms of everyday life (as micro level) (see Lefebvre, 2008 [1974], 33).

Thirdly, ‘Space is at once result and cause, product and producer’ (Lefebvre, 2008[1974], 142)⁴ - therefore the historical process of space production and the materialisation of social activities and knowledge has to be observed. Lefebvre reminds us that space as a whole contains time and always is and therefore bundles past, present, and a possible future (Lefebvre, 2008 [1974], 37).⁵

However, this is more actual than ever. Gardens on railway lines and urban niches, kite flying on airfields and parcour on public stairs, ramps and benches, a barbecue on a sidewalk and the white dinner in Olympic stadium, sharing and repair services of bicycles as well as flashmobs, an art exhibit, and a jam session on an investor’s property. Against the background of multiple planetary urbanization processes contemporary open space appears not only as a political and architectural objective, but also as the individual and communal expression within a city. In times of the Spatial Turn and neoliberalistic economic crisis (Soja, 1989, 1996)⁷ the interactivity of open space– in addition to its conceptualisation as an atmospheric contribution, civic participation, and an individual and partly artistic provocation – has become an important indicator of the degree of mutual influence of space and society. Short-term use often overlaps with long-term projects in open space areas, and the speed of this transformation is currently increasing. have also become more active. This means that open space is not only modified as a result of planning and design, but through everyday life that overlap or superimpose themselves on it. Experimental areas and space pioneers are converging. This is a fact for the planetary urbanization and its impacts on all scales.
As landscape architects our field of research and design is the physical space. Against this background of changing production and reproduction processes of urban space and a multiplication of actors, the categorized questions are merging. Landscape and open space become a platform of dynamic multidimensional relationship or as Jane Bennett (2010)\(^9\) calls it a ‘vibrant matter’ – as a space or landscape that has the competence to act (Loenhart, Bennett, 2011, 15).\(^9\) Therefore, there is a need to create new analytical approaches between theory and practice to decode this interactive competence of open space. This goes along with the challenge of understanding open space as ‘space of possibilities’ with a proof of social order and reading the commoning as the process of challenging, extending and interpreting existing space (Stavrides, 2014, 83).\(^10\) The need for more inclusive ways of doing research is also mentioned in Brenner’s (2014, 15)\(^11\) call for new conceptual and methodological approaches. Against the background of complex and planetary urbanization processes he mentioned first that there is a need for describing the complex and recursive relationships of agglomeration processes and operational landscapes at all scales (Brenner, 2014, 21)\(^12\) and second the urgency ‘to develop theories, analyses, and cartographies’ (Brenner, 2014, 28).\(^13\)

**Methodological approach**

Lefebvre has already invited us for ‘a methodological destruction of the codes relating to space’ and therefore a reconstruction of ‘a language common to practice and theory’ (Lefebvre, 2008 [1974], 64).\(^14\) From the viewpoint of a space-designing discipline, the linkage between theory and practice of urban open space production to be presented here is a methodological approach. It adopts Lefebvre’s understanding for decoding urban space both in the process of its production and as a product of the interactions between society and individuals. This study conducts a conceptual and spatial reading of its dimensions of social space in its
reciprocal relationships – to nature, society and time and as process and product simultaneously (see Figure 1). Lefebvre’s dimensions have been interpreted and translated into three spatial dimensions of interactivity that draw attention to the interplay of actor’s networks, spatial practices and the morphology of space (see Figure 2). The spatial dimensions of conceived space, generated space and used space are introduced here to identify manifestations of the interactivity of space and to categorize urban commoning (see Table 1) and Figure 2).

They include various intensities of actor-space relationships defined by diverse constellations of actors, different time frames and differing intentions. They demonstrate an historical and an ad-hoc visibility of social relationships, and a balancing between state interventions, designs and norms as well as projects and tactical forms of everyday urbanism. The spatial dimensions will be introduced here followed by projects that demonstrate a range of visible urban commons but differ from scale, collective bottom-up activities or stimulating design interventions and intentions.

**Conceived space** occurs as a result of spatial practice, using planned codes and rules that leave predictable traces behind. The purpose of using this space is compliance with codes. This is open space that traces back to the classical production of urban spaces using urban design and landscape design concepts. It is socially negotiated space that, depending on the era in question, materialises the value system dominant at that particular time. In everyday life it clearly functions according to the same rules, i.e. the code that was incorporated.

A typical example is Berlin’s block structure. Its value system is primarily based on a structure of ownership. Block development consistently sets the boundary between private courtyards and public streets framed by the facades. This typology’s open space are similarly formed: hierarchically in urban plazas, parks, and traffic areas; representative and inviting, they are
concrete proof of the confidence of the aspiring middle class. Based on the everyday correlation between space and actors, the entire Berlin urban area with its diverse urban typologies and their respective coding belong to this dimension. This also includes the typology of open space. For its use in design this level is being scrutinised with regard to its resilience versus other more immediate processes of the production of open space (generation and use). But there is also a shift recognizable in new planning policies which provide various incentives for improvised, temporary and creative uses of unused spaces. They demonstrates to which extent the spatial bottom-up practices have already entered the stage of society and governance schemes.

On the other hand these policies give creative designers opportunities to realize projects or providing access and temporary uses of land. They act as enabler or facilitator for these practices. Examples are the strategies of the ‘space pioneers’ in Berlin, the ‘Broedplaatsenbeleid’ policy (breeding place policy) in Amsterdam or the programme for ‘Meanwhile uses’ in London.

**Generated space** occurs when spatial practice changes the physical structure in an active, direct, and permanent way. The purpose of using this space is the interaction with the space itself. Individual, collective, and daily, as well as social, economic, and artistic articulations in a particular urban space belong to this dimension. That means that space pioneers occupy, appropriate and transform urban open spaces. These appropriations act in either a contrary or an additive manner to planned codes. But the dimension of the generated space in accordance to Lefebvre’s first category of spatial practice mirrors also the conjunction of urban design typologies of municipal planning with these everyday uses and expressions. As Ferguson (2014, 15) argues the work of planners, architects and artists can be involved in this form of spatial practice (or agency) which guides and mediates the production of urban commons on a number of levels and scales. These can be both – temporary or permanent – as critical spatial practice to conventional planning policies by breaking urban codes and regulations. All
together these actions, projects and interventions lead to open processes and unforeseen but tangible spatial transformations. The dimension of generated space therefore wishes to draw attention to a range of collective actions of citizens to design architectural interventions for stimulating such collaborative urban space production. Citizens will change to city producers instead of city consumer. Space producers realize their own project ideas as experiments or spatial strategies, which inscribe a co-authorship especially in urban open space.

The Shieblock and Luchtsingel from team ZUS (Zones Urbaines Sensibles) in Rotterdam serves as a prominent example of self-made-city and the intention of spatial transformation. Shieblock was a former office block located in Rotterdam near the main station that had been abandoned for 20 years. It came into attention initially through a public protest organized by team ZUS for the maintenance of the block and against planned real-estate projects, which was followed by informal cultural activities (as guerrilla practices). The Rotterdam Biennale serves as a door opener for building a corporation, the Shieblock. Beyond several start-ups and creative offices moving-in, the ZUS team extended the perspective for the neighbourhood, the interconnection to the public space and also between the central and the northern district of Rotterdam. That means that within and around the Shieblock the team has developed a continuously growing program of offices, co-working spaces, cultural institutions and public uses – like the roof top garden with Urban Gardening and the Rotterdam ‘Highline’ – the Luchtsingel (Luchtsingel, n.d.; Buttenberg, et al., 2014). The project was realized by a crowdfunding campaign which was visualized as an every wooden plank marked by the name of the donors. Finally, it was built a 350 meters wooden pedestrian bridge from the Shieblock to the main station. This modest example of crowdfunding and space production shows citizens becoming directly involved in small-scale urban transformation using web and digital applications. Therefore a space is generated implementing the sense of taking part in urban transformation of individual inhabitants. On another scale, the interconnectedness of a growing spatial structure with the urban context (see Figure 4).
With the term collaborative urbanism community-based initiatives in the Global South are considered which show the engagement of people to improve their urban environment they live in. With regard to the Urban Age Award they were also named as ‘handmade urbanism’ (Rosa and Weiland, 2014). In relation to the design initiated or mediated projects these examples act in response to urgent issues and needs like shelter, security, employment, health, and education and they are to be found in the sphere of informal settlements. The aim of these projects is not so much the transformation of urban space but to induce change on a micro level and ‘to build a collective space, collectively’ (Rosa and Weiland, 2014, 18).

