PORTUSplus_the Journal of RETE
N. 9 - 2020, Year X
Issue "Research Themes"
RETE Publisher, Venice, ISSN: 2039-6422

ABSTRACT

Port cities understood as complex human-environment systems are in an urgent need of complying with sustainability goals in the wake of the changing climate and the resulting economic and social consequences. Furthermore, such systems' interdependencies are not fully understood, changes in them not fully predictable, and straight forward solutions to make them more fit for future challenges tackle part of the problem while generating other. Hence, port city development poses to any actor involved what researchers have identified since the 1970s as 'a wicked problem'. Contemporary researchers engaged in the study of such problems increasingly recognise the inability of a single field of knowledge to generate pertinent answers, pointing at transdisciplinary science to be the only way out. In this paper we invoke basic tenets of transdisciplinary science to call for the inclusion of the discipline of landscape architecture into port-city studies. The disciplinary understanding of dynamic human-environment systems as 'landscapes' prompts the production of multi- and transdisciplinary knowledge, in particular through design research. Based on a case study of three design projects for transforming post-industrial port sites in Nantes (France), Gothenburg (Sweden), and Providence (U.S.A) the paper discusses how their design approaches (iterating, prototyping, simulating) could render planning procedures more dynamic. Furthermore, the paper theorises the interdependency of place and site, project and process, practice and theory.

Building transformative capacities: integrating design research into port-city transformation

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KEYWORDS
Port-city transformation, Dynamic planning procedures, Landscape perspective, Design research, Transdisciplinary research

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Landscape architectural design research for port-cities

Ports and cities are dynamic by nature, as are landscapes. Goods and freights being shipped in and out of ports, the names and flags of vessels reminding us of places far away and close, tides bringing water in and out. Layers and layers of city fabric from various epochs melt together with people's dreams and ambitions to create and reinvent contemporary spaces for urban living. In the discipline of landscape architecture, space is understood both as a physical space and the processes that shape and change it (Stokman 2013). Port cities, just as other cities with an industrial past, are complex human-environment systems undergoing massive transformation in the deindustrialising regions of the globe. Furthermore, they face the urgent need to comply with sustainability goals in the wake of the changing climate and the resulting economic and social consequences. Interdependencies of these developments are not fully understood, futures are not fully predictable, and simple solutions mostly tackle singular problems while neglecting or generating others. Hence, port city development poses to any actor involved what researchers have identified since the 1970s as 'a wicked problem' (Rittel & Webber 1973). Contemporary researchers engaged in the study of such problems increasingly recognise the inability of a single field of knowledge to generate pertinent answers, pointing at transdisciplinary science – also known as Mode 2 knowledge – to more successfully address complex cluster problems (OECD 2020). In this paper we invoke basic tenets of transdisciplinary science to call for the inclusion of the discipline of landscape architecture into port-city studies. Its understanding of dynamic human-environment systems as 'landscapes' prompts the production of socially distributed Mode 2 knowledge through design research. Based on a case study of three design projects for transforming post-industrial port sites in Nantes (France), Gothenburg (Sweden), and Providence (U.S.A), we investigate how design research can add knowledge raised from design practice to complement scholarship offered by other disciplines, so far more prominent in port-city transformation studies than design.

Transdisciplinarity as a theoretical foundation

The study of port cities allows to grasp the complexity of sustainable urban transformation because port cities are particularly exposed to driving forces that are eclipsing achievements to meet the sustainable development goals. This has been discussed from various disciplinary vantage points in this journal, for example in terms of effects of globalisation, international trade, labour distribution and the respective social implications. Port cities are also situated in densely populated spaces on the edge of water bodies and water ways, hence particularly affected by climate change through shifting water regimes and their spatial and socio-environmental consequences. Imagining a sustainable future for port cities while spatially transforming areas left over by the evolving port industry into environmentally resilient and socially viable urban districts poses a societal challenge with no straight-forward solution. This resonates with the problems of global urbanisation addressed by different scholars active in the arenas of urban studies and critical urban theory (cf. Sassen, Sennet, Burdett, Brenner, to name only a few). Its complexity escapes the scope of traditional urban planning practice as much as that of traditional science. Landscape architecture (practice and research) can offer new approaches to this endeavour, including the knowledge of socio-spatial and environmental interrelationships and design thinking, which so far have rarely been included into port-city studies and their transdisciplinary nature.

A recent report by the OECD (2020) confirms that transdisciplinary research can complement traditional research endeavours to meet sustainability goals, as defined by the Agenda 2030 (United Nations 2015). This is argued to be favourable in highly complex situations with unpredictable futures and causalities beyond the explanatory agency of one single field of knowledge or even scientific knowledge at all, i.e. where non-academic stakeholders are deemed to raise and implement knowledge indispensable for tackling the complexities at hand:

> "TDR [trans-disciplinary research, note by the authors] […] offers a practical way to address issues that are highly contested and where stakes are high. It can expand on existing scientific evidence and give rise to more innovative, holistic solutions. It can generate both new scientific insights and practical societal benefits. As such, it is a necessary complement, but not a replacement, to traditional research practices. However, given the scale and urgency of the human-environmental system challenges that society is currently facing, there is a strong argument that TDR needs to be scaled up very considerably and become a mainstream modus operandi for research" (OECD 2020: 9).