**Used space** occurs when spatial practice changes the physical structure in a non-permanent way without leaving any traces. The purpose of using this space is a particular action. It represents individual and collective articulations of citizens within an urban area. These are not expressed through spatial interventions, but only through short-term actions. They usually have a particular purpose, which is largely independent of the immediate environs. The space does not undergo permanent change due to the activities that occur there. Manifestations in terms of social, political as well as cultural movements are one example in the raw movements from the right-to-the city movement, reclaim-the city-movement, and transition-town movement that demonstrate a radical shift. They politicize space and in Lefebvres sense a new centrality of encounter is generated – the joining of and juxtapositions of differences (Merrifield, 2014, 176). The given urban space serves as a projection area at specific sites – mostly of them in prominent and central places. Flashmobs, cultural events and statements belong to the same dimension of interactions. The establishing of a musicians scenery in Berlin Mauerpark, the parcour movement, a flashmob of Tactical Urbanism to disrupt the urban routine for announcing an interest to the potential of a pedestrianized square (Rauterberg, 2014).
Maybe the most widespread of these tactics is the annual worldwide event of the Park(ing) Day, in which parking lots in central urban areas are turned into temporary park spaces by initiatives of artists, designers and citizens (see Figure 5). These social practices are driven by a dissatisfaction with urban governance and crisis or urban development plans and speculative processes. Their aim is to demonstrate the right of civic participation in urban processes with forms of democratic, self-managed urban governance. They are characterized as forms of new collectivity, which criticize, cover or collage the existing urban space but do not transform it for long-term development.

Interactive competence of open space in informal settlements

In dealing with the interactivity of open space the ownership of urban space is a neglected topic with regard to informal settlements in megacities like Rio de Janeiro. But against established categorization studies of informal versus formal city in both political guidelines and scientific discussion and furthermore the prejudice of self-organization to ensure survival rather the production of settlement space and housing is closely interwoven with processes of urban development. The spatial dimensions – conceived, generated, used space - opens up the possibility of a neutral perspective on informal settlements for the urban systems in the global South. The matrix shows that informal settlement is the most visible form of spatial (or physical) articulation of space production induced at all social levels (see Table 1)! Neutrality here means to understand urban informality as “organizing urban logic” (Roy and Al Sayyad, 2005, 5; Roy, 2011), and thus as a process of interacting of various actors, practices and spaces throughout the whole urban fabric. The objective to identify the interconnectivity between the actors of space production and the spaces of informal settlements the methodological approach – conceived, generated, used space – has been enhanced.

Analytical tools have been developed that
connect Lefebvre’s theory and other social scientific and architectural approaches to understanding space in its interactive role and as a social construct:

- translation of ANT into spatial effects (Latour, 2005; Busch, 2007);

The method looks at the characterization and decoding of spatial interactivity within the settlement and the open space production of informal settlements. This includes the identification of the actor networks involved and their social and spatial practices of interaction, as well as the differentiated spatial structures at different scales including historical and daily processes. Decoding these dynamic actor-space-relationships four analytical tools as a systematic analysis has been gathered (see Figure 6).

The analytical tools have been applied to the example of the Manguinhos favela complex in Rio de Janeiro, with an analytical examination of 14 ‘comunidades’. Manguinhos is named as a typical suburb of Rio de Janeiro (Fernandes und Gama-Rosa, 2009, 28), which distinguishes itself as a mix of industry, entrepreneurial activities and residential areas. Deindustrialization and vacancy have created conditions which have encouraged a comprehensive informalization. Housing is affected by a high degree of informality and density characterized by hygienic and ecologic vulnerability and by conditions of socioeconomic poverty. Moreover, since the 1990s Manguinhos is internationally known through its extreme impacts of violence criminality. Drug trafficking, arms dealing determine the daily life. This also influences movements of settlements and the use of remaining open space.

Most of all the informal growth of Manguinhos was caused by the absence of a regular housing
policy. In fact, several urbanization and slum upgrading projects were implemented by analogy with urban development in Rio de Janeiro. However, Fernandes und Gama-Rosa (2009, 27-38) has mentioned that instead of leading to improvements for better living conditions it has stimulated further growth of favelas and conditions of social insecurity, vulnerability and a criminalization of poverty. The oldest community Parque Oswaldo Cruz – a typical self-organized and occupied favela - is over 100 years old. Since then, several occupation processes induced a very heterogenic development of informal settlements. More recent occupations have been organized in industrial wastelands waiting for compensation payment or habitation through urbanization and infrastructure programs like Favela-Bairro or Growth Acceleration Program (PAC Manguinhos).

Adapting the analytical tools in Manguinhos favela complex it was possible to demonstrate the interactive competence of the open space and thus estimate further spatial and social development of the informal settlements. Open space in Manguinhos’ communities is always in conflict with private dwelling requirements. It is the remaining open space including a collective idea (Duarte, 2008; Andrade, 2002). The latter ranges from keeping narrow open space for transport and allotment (Figure 7) to expanding open space for transport, exchange of household facilities, collective sites for memory, waste disposal and recreational areas like football grounds (Figure 8). In Manguinhos this can also be places controlled and appropriated by parallel power which often are very devastated. The social practices of the primary (inhabitants, families, and neighbours e.g.) and secondary actor networks (community agency, drug trafficker, militia as parallel power) determine the degree of the collective idea. The interplay of these networks also establishes accesses to the communities, borders (to avoid access) and rules for the maintenance of the open space (Figure 9, 10). Here, primary networks and secondary networks compete against the remaining open space. The everyday negotiation processes for
open space are characterized by practices of exchange, competition, rivalry and conflict. They lead to conflicts between individual requirements for habitation and collective ideas of open space. The more solid the primary networks interact, the more stable the open space as collective idea is developed. The more influence of parallel power as secondary network, the more monofunctional, controlled and precarious the open space remains. (Wieck, 2015, 423-427).

To conclude, the analysis visualised the actor network practices and the tendencies for the reproduction and duplication of informal settlement structures that have been inscribed in open space. This leads also to both a risk and a potential to reproduce the conditions of settling and produce new ones. However, the open space in informal settlements and its intimacy with every day activities deploy transformations for stabilization or destabilization of the space of the communities and the collective itself (Wieck, 2015, 444, 445). For landscape architects, to develop spatial solutions in open space means here to intervene in incremental processes and delicate reciprocal actor-space relationships.

Conclusion
Learning both, from the global South and urban transformation as a landscape architect we form and design open space. We investigate the effects our interventions have on urban areas. But we also get involved in this process; we choreograph it in order to understand spatial needs, to translate and to regulate them. In doing so, we complete the circle between actors and open space. We operate in this way – from thoughts about space to the actual production and reproduction of open space. This is an act of production of space – as knowledge and action at the same time. Taking into account that designing and describing such landscapes is an act of spatialisation of knowledge we need to sharpen our questions related to interacting open space in order to stimulate urban transformation. A central question for the practice of landscape architecture is how to link small-scale activities and
planning strategies? How we describe and stimulate such processes with interventions, which lead to both the generation of collaborative open spaces, the strengthening of authorship of spaces and to the regeneration of urban development? Taking part in urban transformation, it is a challenge and responsibility of landscape architects to envision the spatialisation of knowledge production in two ways: combining conceptualized and contextualized knowledge and to shape integrative knowledge production and design as a collaborative process with all involved actors, including the interactive open space.

(Endnotes)

1 References


2 Ibid.

3 Ibid.

4 Ibid.

5 Ibid.


Verlag, Berlin, 14-30
12 Ibid.
13 Ibid.
16 Ibid.
The spatial dimensions of conceived space, generated space and used space have been also tested and reflected as methodological approach for two landscape architectural design studios in 2007 and 2008 at the Chair of Landscape Architecture and Open Space Planning, TU Berlin, together with the architect Maria Agudelo Ganem.