Transdisciplinarity is defined as a mode of knowledge production bringing together academic researchers from various fields of knowledge (natural sciences, social sciences, humanities) and non-academic actors of various arenas of society (authorities, industry, professions, NGOs, civilians) (Swiss Academies of Arts and Sciences). The history of scientific development led from the emergence of modern science, in the 16th and 17th centuries, to the disciplinary fragmentation and specialisation of the natural and social sciences and the humanities, in the 19th and 20th century. But already during the second half of the 20th century it was recognised that the resulting 'science silos' would not be able to address societal complexity and this spurred the emergence of systems thinking and eventually the claim for integrative research across disciplinary boundaries, termed 'transdisciplinarity' (OECD 2020: 16-18, Augsburg 2014: 234-238). Since, various scholars of different origins have studied how to redefine and reframe science in relationship to society. Silvio Funtowicz and Jérôme Ravetz call 'post-normal science' a research practice that integrates an 'extended peer community' into knowledge production (1993), including non-academic stakeholders. Lima de Freitas, Edgar Morin and Basarab Nicolescu take up the term of 'transdisciplinarity' in the first Charter of Transdisciplinarity (1994). Michael Gibbons et al. (2001, 1994) point out that research is increasingly carried out in dialogue with a large number of different actors who bring heterogeneous skills and expertise into the problem-solving process, which they came to call 'Mode 2' (Nowotny et al. 2003, 2001). Schneidewind et al. (2016) claim that a so-called 'transformative science' could even initiate and catalyse societal transformation processes, beyond observing and describing them. Today, transdisciplinarity gathers a growing community of scholars and society actors, which most recently led to the creation of the International Alliance of Transdisciplinarity (Swiss Academies of Arts and Sciences 2019).

The ongoing repositioning of science, society and knowledge production has also gained attention in the design disciplines, which all feature close links to the professions they have emerged from, including landscape architecture. Their closeness to professional practice prompts their predisposition for entering transdisciplinary processes of knowledge production from within the context of its application (Gibbons et al. 1994). It clearly resonates with design research (Cross 2011 and 2007, Brown 2009, Simon 1996, Frayling 1993, Schön 1983), which is mostly associated to Mode 2 science, one of the many forms of TD research and referred to in landscape architecture (OECD 2020: 17, Prominski and Seggern 2019, Seggern et al. 2008, Nowotny 2003 and 2001). As design professionals act in concrete projects, inter alia in the realm of port-city transformation, they can contribute to raise knowledge from within the very contexts they are embedded in. This knowledge will "always [be] produced under an aspect of continuous negotiation and it will not be produced unless and until the interests of the various actors are included" (Gibbons et al. 1994: 3-8). Mode 2 research sometimes shares the context of application with the so-called applied

sciences, found inter alia in engineering and computer science with their very practical but restricted problem scopes. Mode 2 knowledge however distinguishes itself from the applied sciences through the nature of the contexts of application, which embrace higher complexity and a broader range of intellectual and social demands. This is why Mode 2 research can also turn into genuine basic research. The case study discussed in this paper present an example of such a shift, as it conceptualises and theorises knowledge raised by designers and other professionals in concrete port-city transformation into generalisable insights on how to advance planning practice and design scholarship for port-cities from a landscape architectural perspective. The cases have been first discussed in a Ph.D. thesis focused on urban transformation projects, without elaborating on the fact that the location of these projects were port cities. In the context of this paper the authors speculate if port cities can accommodate forward looking projects more easily because of their particular local cultures (cf. Warsewa 2012). Port cities' resilience can thus be seen as laboratories for other cities with transforming industrial areas (Hein 2019).

Capturing human-environment systems from a landscape perspective

Complex dynamic conditions characterise port cities, and they are inherent to landscapes. Opposing the lay understanding of landscape as a static scenery made from vegetation, we rely on the definition given by the European Landscape Convention: "Landscape is part of the land, as perceived by local people or visitors, and which evolves through time as a result of being acted upon by natural forces and human beings" (ELC 2000). Furthermore, the European Landscape Convention describes landscape as being something beyond mere physical space and states that "the landscape forms a whole whose constituent parts are considered simultaneously in their interrelations" (ibid). This demands that increased complexities in the overlay of planning, design, implementation, and management perspectives need to be navigated. Studying port-city transformation from a landscape perspective we resist the conventional idea of planning, design, implementation, and management being subsequent protocols in a linear process and suggests them to exist simultaneously.

In this understanding, we propose that landscape as an integrated system includes all sorts of dynamics, embracing human perception and imagination and challenging the supposed dualism between nature and culture, or between landscape and city. Space from a landscape perspective is understood as interwoven with the processes that shape and change it, as discussed by the landscape scholars Antje Stokman (2013) and Lisa Diedrich (2013). In landscape architecture natural spatial conditions and nature processes are considered on an equal footing with man-made elements and human practices.

This mindset relies on the assumption that things do not exist in isolation from one another but are moving parts in a complex network of simultaneous, multidirectional exchange. We argue that this makes the landscape perspective particularly promising for the study of port-city dynamics: no one singular object or defined unit, be it a building, a tree, an entire port area or an urban ecosystem, will be conceived as fixed and finite but instead as continuously in evolution, while being seen in relationship to other objects and units, their socially constructed ideas and imaginations, and their development in the interplay of natural and human forces – an integrated systemic view, corresponding with the basic tenets of transdisciplinary science.

Added epistemological values, when studying port-city dynamics from a landscape perspective are:

- Recognising what is already there and an understanding of the processes that shape and change the landscape.
- Appreciating decay and emergence beyond linear understandings of evolution of space.
- Narrating to guide the understanding of place and a resistance towards undertakings for better, fixed or finite outcomes.

- Working incrementally and trans-scalarly without the obligation to act comprehensively and holistically.
- Bridging the gap between the arts and the sciences when linking up interpretations and measurements of a site understood as both natural and man-made.
- Encompassing the segmented branches of the sciences when putting natural spatial conditions and natural processes into a design orientation.

Designerly knowledge for port-city research

Understanding port-cities as landscapes is one thing, actively contributing to their transformation another. This is where landscape architecture offers transdisciplinary tools and techniques, extracted from design practice and theorised in design research. This qualify design as an investigative practice to generate knowledge for port-city transformation, instead of limiting design to a phase in the presuming linear procedure of 1/ planning 2/ design 3/ implementation 4/ management (cf. Kahn and Diedrich 2018). As a composite discipline – quasi a model for transdisciplinarity – landscape architecture encompasses epistemologies and methodologies of the natural sciences, the social sciences, the humanities, and the arts, while including design (Kahn 2016). Theorised along the concept of Design Thinking (Cross 2011 and 2009) landscape architectural design relies on its professional foundations, integrates other than academic actors in knowledge production processes, and offers the agency to lift professional expertise into academic research, and vice versa, to introduce research outcomes directly into real-world situations.