Figure 1. The dimensions of social space as concept of reciprocal relationships (according to Lefebvre, 2008 (1974)) (Wieck, 2015, 162)

Figure 2. The spatial dimensions of interactivity of space (Wieck, 2015, 218)
### Table 1. Spatial dimensions of interactivity – matrix of conceived, generated and used space

(Wieck, 2015, 219/16)

<table>
<thead>
<tr>
<th>Dimensions of interactivity</th>
<th>Conceived space</th>
<th>Generated space</th>
<th>Used space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial translation / Spatial interpretation / concept</td>
<td>Spatial practice / Medium</td>
<td>Spaces of representation / Site = counter space</td>
<td></td>
</tr>
<tr>
<td>Forms of manifestations / Intereactivity</td>
<td>Participative architecture / Transdisciplinary design / Knowledge production for transformative infrastructures / Informal settlements</td>
<td>Self-use / city / Collaborative urbanism / Informal settlements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cultural / political / institutional / Tactical / urbanism / Informal settlements / riots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actors</td>
<td>Architects, planners, urban policy, land market, society, macro level</td>
<td>‘Homestead’ (Lefebvre, Marcuse) / Space pioneers + space entrepreneurs, civil society, ‘xyxyxy’ (Lefebvre, Marcuse) / individuals / collectives + society, micro – and macro level</td>
<td></td>
</tr>
<tr>
<td>Time in space</td>
<td>Past + possible future</td>
<td>Present transformation of past + possible future</td>
<td>Past + future</td>
</tr>
<tr>
<td>Intention (social practice)</td>
<td>Re-purposing / governing / designing / transforming of space</td>
<td>Interacting with space / transforming of space / implementing of counter spaces</td>
<td>Action / projection of counter spaces / entrepreneurship / political and cultural declaration</td>
</tr>
<tr>
<td>Exploiting (social + spatial practice)</td>
<td>Standardization of urban space / manifestation of values</td>
<td>Self-use / city / Procurement / installation / charging, consumption</td>
<td></td>
</tr>
<tr>
<td>Spaces (spatial practice)</td>
<td>Urban spaces / transformation spaces / conceptualized and designed spaces</td>
<td>Catalytic space</td>
<td>Projected area / manifestation / imagination</td>
</tr>
</tbody>
</table>

Figure 3. Conceived space: Tempelhofer Feld with pioneer project of urban commoning ‘Allmende Kontor’ © Kathrin Wieck, 2012

Figure 4. Generated space: Incremental and common process of Luchtsingel, Rotterdam, © Xenia Kokoula, 2014
Figure 5. Used space: Spatial intervention with performance at Parking Day in Friedrichstraße, Berlin © Kathrin Wieck, 2009

Figure 6. Compilation of analytical tools for decoding actor-space-relationships at macro level and micro level (Wieck, 2015, 270, 271)

Figure 7. Inner zone with narrowed corridors in Parque João Goulart, remained open space and additive housing extensions © Kathrin Wieck, Manguinhos, 2008 (Wieck, 2015, 399)
Figure 8. Remained residual open space, devastated but frequented open space underneath high voltage line in CHP2 © Kathrin Wieck, Manguinhos, 2008 (Wieck, 2015, 399/32)

Figure 9. Strategic restricted access and sharing of household facilities in Mandela de Pedra, © Kathrin Wieck, Manguinhos, 2009 (Wieck, 2015, 381/33)

Figure 10. Wall as protection border in Vila Unidas, enacted state spaces, © Kathrin Wieck, Manguinhos, 2009 (Wieck, 2015, 388/34)
Abstract
Disruptive innovation is a term first defined by Clayton M Christensen in 1995 which describes any new technology that has the capacity to not only improve but render obsolete the technology that it replaces. New technology is often deemed disruptive as it emerges from the fringes and revolutionises an industry before the mainstay players have had a chance to adapt.

We see examples of disruptive innovation in everyday life as new technologies replace old ones and enable rapid changes in consumer or industry trends. The smartphone is a perfect example, where one device replaces the function of many. Convergences in technology often lead to radical changes industry approaches.

The combination of global positioning systems, advances in camera drone systems and cloud computing coupled with high speed internet have created the conditions under which aerial survey has become an advanced and accessible technology capable of displacing traditional survey. The technology has led to an explosion of new software platforms, collaborative planning systems and modelling applications that dovetail into the expanding applications of BIM in the construction sector.

The large volumes of site specific data that drones are able to generate quickly and affordably are contributing to an expanding database that allows complex environmental models to be created. The ability to create and process such large volumes of information on remote servers is commonly referred to as Big Data.

The availability of this technology and cloud based processing is creating an environment in which the designer is now able to acquire, process, analyse and present virtual simulations of the land in an environment that enables global collaboration.

Whilst large databases present an opportunity for an evolving and constantly updated model of our planet, they also raise the issue of information security and the threat of cyber terrorism. This
paper discusses how the evolution of remote sensing technology is likely to revolutionise future of planning and decision making within the next decade.

Disruptive Innovation in Land Planning

Innovation has often been described as a response to a problem where the current solutions are unable to fulfil the requirement. In most areas, we see innovation moving in small steps or occasional leaps. Sometimes a new idea has the power to completely revolutionise an industry. This is commonly referred to as Disruptive Innovation. The term was first defined by Clayton Christensen in 1995 as any new technology that has the capacity to not only improve but to render obsolete the technology that it replaces. New technology is often deemed disruptive as it emerges from the fringes and revolutionises an industry before the mainstay players have had a chance to adapt [1].

We see examples of disruptive technology in our everyday lives. The rise of the smartphone has virtually stamped out traditional mobile phones, sat-nav devices and compact cameras and combined these into a user friendly and internet connected multi-media platform. Just as the smartphone has revolutionised the user experience in data acquisition (taking photos or recording video) and information sharing (email, social media, cloud based platforms), the planning sector is now waking up to the prospect of an information revolution.

The planning sector often moves slowly and is process driven. While computers have accelerated the way in which drawings and representations are made, the steps taken to arrive at a finished scheme usually progress in a linear fashion with several iteration loops along the way. The widespread adoption of building information modelling (BIM) has created a platform for the sharing of construction information in a single model database. Completely independent of this, geomatics and remote sensing combined with the rapid acceleration of drone technology have revolutionised the collection and synthesis of
site information. The two technologies combined have the power to completely transform the process of design, enabling co-collaboration from the moment of project inception to its decommissioning and demolition. Other factors, such as 3D printing and virtual or augmented reality, have the potential to radically alter the design process. This paper is primarily concerned with the potential for unmanned aerial vehicles (UAV's) or drones in combination with other technologies to transform the construction industry.

Development of Land Mapping

The origins of site survey lie in the measurement of land parcels using rods or chains and later optical devices. These simple measurement systems remained largely unchanged for centuries. It was not until the advent of the aircraft that images from above the Earth’s surface were able to verify and correct the inaccuracies of ground based surveys. The invention of radio, radar and laser technology helped to provide greater accuracy in the measurement of linear distances but it was not until the birth of satellite systems that an accurate global map of the Earth was attained.

Whilst Global Positioning Systems (GPS) were first developed during the Cold War, the first fully functioning GPS constellation of 24 satellites was not active until 1995. This technology enabled for the first time a precise and globally accessible fixed point in space and time and ushered in a new era of mapping and surveying, leading to the development of a world geodetic system; a universal co-ordinate system that is used today in virtually all location devices. GPS has been an important part of land survey for the past two decades, but the process of recording and collating surface data has for the most part been a manual one.

Remote piloted aircraft systems, originally developed for military purposes, have led to rapid advances in navigation and camera systems that we now find in civilian drones. The combination of aerial photography with embedded GPS location data has led to a revolution in remote
sensing that is rapidly overtaking ground based survey solutions. This has, in part, been fuelled by the availability of domestic drones with highly advanced radio transmission, cameras and navigational systems. Using sophisticated flight planning software, drones are able to cover large areas of land, acquiring high quantities of overlapping images that can be processed as a single image. The drones ability to record accurate location and altitude means that the data encrypted into each image can be used to construct a 3D representation of the ground plane.

**Information Processing and the rise of ‘Big Data’**

The first step in the process of creating a 3D terrain mesh is the creation of a point cloud. Using complex algorithms, computers can assess corresponding pixels in overlapping images to detect the geometry of objects based on the drones changing position around the object. The creation of a point cloud can be a laborious and memory intensive process, depending on the size of the site. It is typical for a point cloud to contain over 20 million corresponding points of data. Once a point cloud has been created, the imagery that was used to create the geometry can then be draped over the geometry to create a virtual representation of the land parcel. The use of a world co-ordinate system, currently world geodetic system 84 (WGS84), means that the derived model can be accurately geolocated. The entire process from capture to 3D rendering can take as little as 8 hours depending on the size of the site. This is due mostly to another innovation that is transforming the industry.

Until recently, even with advances in the speed and power of personal computers, the processing required to manipulate large amounts of data was only available to large organisations. The emergence of cloud computing has enabled individuals or small organisations to buy a stake in large computer arrays that will store and process large volumes of data. Combined with high speed internet connections, this has created an information super-highway that enables large
and complex models to be assembled remotely. This offsite processing and storage of data is often referred to as ‘The Cloud’. The large amounts of information collected, processed and analysed in the cloud is often referred to as ‘Big Data’. It enables the combined computational power of many thousands of processors to evaluate problems as complex as financial forecasting, medical research and the search for life on other planets. The data from low altitude drone capture, low Earth orbit and high Earth orbit satellites is currently being assembled in data centres in order to create the most comprehensive model ever produced of our own planet.

Public access to this data via the internet means that informed decision making is able to move from the elite few and into the hands of the empowered many. The data acquired by drones can be used to create virtual models of sites through which the design team can collaborate at an early stage in the planning process. This has not yet replaced the need to physically visit a site to understand context and complex environmental or ecological systems, but it does provide a tool for a co-ordinated site appraisal. The combination of locally collected data, the here and now, can be combined with historic satellite imagery to determine change over time. The use of drones at regular intervals provides the capability to monitor short term change, for example progress on a construction site. This information in turn is being fed into an even greater and rapidly evolving model of our Earth that may soon provide real-time updates on the changing face of our planet.

With such large amounts of data and such enormous processing power come many challenges. As with other technologies such as email or social media, there is a danger of being overwhelmed by too much information. Filtering of information and separation of data into layers will be critical to accurately evaluate the relevant characteristics of a site. Identifying relevant data could become a more important function of site analysis in the future than the commissioning of surveys. Recent cyber-attacks on computers
using viruses, trojans or ransomware have raised concerns over the security of publicly accessible data. Increasingly centralised information and increased data traffic also poses a risk to personal computers accessing or contributing to the database. With so much non-validated information being contributed to data sets by individuals, there is also a risk that the integrity of the data may be compromised. Although data centres house millions of computers, they are less prone to attack than personal computers that often have lower levels of security and are prone to human error in the opening of infected files. The recent WannaCry ransomware attack, which affected over 200,000 computers worldwide, exploited a repurposed cyber spying tool known as EternalBlue, stolen from the US National Security Agency and leaked online [2]. The malicious software, spread through email or web browsers, was then able to exploit connections between devices on the same network, requiring a ransom to be paid for the decryption of ransomed data. The computer virus affected financial institutions, health services, train operators, telephone companies and government agencies around the world. There is an argument that Big Data offers protection against such attacks, acting as a digital fortress in the new information age.

The role of drones in Land Planning
The use of drones in site data acquisition represents a unique opportunity in the future of land planning. For the first time, an individual operator can carry out the site survey, provide site analysis and conceptual design, collaborate with a remote design team and co-ordinate a multi-disciplinary team. The resulting models can be easily replicated in 3D printed models or experienced through virtual simulations. The widespread adoption of BIM also provides a platform into which the original site data can sit alongside design iterations, highlighting the decisions making process from site data acquisition to completion. In the near future, it is highly likely that design companies will trade data with other organisations, contributing,
for example, aerial data capture, terrain and hydrology models in exchange for other layers of data such as geology, archaeology, ecology and heritage. We are on the verge of being able purchase both historic and current site data integrated into a virtual model, with options to upgrade the model at regular intervals. Such models would enable a team with a wide geographic distribution to collaborate in a virtual environment and for the client and planning authorities to follow the development process regardless of their location.

Our future perception of the drone is also going to shift radically from the current one. Advances in drone technology have enabled it to adapt to a wide range of environments and purposes. The drone has evolved from the fixed wing aircraft into the multi-rotor and quadcopter formats that we are now familiar with that provide a stable filming platform. These VTOL (Vertical Take-Off and Landing) platforms have found their way into numerous industries including aerial photography, inspection, survey, search and rescue and surveillance. Although delivery of goods is still some way off in urban areas, they have been trialled successfully for the delivery of medicines and emergency equipment in remote or inaccessible areas. Advances in camera technology have resulted in smaller, lighter and more powerful cameras that can easily be carried by drones. Many commercial drones now carry two or three cameras including visible spectrum, thermal imaging and FPV (First Person View) cameras that enable the creation of thermal envelope models to be constructed for buildings or for tackling fires. Drones are also able to contribute to other areas of the design and construction process such as the monitoring of works, or stockpile calculations in mineral extraction. Dr Raffaello D’Andrea, professor of Dynamic Systems and Control at the Swiss Federal Institute of Technology in Zurich, carries out research into the ability of drones to carry out complex operations and make decisions autonomously. He has even demonstrated the ability of drones to be programmed to build complex structures acting in collaboration with
other drones [3]. The Aerial Robotic Laboratory of Imperial College London is currently researching how drones could mimic nature by jump-gliding, an ability to climb and then spring from objects such as trees in order to prolong their flight time and exist in a natural environment to observe and gather data [4]. We may one day see such devices being employed in a surveillance role in our cities. The military has a strong desire to deploy micro-drones in close combat situations, to enter buildings and detect a threat or to distinguish combatants from civilians.

Emerging technology has the power to radically change the way that information about the environment is collected. So, could a swarm of autonomous drones take over the role of surveyors or even build the schemes of the future? According to a Stanford Report, there is fear in some quarters that advances in AI will be so rapid as to replace all human jobs—including those that are largely cognitive or involve judgment—within a single generation [5]. Whilst this has the potential to render whole sectors of the construction industry obsolete, it is more likely that many industries will adapt their operations to embrace the new technology rather than succumb to it. There is also evidence to suggest that smaller organisations will have a greater benefit from automation and AI. ‘Many organizations and institutions are large because they perform functions that can be scaled only by adding human labour, either “horizontally” across geographical areas or “vertically” in management hierarchies. As AI takes over many functions, scalability no longer implies large organizations’ [6].

It will also enable access to high quality data for small and medium sized practices and with the ability to carry out complex modelling operations in the cloud, give them an equal footing with large and multi-disciplinary organisations. We will likely see smaller niche practices becoming more competitive, more collaborative and able to operate on a global scale with lower operating costs. The use of drone technology is already enabling small practices to enter the design process at a more strategic level and at the
The level of automation that the use of drone technology and cloud computing offers will ultimately render more menial tasks, such as drafting, obsolete. While the adoption of drones and the growth of AI is likely to change the employment landscape, it is still unlikely that machines will render creative industries or cognitive tasks obsolete. The designer is still placed at that most unenviable position of having to consider all of the available information, make value judgements and filter out the irrelevant or unnecessary information. As long as planning decisions are made by committees and open to consultation with communities, the design process will still be led by people. Advances in technology may well change the way that the data is acquired or presented and it is highly likely that the information gathered by drones will inform the site planning process. As we continue the shift to virtual representation, we may ultimately see the decline of traditional drafting skills but equally more time invested into site modelling technology. Cyber security consultants and IT literate designers are likely to be successful future employees of firms who embrace this new paradigm.

**Conclusion**

Drones, coupled with other innovations such as cloud computing, virtual reality, 3D printing and artificial intelligence, are likely to continue to gather momentum as a disruptive innovation in the planning sector. Almost all new licensed commercial drone operators are individuals who have registered in the last five years. In June 2017, this number stood 2,897 in the UK. Although this number has grown rapidly, it has not kept pace with the vast increase in the sectors in which drones are being employed, from site surveillance to survey and aerial observation. As the industry matures it is likely to be absorbed into different practices as a specialist arm of consultancy and as the complexity of the systems and data grows, it is likely to spawn new sectors and new specialisms within the land planning sector. We can expect to see remote sensing become a
mainstream employment sector within the next few years and for the technology to become faster, more accurate and cheaper. Whilst we will continue to be bombarded by a constant stream of data, we can expect still further advances in the intelligence of the interface between the designer and the data. We may also be tantalisingly close to real-time observation of our environment, being able to playback in detail the events leading up to catastrophic failures in our infrastructure or in an evolving and complex situation such as climate change. The one remaining hurdle that drones are yet to conquer is the inherent mistrust of humans in automated systems. There has been a rise in reports of drones being used negligently, especially around airports, that may lead to tighter restrictions on their use. Much of the media hype around the misuse of drones would also appear to be aimed at whipping up public opinion against such technology. The question that remains to be answered is whether this is targeted at a genuine concern for safety or a more inherent fear of the rise of technology that drones represent. In either case it seems apparent that drones are just the first wave of new technology that is set to transform future practice in the planning and construction industry.