Landscape architectural design practice foster expertise in imagining, experimenting, evaluating, refining, communicating, and facilitating transformation processes in specific situations and on concrete sites; design research theorises, synthesises and enables transfers of that practice to strategic and academic levels (Prominski 2019, Buchner 2018, Herrington 2017, Lenzholzer et al. 2013, Deming and Swaffield 2011, Burns and Kahn 2005). Yet, designers in the field of landscape architecture have rarely entered the arenas of port-city research and port-city planning; they most often see themselves confined to realise a park, a promenade or other single elements of a larger transformation project. The agency of conceptualising these projects as port-city landscapes within port-city transformation has rarely been acknowledged on the meta-levels of urban research and planning (Diedrich 2013).

Consequently, in this paper, we start from identifying our objects of study as port-city 'landscapes', a concept sharing some similarities to the idea of 'port cityscape' introduced by Carola Hein (2019). We raise knowledge from a transdisciplinary case study of three design projects (Dahl 2020), and we ask how to integrate designerly tools and techniques into port-city planning procedures targeted towards sustainable port-city futures, with the aim to better respond to the shifting scales and temporalities in port-city transformation.

How can design dynamise port-city planning procedures?

Indeed, most changes to the physical landscape of ports and cities are stipulated through regulatory planning, communicated in some kind of strategic plan or prescriptive document, often termed masterplan, illustrated by a long-term vision of a future. As recognised by many researchers and practitioners, those plans and visions often fail to deliver what they promise, because the driving forces that act upon the sites slated for transformation are dynamic and changeable, dominated by the complexities of 21st century cluster problems (Giddings & Hopwood 2006; Wohl 2018; Halla 2002; Tian & Shen 2011). In urban planning this insight has led to calls for design (Romice 2017; Bullivant 2017) as a means for changing the nature of masterplans into "integrated, loose-fit frameworks designed as evolutionary, generative systems,

possessing adaptive capacities for intelligent differentiation of place" (Bullivant 2012, p. 276). Design and design thinking's coalescence with masterplanning holds a promise for many authorities in urban development to facilitate the shift from port to city as an incremental and site-specific process which allows for iteratively navigating complex and shifting temporalities and stakeholders' interests. In this paper we focus on projects that have applied design as the guiding principle for deciding what, where, who, and when to initiate change. Experimental design interventions allow to invite stakeholders and actors on site to interpret concrete situations and hypothesise specific futures. Dunne and Raby (2013) dubbed such practices 'speculative design', in which change actions can be both probable (strategic) and plausible (pragmatic) and then amplified one by one or in combinations depending on the site and situation (ibid). The paper elaborates on the approaches of augmenting, complementing, and supplementing masterplanning as viable means for interactions between masterplanning and design that support the upgrading of masterplanning to better respond to the complexities of 21st century cluster problems when ports are transformed into urban districts.

Site-specificity and incremental change require that speculation about the future starts from site and in the present. On a practice level this is an opportunity to link site and plan, and the status quo with a vision. On a scholarly level, it is a potential of transdisciplinary knowledge production. Robert A. Beauregard (2005: 43) discusses the interaction between the concept of 'place' and the concept of 'site' and elucidates that the intention of turning place into site is an action of emptying out a place from socially embedded narratives in order to prepare it for real estate development, that will subsequently turn the site into (another) place again. Chunks of land – in both ports and cities – can be defined as place, while the same land during the process in which the land is transformed into something else can be defined as site. In the last decades that transformation has been from port to city, but the concept of site does not limit the change to be one-directional, it just suggests that something is changing and that the narratives that previously have constituted the place are being redefined. This opens up a window, a 'mean-time' in which design actions can be used to enable stakeholders to negotiate and renegotiate masterplans for port-city transformation. But how does this happen in practice? The following part introduces a case study of the 'mean-time' in three port-city transformation projects with the aim to showcase three different ways for how masterplans can be expanded through designerly concepts and interventions, and how design research contributes to advance knowledge for port-city transformation.

Studying the role of design in three port-city transformation projects

Both authors are transdisciplinarians with degrees in architecture, urban planning and landscape architecture and we have adopted a landscape perspective to the studies of port transformation projects. To us a landscape perspective does not necessarily entail an interest in urban nature, greening of a masterplan, or studying biological systems, as explained above. A landscape perspective on transformation of ports into urban sites invites us to consider port-city dynamics with an understanding of space as process and an ability to navigate various temporalities in which change actions happen with different and overlapping speeds, durations and permanence. In the framework of a doctoral thesis in landscape architecture (carried out by one author and supervised by the other) a transdisciplinary case study of port-city transformation projects has been set up as qualitative design research (Dahl 2020).

The transformation projects were chosen in the context of the doctoral project in order to offer a wide range of situations and insights. From an initial broad scanning of ongoing transformation project six projects were selected for further studies and three of those are discussed in this paper. The selection had the purpose to show diverse design approaches to urban transformation in order "[to] maximize the utility of information from small samples and single cases" (Flyvbjerg

2006, p. 230). The purpose was not to compare the different cases, which differs to some other case study methods in which validation is thought to arise from analyzing and comparing several similar cases (cf. Yin; Abercrombie, Hill, & Turner). Robert E. Stake's (1995) constructive and inductive approach to case studies was guiding the explorations into understanding the selected cases as Stake's approach aligns with design research which is a constructive and interpretive practice in which the specificity and particularity of the work is essential to achieve deeper understanding.

The doctoral project included literature and archival studies, multiple field trips, stakeholder interviews, participant observation and epistemic drawing. Taking in lessons from professional practice or being involved in producing them as a consultant, the doctoral researcher criss-crossed the traditionally separated realms of science and practice while aiming at contributing to the advancement of both. The following text is a synopsis of main insights from the doctoral project and from related transdisciplinary enquiries (Dahl 2016; Dahl et al. 2019). It starts with a subchapter introducing the cases and the particular design approach that is used in each project. A subsequent chapter introduces findings from the study that are applicable when re-conceptualising port-city dynamics.

Design approaches for dynamic planning: Iterating, Prototyping, Simulating

Studies of three port cities undergoing transformation from port to city in Nantes, Gothenburg, and Providence, reveal design approaches that can facilitate more dynamic planning procedures for port-city transformation (Dahl 2020). The approaches of iterating, prototyping and simulating, provide opportunities and challenges for the 'mean-time' summarised in Table 1. The approaches also support conventional masterplanning, inviting to augment, complement and supplement masterplans.

Ile de Nantes **Nantes, France**	*Plan-guide* method Iterative & mystified Site surveys	Iterating	Augmenting masterplans
Frihamnen & Jubileumsparken 0.5 **Gothenburg, Sweden**	Building together Temporal & non-transferrable Workshops	Prototyping	Complementing masterplanning
BayCity **Providence, RI, USA**	Parametric computation Speculative & evolving Systems	Simulating	Supplementing masterplanning

Table 1. Summarising the three studied cases in terms of design actions, design approaches, and relationship to masterplanning three approaches are identified; iterating, prototyping, and simulating that can augment, complement, or supplement masterplanning in port-city transformations.

Ile de Nantes- Augmenting masterplans by iteration

Figure 2-4. The Plan-Guide method allows for an incremental transformation from port to city in which post-industrial leftovers, such as floorings, buildings and large structures, are used for short term leases to host creative businesses while waiting for final decision whether or not to keep these elements. The former harbour site can thus be used during a "mean-time". This "mean-time" opens up for a sustainable use of resources as well as being pragmatic about what to invest in and when. Added values comprise unconventional programmes and unusual stakeholder constellations driving the transformation, as in the collaboration between the developer SAMOA and the artist collective Les Machines de l'île, famous meanwhile for their 'walking sculpture' of the Elephant. (Photos by Authors).

Frihamnen – Complementing masterplans through prototyping

In the Frihamnen area in Gothenburg, Sweden, prototyping is used as a method for instigating both physical and institutional change on the derelict harbour site while navigating design actions of different durations (Dahl 2016; Dahl & Dahl 2016; Dahl et al. 2019; Dahl 2020). The Frihamnen area is one out of several areas located along the Göta River slated for transformation by the public developer Älvstranden Utvecklings AB. In 2013 a place-making project was instigated with

the purpose of opening up the Frihamnen area to the public while also testing new park programmes and more inclusive protocols for building and maintaining the site. The project team chose to construct several prototypes focusing mainly on different aspects of bathing cultures – intended to last 3-5 years but in actuality most lasted much longer. Shortly thereafter the project expanded both in terms of time and scope to also include temporary housing intended to last for 15 years (Figure 5).