Endnotes


Abstract
The Appalachian Mountains of the Eastern United States are the oldest mountain range in North America and one of the oldest in the world. The landscape had been occupied for thousands of years in pre-European times by native populations that were often using river valleys as migration routes moving between settlement areas to the south and Pennsylvania and New York to the north. European settlers moved into the region in the early 1700’s but the region was not intensively settled until the mid-19th century with the birth of the Appalachian coal industry. Prior to the first coal mining after the Civil War, the first European settlers established small classic mountain Scotch / Irish communities and farmsteads. The region is also home to numerous French and Indian War and Civil War battlefields as well as Blair Mountain, the location of the largest civil insurrection in the history of the United States. Beginning first in the 1950’s, and more importantly in the 1970’s, the region’s character began to change drastically with the onset on large scale surface mining, often done with mountaintop mining and valley fill construction methods. This mining has also resulted in significant losses of known and potentially much greater losses of not yet discovered archaeologic and historic/cultural resources including important cultural landscapes. Currently in portions of southern West Virginia and eastern Kentucky active mountaintop mining is actually consuming significant portions of individual counties. For example in West Virginia there are currently over 300,000 acres in active mining or mining permits. This paper will describe a range of efforts that are focused on identifying and documenting remains, ruins, and traces of past landscapes and features in the region focusing on traditional methods, as well as emerging methods such as interpreting airborne and terrestrial Lidar, 3D photography, and drone based remote sensing. The paper/presentation will also address multiple scales of cultural resource loss and assessment – from individual features to larger cultural landscapes. The presentation
will also review methods being implemented to understand aspects such as larger heritage landscapes and the roles mined landscapes can assume in providing ecological services to adjacent communities with innovative landscape design. This documentation is also potentially timely, at least for the rich industrial / mining history of the region, with the recognition of the shortfall of historic industrial landscapes, given the renewed interest in such sites and landscapes on the part of the USDI National Park Service and the Geoparks Program of UNESCO.
Abstract

The Alps are considered one of the few wild and pristine areas in the vastly urbanised European continent. But even such a sublime landscape, is the result of programmatic intentionality and contextualised interpretations. The apparently fortuitous, natural incidents and the seemingly untouched environments in fact disguise the utterly artificial project behind. The social, cultural, and political resolutions that lie at the base of this spatial project are just as influential as the natural factors that intrinsically determine the landscape.

Venturing beyond the obvious topics of infrastructure, alpine architecture or technology, this paper explores how the landscape as a whole has been constructed, and through which mediums. Ranging from architects, to artists, to scientists, a collection of figures and the projects they developed is investigated, mainly in terms of their understanding of the alpine landscape and of their impact in mutating it.

Albrecht von Haller saw the Alps for the first time as a locus amoenus and turned them into a poem; looking at Mont Blanc, Viollet-le-Duc caught a glimpse of the Gothic cathedrals that had yet to emerge from the alpine range; Bruno Taut envisioned rocks turning into crystals to redeem a violent society; and a climber mentally traced the ‘magic lines’ that would lead his way up to the highest peaks.

All these visions come together to form our current interpretation of the mountain range and reveal the extent of the definition of landscape both as a concept and as a space. Their effect on originating a landscape is as relevant, if not more, as any concrete infrastructural or architectural intervention.

The following text is an extract from an ongoing investigation that began at The Berlage Center for Advanced Studies in Architecture and Urban Design in 2016. It is based on archival research and personal ramblings among the heights of
alpine literature and pathways. Such venture was triggered by the reading of Rene Daumal’s ‘Mount Analogue: A Novel of Symbolically Authentic Non-Euclidean Adventures in Mountain Climbing’ (original title: Le Mont Analogue. Roman d’aventures alpines, non euclidiennes et symboliquement authentiques). The unfinished novel, published posthumously in 1952, describes an impossible journey to an invisible yet necessarily existing mountain, that is eventually never reached. Mount Analogue convinced me of the possibility, or better, the necessity of building a mountain.

A mountain is a geological formation, the result of tectonic forces that raise the Earth’s crust, normally part of a greater system of reliefs, rather than an isolated landform. It is an impervious region in which natural forces manifest themselves in such an overwhelming way that wilderness seems to prevail over constant anthropic endeavours to conquer it. Its construction is a long process of sedimentation and erosion, invisible to the human eye. But a mountain is also an artificial construct, when it is transformed into a landscape. ‘The most splendid drawing of the chain of the Alps, irrespective of their relation to humanity, is no more a true landscape than a painting of this bit of stone,’ was once professed by John Ruskin, holding a rock in front of a crowd in Oxford. Mountains need to be gazed upon, interpreted, written about, studied, painted, climbed, in order to exist and play a role in our cultural, political, economical life. To a point where the physical relief is not even indispensable anymore, and it is its conceptual construction, the building of its imagery alone, that creates the landscape. A souvenir idealising an iconic peak could be already enough to prove the actuality of a fictional mountain. ‘People come in flocks to - not to see the mountain.’ Departing from their physicality and geological construction, and reaching the most abstract construct cast upon them by an explorer, an artist or an architect, mountains can be built and become part of an artificial, familiar landscape.
The Alps, in the European historical and geographical context, are the mountains *par excellence*. Their relevance is that of a cohesive geographical structure that spans through eight countries, provides borders and connections, and was the departing point for developing -from a western perspective- scientific and aesthetic knowledge of mountainous regions of the world. Still considered as a pristine and wild environment, the Alps are a constructed landscape. They are a spatial project. The apparently fortuitous, natural incidents and the seemingly untouched environments disguise the utterly artificial project behind. The social, cultural, and political intentionality that lies at the base of this project is just as influential as the natural factors that intrinsically determine the landscape. Many figures and imageries have contributed to the Alps, each one building a specific vision of the mountain range, a vision that has taken the form of a poem, say, or a geometric study, a scarf, a shopping mall, a snow globe. The effect of these visions on generating a landscape is as if not more relevant than any literal infrastructural or architectural intervention. Each vision synthesises the contrasting and apparently incompatible factors into a coherent system. An interpretation is cast, and that—despite the form it assumes—is already sufficient to generate a new kind of space dictated by a precise interest or position.

In pre-Enlightenment times, the Alps were made of stories. Stories of magical creatures, and of encounters that men had with them. The Swiss intellectual Johann Jakob Scheuchzer, in 1708, catalogued the species of a series of dragon-like beasts as recalled by villagers who ‘met’ them or as heard in folk tales. The descriptions and detailed illustrations of these creatures were compiled in his eminent book *Itinera alpina* (*Ouresiphoitēs Helveticus, sive, Itinera per Helvetiae Alpinas regiones facta annis MDCCII, MDCCIII, MDCCIV, MDCCV, MDCCVI, MDCCVII, MDCCIX, MDCCX, MDCCXI: plurimis tabulis aeneis illustrata*), and were combined with natural
science observations about biology, geology and hydrology of the alpine chain. His figure is ambiguous and seemingly incoherent, as it is his attempt to partially overcome the orality of the landscape through its materiality. He, like many other travellers that followed in the second half of the eighteenth century, finally saw the Alps as physical entities made of rocks, ice and water. He gave names and explanations to its composing elements, while the mythological space of the Alps transformed into a very concrete one. And yet, the process of rationalisation still left room for archaic mystery and wonder. Numerous other scholars –like Horace-Bénédict de Saussure, who is considered the founder of the discipline of alpinism–, took part in the discovery of the Alps. After centuries of inspiring fear and awe, the Age of Enlightenment prompted many intellectuals to conduct the first systematic studies of this environment, particularly in the fields of botany and geology. The wild and obscure Alps became more vivid, more readable, and therefore more relevant, for at least an elite of travellers and intellectuals, if not for society at large. The Alps were made of rocks, of earth, and water, and trees, and finally rendered concrete and measurable. Once started, the process of systemisation of knowledge re-created the mountain chain as a composite scientific model.

Connected to the scientific discovery of the mountain chain was also its artistic discovery. The ancient stories were forgotten, and new ones introduced, reshaping the Alps as a new, hospitable landscape. The publication of an anonymous poem in 1732 entitled *Die Alpen* is a pivotal moment, as demonstrated by the many editions and translations later acknowledged by the author Albrecht von Haller, that brought forward this radical landscape paradigm. The Alps were fabricated for the first time, despite the harshness of their morphology, as a pastoral landscape, rehabilitating the imposing, fearsome alpine territory. Since the poem also raised scientific interest, it attracted the attention of a wider public, ultimately culminating in the emergence of alpine tourism.
In the 1800s, the Alps—in all their recently ‘discovered’ materiality—were constructed once again as spatial structures, and to them were ascribed different spatial theories, for man needed to associate cultural meaning and explanations beyond mere scientific facts to such complex and apparently fortuitous landscapes. Figures like John Ruskin and Eugène Emmanuel Viollet-le-Duc developed such specific spatial structures in relation to the mountain chain. Ruskin’s masterpiece *Modern Painters* openly attests to his predilection for mountainous landscapes and to the fundamental role of the alpine range in establishing his system of thought about the sublime. The monumental spatial features so typical of the Alps, when connected to human scale, generated a new landscape: the sublime landscape. In fact, despite the intrinsic qualities of the Alps, Ruskin insisted on the argument that all landscapes and the very tangible matter that composes them receive their interest from the presence—actual or imagined—of man as standard for sublimity: there is, Ruskin states, ‘no more sublimity—per se—in ground slope at an angle of forty-five, than in ground level; nor in a perpendicular fracture of a rock, than in a horizontal one. The only thing that makes the one more interesting to you in a landscape than the other, is that you could tumble over the perpendicular fracture—and couldn’t tumble over the other.’