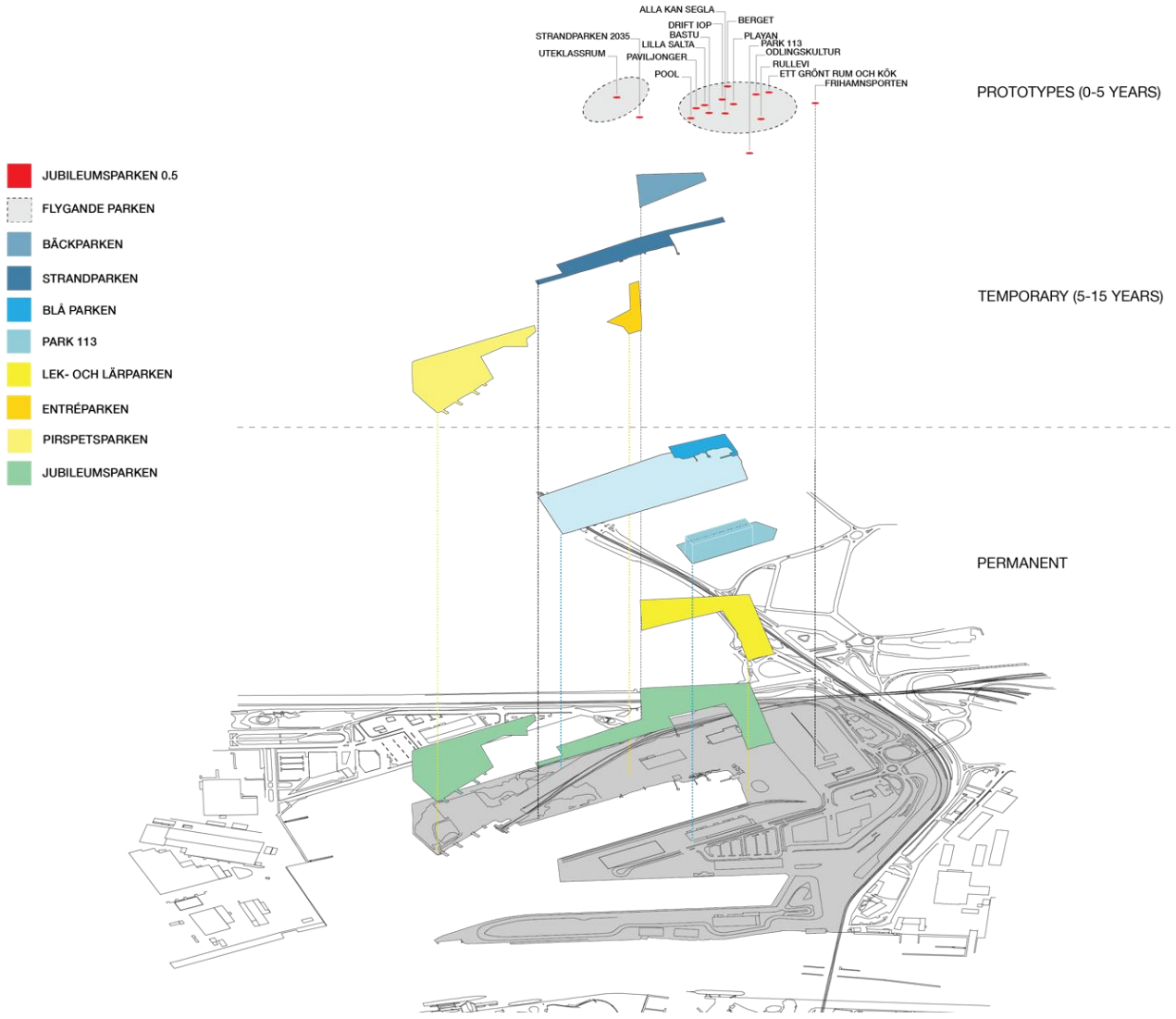


Figure 5. Prototypes, temporary parks and permanent parks in the Frihamnen area in Gothenburg, Sweden, creating a complex situation of navigating different temporalities in the transformation from port to city. (Illustration: Author).

Several of the prototypes that were constructed were executed through a process of 'building-together' in which inhabitants in the city were allowed to participate in the actual construction of the prototypes. New protocols in terms of maintenance allowed for NGOs to bid on the contracts for managing the prototypes. Both those aspects of the Frihamnen case correspond to Mode 2 knowledge production about the site and the transformation process (Figure 6-7).

Figure 6-7: The process through which the designers realised prototypes of various park amenities together with the inhabitants generated valuable site knowledge. It was later overlooked in the conventional planning process, but could inspire changed planning protocols to inform port-city transformation. (Photographs: Author)

However, in parallel with the on-site placemaking project the City of Gothenburg proceeded with conventional urban planning drafting masterplans for the future use and design of the area. The two processes ran autonomously and mostly unrelatedly until a growing gap between the planners' long-term vision and scientific mode collided with what was actually built and appreciated on site through Mode 2 approaches. This eventually made the planning process coming to a halt in mid 2016 and it remains pending since.

The project showcases, among other things, the challenges of creating knowledge and experiences that stem from working on site and its integration into legal and top-down masterplanning processes. Hence, the method of prototyping design actions intended to last for a varying number of years reveal the difficulties for port-city dynamics to navigate between abstract strategic planning and site-born actions of change. In conventional place-making projects this might not pose a challenge as temporal design actions seldom are intended to last. In the Frihamnen case this is not the case as the place-making organisation worked through design actions of various temporalities and also an openness to shift the intended design action from being temporal to permanent (Figure 8-10). Hence, an agglomeration of change actions occurred on site that could have complemented the planning process if it would have been able to integrate those on-site interventions in the long-term plans. As it happened, they were overlooked and not understood as an asset. In order make on-site actions interact with strategic planning, the respective capacities need to be trained in the first place, with formats for doing so surfacing from the project's innovative design solutions, economy of means, and co-creation.

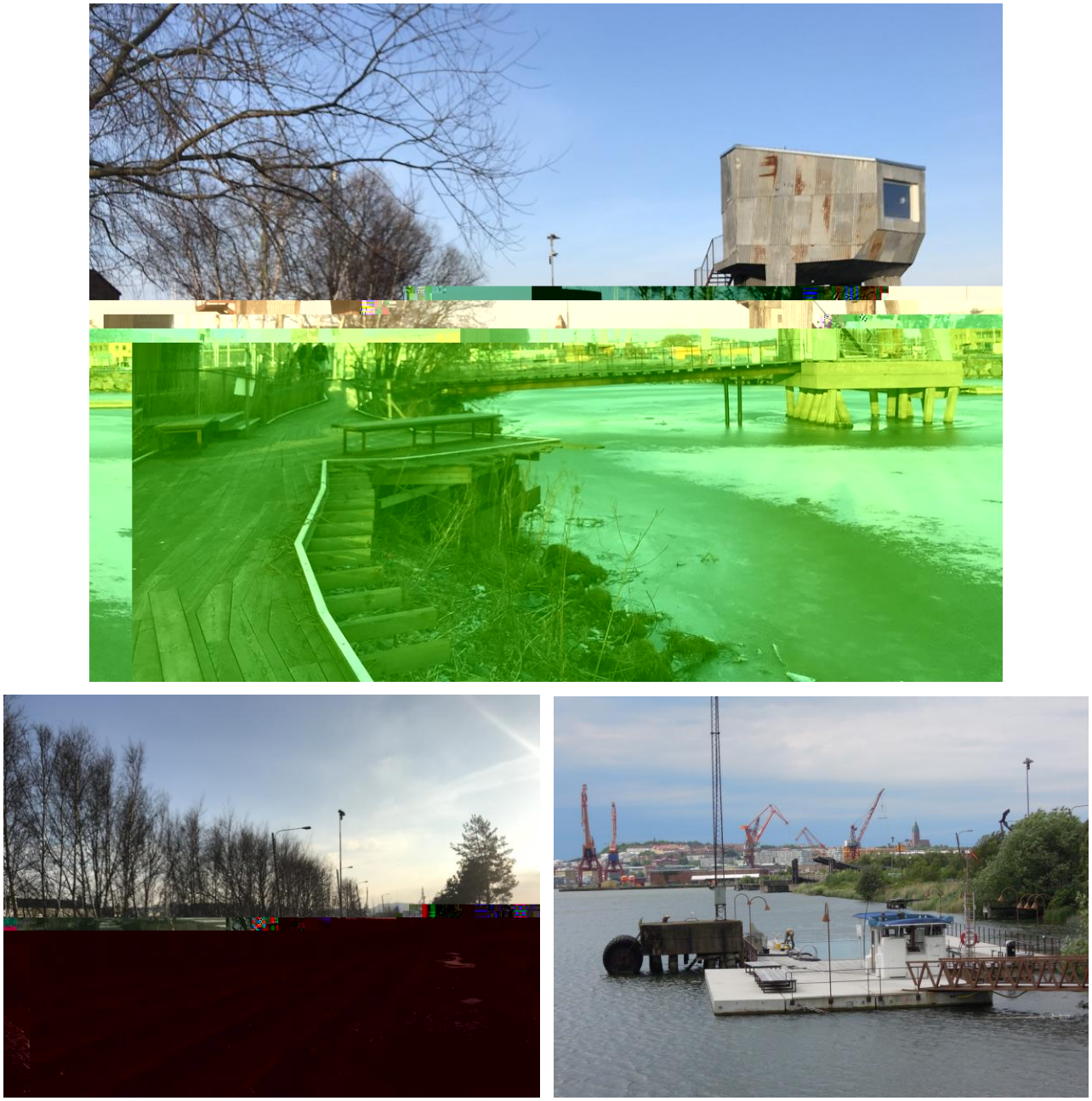


Figure 8-10: The Sauna by Raumlabor, built by re-used materials from the site in collaborative processes with inhabitants was intended to last for 5 years but after national and international recognition for both process and architecture the prototype is now integrated in the long-term visions as a permanent construction. In addition to the sauna a floating pool was constructed as a response to calls from the inhabitants to be able to swim in the River. Both of those prototypes are managed by a NGO. The temporary park intended to last for 15 years was designed by Atelier Le Balto and includes "rescued" trees from other parts of the city as well as newly planted ones. (Photographs: Author).

BayCity – supplementing masterplans through simulations

In Providence, Rhode Island, USA, the unrealised project BayCity used computational simulations to continuously map and communicate stakeholders' competing interest on an extensive and diverse waterfront site (Thurlow Small 2008). The designers, Thurlow Small Architects and Muchi East, refused to draft a plan with fixed conditions and favoured designing a process, because the vastness of the area and the complex stakeholder constellations suggested that the transformation process would take a long time during which the scope and vision for the area would change. The processes entailed conventional activities in collaboration with the municipality

as public hearings, fieldwork, in-depth studies of various aspects, etc, much in line with a Mode 2 knowledge production (Figure 11-12). However, the project was never realized due to the economic downturn 2007-08.

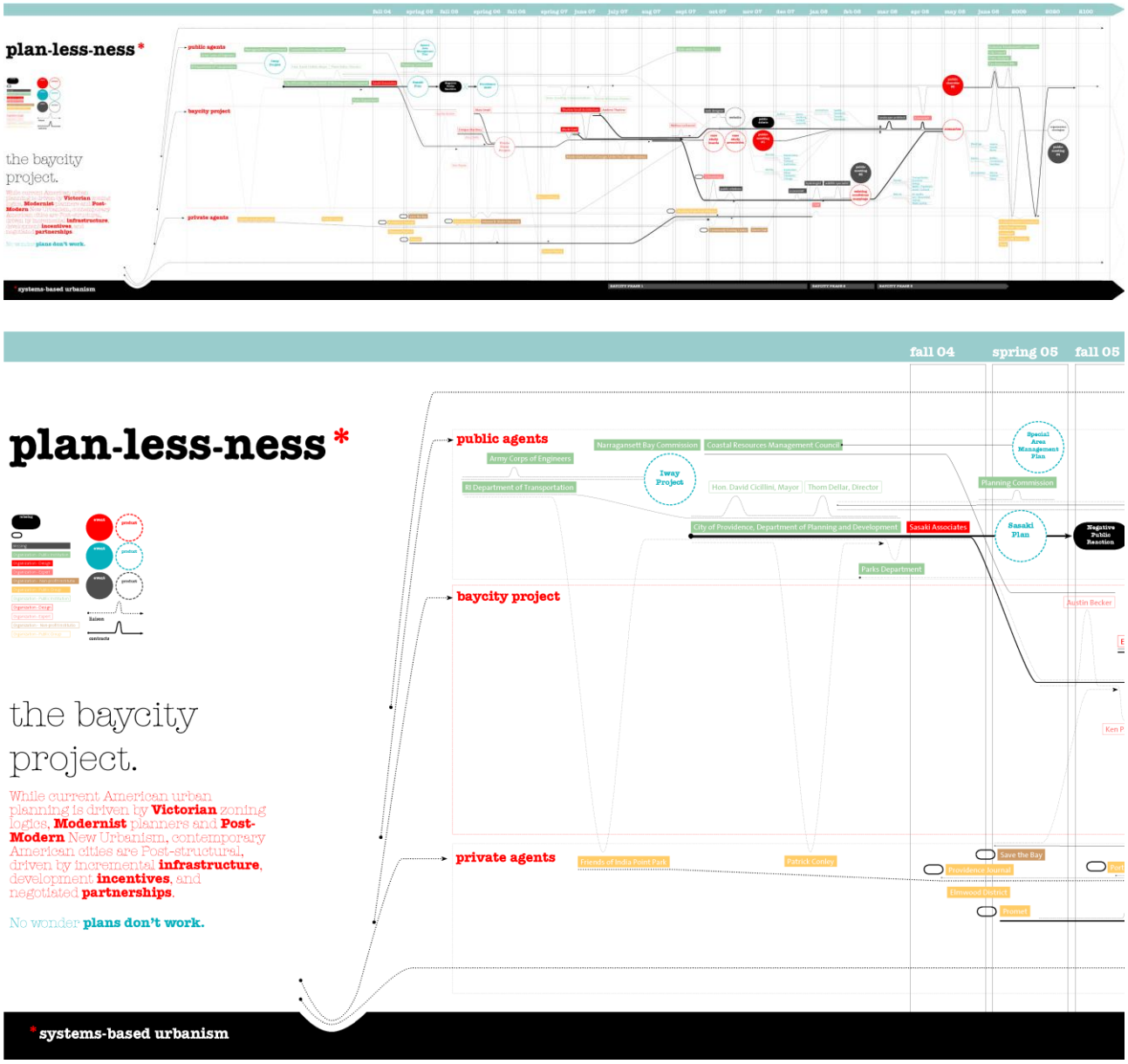
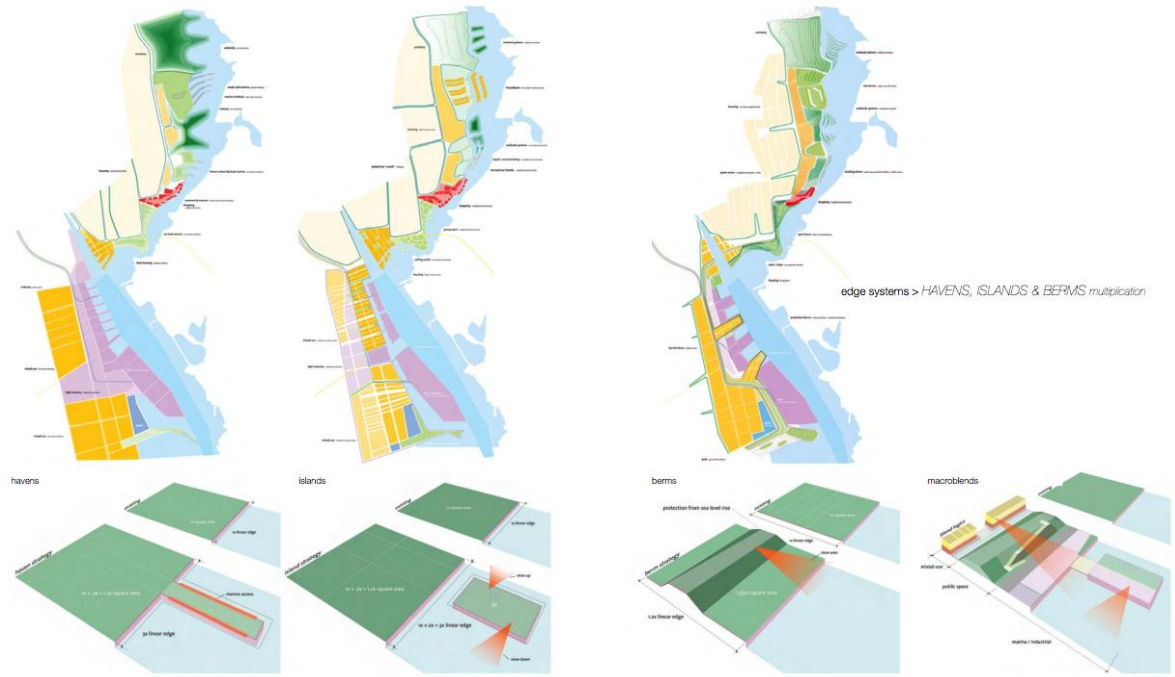