Viollet-le-Duc went even further, addressing and reconstituting Mont Blanc as a piece of architecture, in order to rationalise its materiality and assimilate it to conventional, well-known artefacts. Through observation he sought to decipher the formative logic of this section of the Alps so as to then be able to follow the same generating geometrical principles and restore its original appearance, in the same manner he would have approached the restoration of a building. Through study drawings and sketches, a new spatial framework was constructed and the gap between the poetical reading of the landscape (mountains as cathedrals) and the inscrutable natural incidents (the apparently arbitrary composition) was
overcome: the Alps became an architectural project.

It may surprise some to see an architect turn away from his art to enter into a domain that is not his own. In fact, the globe is but a vast edifice whose every part is coordinated and modified following absolute laws. To critically analyse a group of mountains, the way they were formed and the cause of their ruin; to reconstruct the order that presided over the their building up and composition, the condition of their resistance and durability vis-à-vis atmospheric elements; to chronologies the period of their formation and decomposition: it is, on a larger scale, to carry out a work of deduction and analysis analogous to that carried out by the practicing architect-archeologist who studies an old edifice in order to discover its origins, its renovations, and the cause of its degradation, before turning to textual sources. Here, however, texts are lacking, and observation is the only available method.4

The reality and materiality of the Alps inspired many, and in the twentieth century, they turned into utopian matter. The mountains briefly became the ideal backdrop for visionary ventures, based on the relief that such an immaculate landscape could offer to critics and outsiders of an allegedly corrupt society. In the early 1900s, the ‘Co-operative vegetarian colony Monte Verità’ was established near Lago Maggiore. The community sought for an alternative life style, freed of social and political constrains and more connected to nature, and attracted notable visitors among artists, philosophers and thinkers. The mountains were proposed as an unspoiled realm, where peaceful coexistence was attainable. Intrigued by a similar idealised reading of the Alps, in the aftermath of the First World War, Bruno Taut worked on the design of the coloured glass building blocks Dandanah and on a series of utopian drawings entitled Alpine Architecture. Both projects delineated a set of programmatic intentions about transparency, light, mobility, dynamism, self-building, and appropriation. The role of the toy was to render
tangible the project of construction of the mountain chain as the exemplary anti-urban setting in which to place a hypothetical society, evoked and claimed by the drawings. In this case, the Alps turned into glass, and through the colourful glass blocks, could be constantly redesigned in architectural terms.

The prominence of subjectivity and the emergence of the self in the second half of the twentieth century, took over all the collective ambitions, and the landscape reflected this new attitude. Distant figures like the artist Gerhard Richter and the architect Carlo Mollino developed personal projections with the Alps as focus, interpreting and taking inspiration from them through their very specific perspectives. The artist sought to emphasise and at the same time defeat the morphology and scale of the massive reliefs –recalling in some way Ruskin’s reflections on landscape. In his paintings, the play of light and shadow reduced the mass to an abstract combination of colour patches, extrapolating a subjective composition from an actual territorial instance. On the other hand, the Italian architect longed for an even more direct engagement with the malleable raw matter that landscape represented for him, to create his own idiosyncratic world. His contribution to the construction of the alpine landscape took the form of buildings, wearable accessories, and a book. As an architect, he advocated for a non-folkloric architecture based on vernacular traditions but responding to present-day standards. As a fashion designer he sometimes took inspiration from the mountains, as in the case of the foulard decorated with a representation of the ski grounds of Cervinia he designed in 1960. Ultimately, as a passionate alpinist and skier, he composed a book about downhill skiing, explaining the technique and indulging in the aesthetic aspects related to the discipline, such as the traces skis leave on fresh snow. Like in Richter’s case, Mollino’s landscape is largely deprived of its ethical values and is turned into a personal experience and an aesthetic agenda.
In the last few decades, the Alps have transcended their own physical and cultural boundaries, to question the contemporary notion of nature, and its relation to artificiality. The horizon has expanded, and the project of their endless construction is continuing on a global scale, reaching as far as to Dubai. There, the mountain range was transformed in an interior space: in a mall in the middle of the desert, a ski slope was built in 2005, and with it, a winter climate and a set of ‘typical’ alpine architectures and equipments, purposefully avoiding any national specificity. This example repositioned the framing of the alpine landscape within a blue-painted envelope, where the inherent artificiality of the Alps was finally made explicit and brought to the extreme.

[...]
Nature is not a thing, a domain, a realm, an ontological territory. It is (or rather, it was during the short modern parenthesis) a way of organising the division (what Alfred North Whitehead has called the Bifurcation) between appearances and reality, subjectivity and objectivity, history and immutability. A fully transcendent, yet a fully historical construct, a deeply religious way (but not in the truly religious sense of the word) of creating the difference of potential between what human souls were attached to and what was really out there.5

From the Persian Gulf, the Alps then drifted towards Berlin, a less exotic destination, but with a more explicitly critical intent, stressing ulteriorly the contrast between natural and artificial, real and fake. Jakob Tigges’s project The Berg, in fact, suggested the erection of a mountain on the Tempelhof Airport site as a new symbol for the city, and factually resulted in a series of postcards and souvenirs that proved the actual existence of the iconic mountain despite its fictional character. Landmarks don’t need to exists anymore, in order to generate memorabilia: the latter exist independently, and it is them that actually generate the original, the icon. The project thus stopped at the souvenirs—more real
and graspable than any landscape or physical space.

Finally, coming back to the alpine region, geology is at work once again: a real mountain is being built, or more accurately, moved. In Atelier Girot’s Alp Transit Depot project, a portion of a mountain from the Sotto Ceneri range is removed to give way to new high-speed tunnels, and transported to a nearby site, in Sigirino (Canton Ticino). There, the new mountain is being built with the debris of the original one, inserted into the existing landscape, and covered with vegetation, paths and water collection systems. Studies have been conducted to envision progressive evolution and integration with the context, and gain consensus: reliefs need time to come into being (even when geological proceedings are highly accelerated), but most of all, they need political approval.

[...] It wasn’t the mountain you were talking to, it wasn’t the mountain you conquered. The mountain is only rock or ice, with no ears or heart. [...]  

Besides, in difficult moments, you’ll often surprise yourself talking to the mountain, sometimes flattering it, sometimes insulting it, sometimes promising, sometimes threatening. And you’ll imagine that the mountain answers, as if you had said the right words by speaking gently, by humbling yourself. Don’t despise yourself for this, don’t feel ashamed of behaving like those men our social scientists call primitives and animals. Just keep in mind when you recall these moments later that your dialogue with nature was only the outward image of a dialogue with yourself.°

Rocks can be something more than just rocks, but they need men to be turned into crystals. If Jakob Tigges’s memorabilia represents the result of radical conceptual construction that takes away all physicality, John Ruskin’s very concrete stone occupies the other edge of the spectrum.
Yet a snow globe is a tangible artefact, a copy that exists autonomously despite the absence of its original, while the rock that Ruskin refers to is alienated from scale and meaning, and therefore turned into an abstract, unintelligible entity, away from its manifest and seemingly obvious corporeal attributes. The distinction between physical and conceptual, and between natural and anthropic, becomes blurred, almost irrelevant. It is within this very fluctuating range, that landscapes -and mountains- can be built. Indeed, the way a space is perceived and looked at already modifies the way it is used, even before concretely intervening in it. Hence the construction of the physical space and the construction of its imagery are two aspects of the same act –the construction of landscape: to build a mountain, one needs a physical action, but also and foremost, an abstract fabrication. The tension between these two endeavours only intensifies the incessant process of creation of the landscape, constantly redefining what we thought we knew about it. It instructs ever-mutating uses and interactions in accordance to the intrinsic qualities of the environment on one hand, and our goals and interests as a society on the other.

Thus, the construction of the Alps still continues.