Figure 11-12. The interaction of various actors, events and knowledge production activities. (© Thurlow Small Architects).

The designers regarded a conventional masterplan as not sustainable. Instead they introduced three scenarios around the concepts of havens, islands, and berms, in order to meet the requirements of three figurative interests, identified as harbour, housing, and recreation (Figure 13-14). Drawing on a topological mindset, they translated the scenarios into geometries, which render crucial spatial conditions such as maximum length of quay, view of the bay, flood protection and accessibility to waterfront. The geometries represent an ideal situation for each of the interests. By using a deformation command in the Autodesk Maya software, infinite numbers of variations can be generated as the dynamics between stakeholders' interest change. By using simulations in the design, the project, even though not realised, showcases how knowledge can be assimilated throughout a process while also communicating shifting stakeholders' interest as a means for continual negotiation of spatial and programmatic proposals.



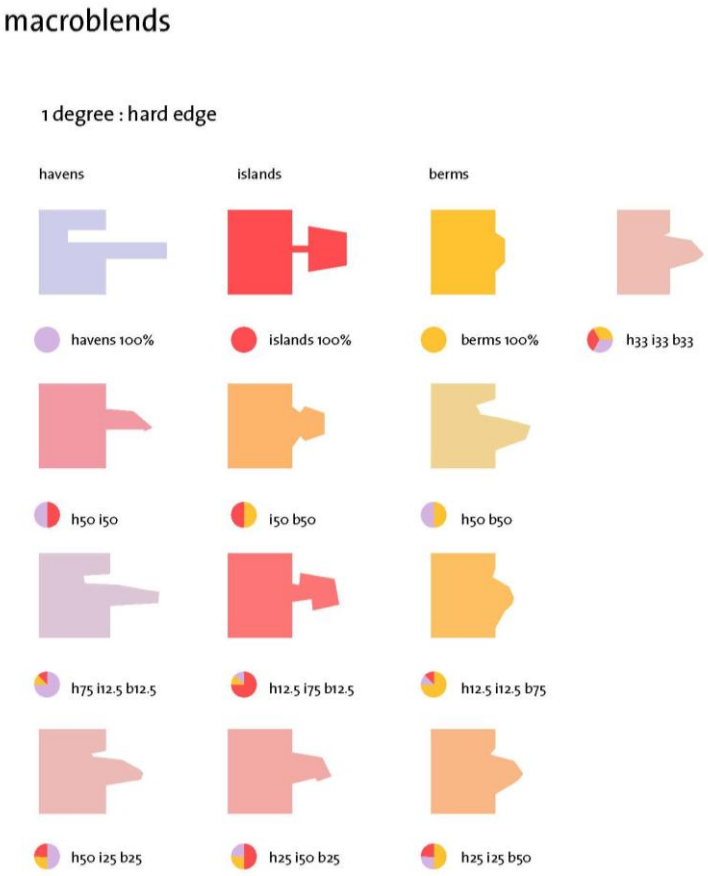


Figure 13-14. Illustrations of the three scenarios and how the blending manoeuvre in the parametric model allows for materialization of the dynamic negotiations between the various stakeholders' interests translated into geometries. (© Thurlow Small Architects).

Design scholarship to conceptualise port-city dynamics

On a scholarly level, the case study of three design projects generates insight into the conceptual contribution of designerly knowledge for port-city transformation. The approaches of iterating, prototyping, and simulating provide concrete tools and techniques on the practical level, and they offer insight into their benefits and shortcomings in order to facilitate more dynamic planning procedures for port-city transformation in terms of place-site, project-process, and practice-theory.