Endnotes
Carlo Mollino, Foulard with representation of the ski grounds in Cervinia, c. 1960, Collezione Casa Mollino, photo F. Ferrari.
Abstract
This paper focuses on the field of tension between design and production processes on the one hand, and the development of individual street furniture on the other hand. How do design- and construction methods influence the properties of the resulting object?
Street furniture plays an important role for the quality of urban life. It should improve the usability, accessibility and comfort of public space, contribute to a city's identity and fulfil aesthetic demands. Specific street furniture should therefore be developed, especially for key spatial situations. In reality decision-makers often choose from standardized facilities from catalogues, mainly because of limited budgets, maintenance reasons and an increased planning effort.
The paper explores the findings of a student workshop at the Technische Universität Berlin. The students needed to create appropriate, individual street furniture and explore suitable methods for designing and making them. CAD/CAM solutions can bridge the gap between design and manufacturing, but not every approach is suitable for every object. It was recognized that the designing tool had a strong influence on the resulting shape due to limiting factors of the software used. The best results in terms of creativity, developing individual ideas and the appropriateness of the design solution were achieved by using multifaceted design methods. These involve experimental model-making and the combination of various analogue and digital design strategies. CAD/CAM solutions open up new possibilities, especially for the production of complex forms. The cooperation with an external company that introduced a machine for the production of free formed concrete elements, gave us the possibility to test an innovative production method. The mastering of the required digital software tools is however mandatory.
Methods vs. Results. The field of tension between design, production and form of street furniture.

This paper focuses on the results of a student seminar at the Technische Universität Berlin (TU Berlin). The aim of the seminar was to develop individual street furniture for specific sites. We explored if and how the tools used for designing and manufacturing are influencing the resulting objects.

Street furniture plays an important role for the quality of urban life. It should improve the usability and comfort of public space for a wide range of users and help to include people with special needs e.g. people with a limited mobility. According to Maria Sanchez and Lois Frankel, street furniture is ‘able to aggregate people’ and also contributes to a cities identity [1]. Therefore aesthetic demands should also be fulfilled.

Objects that do not meet the needs of the users or poorly designed street furniture that is not integrated within the design principles of an open space, encourage negative effects like exclusion, a sense of emptiness, hazards or vandalism. Gökcen Firdevs Yücel, Street Furniture and Amenities [2] This can lead to a lower acceptance and thus to a downgrade of a place, higher costs in terms of maintenance or even to injuries due to decay or damages to the furniture. The selection of street furniture should thus be made relating to the specific local context, which also means in consideration of the spatial situation, expected users, required uses, the intensity of utilization, the built and natural environment, local traditions and thermal comfort. With this in mind, street furniture would not appear cluttered and random but embedded in the design principles and matched with what we call the genius loci, the spirit of a place.

Landscape Architecture aims to offer specific, tailor-made spatial solutions. While this statement seems to be valid for the common spatial design, my experiences as a professional landscape architect show that decision-makers and designers often do not consider the specific requirements for street furniture but choose standardized facilities from catalogues instead.
This is predominantly due to limited project budgets, maintenance reasons and because of the necessary planning time for the creation of individual solutions. Similarly, in their publication *Landscape Architecture and Digital Technologies*, Jillian Walliss and Heike Rahmann state that ‘Economies of scale and limited budgets often limit the opportunities for bespoke design in landscape architecture’ and that ‘Furniture, engineering infrastructure, paving and lighting are frequently specified from design catalogues, rather than specifically designed and constructed for a project’ [3]. In some municipalities it is actually required to ‘only make use of certain specific furniture designs that can be easily cared for and maintained…’Cordula Loidl-Reisch, *A Remarkable Process of Catching Up Currents and trends in Austrian landscape architecture 1994-2014* [4]. As financial reasons and maintenance are certainly important factors for decision makers, this strategy is not generally wrong, especially if related to common spatial situations. Many of these ready-made outdoor elements fulfil aesthetic and functional demands. They are stable and durable and might even contribute to a cities corporate design. Nevertheless it has to be questioned, if standardized products can satisfy the requirements of specific local situations and contribute to the creation of a unique atmosphere and distinctive spaces. In different cities but also in different locations within a city, one can find the same products. Critically viewed this approach could lead to a desolation of public spaces. Therefore specific street furniture should be developed for key spatial situations.

The chair of landscape construction at the TU Berlin has a long tradition in exploring and identifying suitable objects for open spaces. In addition to the search for ergonomic solutions, production and maintenance at reasonable costs, it is our aim to create and provide knowledge about design and fabrication of street furniture that exceeds standardised products in terms of an appropriate atmosphere.

In a Design-Build Workshop we developed multifunctional street furniture that improves
the usability of existing elements as a response to mono-functional furnishing at the Campus of the TU Berlin. To deliver various use, we mounted rotatable stools on concrete bollards so that they would become seating elements and also play equipment instead of just preventing access by vehicles.

In another course, led by Prof. Cordula Loidl-Reisch the students examined the aspects that contribute to the convenience of seating elements. By self-testing the students found out that the most important elements of comfort are the rounded popliteal area, the possibility to bend the legs, a gentle inclination of the backrest and armrests to give support when sitting down or standing up. Flexible seating and a variance, e.g. in terms of the seat height for different age groups add to comfort. Regarding the aesthetic impact it should be noted that integrated in an overall design the seating elements were recognized as a part of the design itself instead of additional furniture. Cordula Loidl-Reisch, Was ist bequem? [5]

Within the DFG (Deutsche Forschungsgemeinschaft) research project entitled Landscape architecture and the time factor, Simon Colwill develops a ‘low-threshold and non-destructive monitoring method for identifying frequently occurring points of weakness and patterns of change through field research’. The main goals of the investigation are to identify and analyse the key causes of change through time and develop optimization strategies for landscape details. Simon Colwill, Time, Design and Construction [6]

Altogether these investigations contribute to the creation of knowledge on outdoor objects. Additionally we explore the relation between digital design tools in connection with innovative methods of production and the built object. The prevailing methods of construction and available tools influence the creation of architecture and architectural objects. Skyscrapers for example could only be implemented through the invention of skeleton construction and the elevator. Rem Koolhaas, Delirious New York [7] Another example is the
crystal palace in London that was ‘...embodying the technological spirit of the Industrial Age and heralding a future of steel and glass buildings’. Branko Kolarevic, Architecture in the digital age [8]

Similarly, outdoor objects always refer to the state-of-the-art. For example, when visiting historic parks and gardens of the baroque era or browsing through publications about them, one mostly finds seating areas made of natural stone. Construction materials of garden furniture always reflected the availability, prevailing fashions and the existing climate conditions. In the late 17th century, lead that was painted or treated to appear like natural stone, represented the cheaper material. Benches were produced from wrought iron. Due to the industrial revolution other materials appeared. Wrought iron was replaced by cast iron that could be produced cost efficiently in high quantities. Since 1760 artificial stone made from aggregate and cement as basic materials and produced through casting moulds in mass production became predominant. Philip de Bay, Gartenkunst im Spiegel der Jahrhunderte [9] Today, available materials and forms are almost unimaginable, including natural stone, concrete, brickwork, various metals, plastics, various composites or wood.

The arrival of CAD-Programs into the practise of architecture- and landscape architecture has enabled shapes that could not have been drawn simply with scale rulers and a compass. It has also become clear that file-to-factory software and CAM (computer-aided manufacture) allows new ways of manufacturing. Mario Carpo, Die digitale Architektur nach der ersten Begeisterungswelle [10]

In his essay Christian Kerez’ Kunst des Zufälligen, Mario Carpo described how the digital designing tools and methods of production led to a style of smooth and curved lines and surfaces in the 1990ies. The biomorphic style, optimized by architects like Zaha Hadid, called Blob-Architecture is still alive, known as parametrism. [11]

Emerging new methods of production and enhanced design tools are at disposal in an
ongoing student seminar, where the aim is to create street furniture that is individually adjusted, versatile and comfortable as well as easy to maintain, cost-efficient, sustainable and matched to the local context. We intend to find out how new design- and production methods can contribute to the development of street furniture that fulfils the requirements mentioned above. The cooperation with Clever Contour, an Austrian start-up enterprise, offered the opportunity to test an innovative production. The idea of Clever Contour is to produce free form object elements out of concrete at reasonable costs. In order to achieve this, offset lines get laid digitally over a 3D-Scan or a 3D-Modell of an object. These offset lines correspond to the bending lines that form the shape of the built object later on. As the Data is transmitted directly to a manufacturing machine that bends single plastic struts, the gap between design and construction is bridged. Due to their small size and weight the plastic struts can be easily transported on site where they are fixed together, encased with a wire gauze and covered with shotcrete. Christoph Hauzenberger, Freie Formen für alle [12]

In his publication about architectural design, Werkzeuge für Ideen, Christian Gänshirt describes that a designer can choose from a broad range of working methods to specify ideas. According to him, the essential function of these methods is to make personal ideas visible, editable and open for critical reflection. Design tools allow the reduction of complex issues to manageable aspects and thus every design tool influences the perception and possible solutions of a problem in a specific way. [13]

In the seminar mentioned above, this statement was affirmed in an impromptu exercise which showed the strong tendency that digital tools have a big influence on the resulting shape. Almost every form study made with Rhino, a 3D application software based on the NURBS mathematical model, led to soft and curved shapes. In order to avoid such a strong effect by the possibilities of design tools, the students were obliged to apply different tools and design
methodologies. In interim presentations and feedback conversations we worked out which approach (e.g. designing with analogue or digital model-making, sketches...) would be the most promising technologies for each student team. In the early stage of product development I encouraged the students to use both- analogue and experimental designing methods. They initially sought inspiration through attentive observation of their environment with the goal to discover, analyse and document interesting forms. Role models were found in animate and inanimate nature, arts, design, technique and through individual experiments with different materials and substances. The discovered shapes were then documented through sketches or by digital image editing and their characteristics analysed through abstraction. Divergences between analogue and digital analysis methods became obvious already in this early stage. Analysis of the characteristics by manual sketching indicated a tendency that point and linear structures like frames or strings were considered essential. While working with digital tools like Adobe Photoshop, surfaces and their textures seemed to have a more important role. From the resulting attributes, rules and criteria for the development of interesting forms were derived.

The outcomes of this first inspiration-phase were overlaid with the outcomes of experimental model-making. For this purpose the students experimented with different materials, machining tools and different additive, subtractive and generative methods of model-making in order to find out which materials and methods would fit to the defined rules and criteria best. An additional benefit of experimental model-making was discovered. Results that appeared by accident, such as negative forms, broken parts or materials that were behaving differently to what was expected, sometimes turned out to be even more interesting than those that were initially intended. Without the experimental methods, solutions that showed up coincidentally (but not arbitrary), would not be detected. Based on the results of the inspiration-phase and the
experimental model-making a design concept was formulated. The design concept serves as the basis for decision making in the process of the development of the outdoor objects in order to give them a mandatory nature instead of remaining arbitrary.

Subsequent to this conceptual-phase the students started to develop feasible street furniture that should fulfil its specific demands. Considering that, the students defined the location for their object, specified the scale and the materials to be used. Attention was also paid to the fabrication method together with the production costs, requirements of maintenance, technical feasibility and legal requirements. Digital technologies encourage seamless and sophisticated workflow processes, bridging the gap between design and making in unprecedented ways. Jillian Wallis, Landscape Architecture and Digital Technologies [14]

In particular those students that were using digital technologies considered the production from an early stage of the design process. Observations of the usage of appropriate materials, structural aspects, maintenance but also logistic reflections like transportation and the installation on site were taken into account at almost every stage of the design phase, and thus also had an influence on the shape and the appearance of the final product. By simply changing design parameters a diversity of variations can be automatically generated: the ability to produce many different variations by digital parametric design tools in a short period of time (compared to standard CAD modelling) reveals one of the major benefits. Instead of modelling an external form, designers could articulate an internal generative logic, which then produces, in an automatic fashion, a range of possibilities from which the designer could choose an appropriate formal preposition for further development. Branko Kolarevic, Architecture in the digital age [15]

The new technical possibilities are beneficial for designers but also require specific know-how in order to use the right approach for the right task. A precondition for using the new
tools is to master the digital software needed. Many students failed to use the plug-in of Clever Contour for Grasshopper software as it took them too long to get good results from it. While almost all students master CAD-Programs like Auto Cad or Vectorworks, only a few appeared to master Grasshopper in the available time. The vocational practice indicates a split-up in the group of designers that are able to use these tools in an appropriate way and the others. Instead of expecting all landscape architects to have the know-how to work with specific CAD/CAM software, a job specialization could be beneficial. It needs to be considered if the required software will be mastered by more students in the future and discussed if, how and to what degree the use of new digital designing software can be integrated into education.

Building models with analogue model-making techniques and convert them into a digital file through 3D scanning or 3D photography represents an alternative to designing with 3D software. As 3D scans lead to big files it turned out that the subsequent processing at the computer is difficult because of a lack of computer performance. Another precondition is to gain know-how about possibilities and limitations of the respective Computer Aided Manufacturing method. Not every approach fits to every object. The approach of Clever Contour for example leads to soft and round curves and surfaces but is not the right tool to produce hard edges or angles. Providing these preconditions CAD/CAM approaches offer a lot of benefits. ‘They opened up new opportunities by allowing production and construction of very complex forms that were, until recently, very difficult and expensive to design, produce and assemble using traditional construction technologies’. Branko Kolarevic, *Architecture in the digital age* [16]

The combination of different designing and production tools often led to appropriate solutions for the student proposals. One student group for example developed a multifunctional outdoor object. Given a basis in concrete which is supposed to be produced by Clever Contour, the
implementation planning only exists as a digital 3D-Model. Additionally wooden seat covering with a steel substructure will be mounted onto the concrete form. The implementation planning for this was done by using classic presentation methods like plan view, sections, elevations and construction details.

It is expected that the CAM tool of Clever Contour will reduce the production costs for creating specifically designed street furniture out of concrete, especially those with complex shapes as costly formwork building can be avoided. This expectation will be tested at a later stage of the investigation through comparing the calculated costs of the objects developed from our partner companies with the costs of similar objects from a conventional provider.

The ability to translate designs from 3D digital systems into physical installation without depending on 2D abstraction, so called ‘file to fabrication’, opens new avenues for more efficient, automated production processes.

Jillian Wallis, Landscape Architecture and Digital Technologies [17]

An outcome of the seminar is in recognizing that it is counterproductive to start designing with digital tools from the very beginning of the design process because the results are influenced by the limiting factors of the software. The best results in terms of creativity, developing individual ideas and the appropriateness of the design solution, were achieved by using multifaceted methods. These involve experimental model-making and the combination of various analogue and digital design strategies.

In terms of maintenance the student results were not able to deliver statement to the questions if innovative CAD/CAM solutions can contribute to the improvement of maintaining street furniture. Further investigation is needed to answer this question. But it is a well-known and long term applied practice that digital tools are used for mapping and monitoring. To ensure a pinpointed maintenance of street furniture, an appropriate mapping and monitoring system should be developed further.

The user evaluation of built street furniture
developed in Design-Build seminars at the TU Berlin led to the understanding, that the development of individual street furniture is a highly complex task. Although we pursued an intensive design process and considered issues like analysing the local context, the durability of materials and constructions, or user comfort, the outcomes of the evaluation highlighted certain problems with craftsmanship. This leads to the presumption that the designing of individual, high quality street furniture is no task that can be satisfied by landscape architects alone but rather should be developed by multidisciplinary teams, or in cooperation with professionals from other disciplines like furniture makers, carpenters, metalworker or product designers.

Conclusion
New and innovative CAD/CAM solutions promise a wide range of possibilities for the development of individualised open space furniture that is adapted to the specific local context and cost efficient at the same time.
The results of the student seminar at the TU Berlin, where we explored the interplay of new tools of design-creation and the production of such objects are encouraging: the tools provide benefits for the creation of individual solutions, especially for objects with complex forms as they help to bridge the gap between design and manufacturing. The selection of the right combination of design tools, production methods and suitable materials is of great importance and assists in generating appropriate solutions.
The resulting shapes of street furniture are strongly influenced by the design tools used. In order to avoid that designers become slaves of their software, but use the software as a creative tool in implementing ideas, it is advantageous to stick to experimental and hand-made modelling in the initial phase of design. The digital technologies turn out to be quite advantageous in more detailed phases of design and to translate ideas into machinable drawings. The mastering of the required digital software tools is however mandatory.
Since the development of individual street
furniture is a highly complex craft, cooperation with other disciplines are advised.

References
Bauhaus-Universität Weimar, p. 139.


**Image credits:**

Fig. 1-4: student: Friederike Zillmer, Workshop Landscape Architecture 2017, TU Berlin

Fig. 5: students: Friederike Zillmer, Quentin Derniaux, Themenbezogener Objektbau 2017, TU Berlin

![Fig. 1: Inspiration](image-url)