Place-site dynamics

Climate change, socio-political uncertainty and economic restructuring are all examples of contemporary conditions urban planning protocols do not accommodate easily as they were instigated during the 20th century's predictable modernist era. Most protocols were used for the expansion of urban fabric on arable land in which the linear process stipulated the change from farmland to city. Today most urban development in the Western world happens through urban densification and transformation of urban sites with increasingly complex conditions and temporalities as well as complicated stakeholder constellations. Such transformation processes are dynamic interplays between notions of 'place' and notions of 'site' as introduced above. We understand this interplay as a dynamic conversation between forces striving for stability versus change and argue that all urban transformation projects need to elevate the capacity to simultaneously engage with both forces.

In the Ile de Nantes project, the notion of 'site' is being expanded by the work mode of the Plan-Guide. The method stipulates a quarterly survey of the whole territory and a subsequent process of initiating change actions in various stakeholder constellations. The method is both opportunistic and strategic; pragmatically transforming what is possible at a certain moment in time while also allowing for evaluating the implemented change actions prior to confirming and reiterating them.

In the Frihamnen project, the notion of 'site' and the notion of 'place' are simultaneously present but in two different realms. In the abstract realm of urban planning, measures are taken to shorten the time during which the concept of 'site' is maintained by focusing heavily on what the future 'place' will look like. In parallel, the placemaking project is expanding the notion of 'site' through various on-site community activities that allow for situated perspectives and open-ended conversations about the future (Doucet & Frichot 2018; Dahl 2016). To allow for a better interplay between the two realms we propose that flexibility in terms of programme, time and site is an interesting path to explore (Bergevoet & van Tuijl 2016). Questions to investigate are how to communicate nuances in terms of what needs to be fixed and what can benefit from being kept open longer? Can flexibility help facilitate a transformation where tentatively conflicting interests can be spaced out, or even identified as irrelevant, over time?

The BayCity project benefits from recent advances in computer-aided design which allow for the dissolvement of 'site' versus 'place' because the parametric model can generate materialised static form or spatial variations simultaneously. The deformation command used in the computer model generates, on a larger scale, variations responding to land use and distribution issues. On a more detailed scale, a reiteration generates formal and programmatic responses to dynamic site conditions. Through every iteration the complexity and detailing of the proposal increases, e.g. becomes more and more site-specific and adapted to a 'real' situation. Indeed, the project showcases how technological advances might mitigate 'site' and 'place'.

The three cases suggest that it is possible to facilitate more dynamic planning protocols where notions of place and site are interchangeable and beneficial. However, we find that without strong facilitation the interplay between place and site can become competitive with the risk of hampering the overall transformation process. Advances in computer-aided design processes can

contribute with structure and transparency in terms of the 'rules' for this interplay. The case study also shows the importance of clear communication protocols between different processes and actors.

Project-process dynamics

Striving for more dynamic port-city transformation challenges the usual phasing schemes of urban planning. Designerly expertise embraces working through increments and agglomerating different change actions into larger processes. This requires an interplay between single projects and longer-term processes, set up in a way as to assimilate materialised change actions and draw knowledge from it. The ordinary urban development process works through the stages of planning, constructing, and maintaining. As an organisational idea conventional phasing conflicts with the orchestration of change actions on post-industrial sites full of ongoing activities, materialised resources, and complex human-environment systems. Hence, we argue that project-process dynamics calls for a framework beyond phasing, able to simultaneously navigate planning, constructing and maintaining while communicating knowledge raised across all stages.

In the Ile de Nantes project, the method of Plan-Guide organises the interplay between projects and process through the continual surveys, described above. The insights gained through each survey help build and execute projects and actions incrementally in dynamic stakeholder constellations. The method makes the important distinction between phasing – understood as transformation of one parcel after another – and increments. In the Ile de Nantes project, the full territory of the island is surveyed quarterly and from this comprehensive understanding of the site, design interventions are suggested, implemented and evaluated. Hence, the whole of the island is subject to urban transformation. The relation between defined design interventions – projects – and the full expanse of the island rejects a predefined and fixed relation formulated in a prescriptive vision or masterplan. It is through the quarterly survey iterations that relations between the projects and the whole of the transformation process are defined and re-defined which allows for continuously narrating the future of the island as well as continually negotiating stakeholders' varying interests.

In the Frihamnen project, two processes ran autonomously and unrelatedly, as described above. The top-down 'concept driven' planning process and the bottom-up, 'site-inspired' placemaking design process related differently to ideas about project and process dynamics. The study showcases that the two simultaneous processes were effectively competing on how and what to transform the area into, even though a larger vision, the RiverCity Vision, was formulated and adopted by the city council. In the planning process the mindset of planning was obviously the dominant perspective while in the placemaking project a management perspective prevailed. This resulted in radically different ideas about which change actions, or projects, to recognise as offering important contributions to the larger transformation process. In fact, the planning processes neglected to recognise the change actions instigated as prototypes because they were viewed as 'only' temporary activities. Only when pressure by the general public was seconded by the Swedish Architect Association shortlisting and eventually awarding the project the national prize for best landscape architecture in 2019, did the planners include some of the prototypes in the long-term strategic plans. In the place-making project change actions of various temporalities were equally recognised. This case provides an understanding of the difficulties of overcoming gaps between modes of planning and modes of managing, a dynamic of utmost importance in transformations processes.

In the BayCity project, the dynamic relation between project and process is facilitated through the parametric computer model. As parametric geometry is not absolute in the same way as Cartesian geometry is, parametric geometry responds to all other parameters in that same environment and potentially offers urban design the opportunity of employing iterative and open-ended design, and continual adaptations based on interactions between project and process. The process stipulates

the relation between identified actors; public and private agents and the project itself. By oscillating between these agents and the events and products generated, a process is achieved where city officials, experts, and private stakeholders have opportunities to respond to a continually growing set of outcomes and data. One of the architects describes it as a "fact-finding mission" and "a gathering of information a priori decisions of what should go into a specific situation or locale" (personal communication, February 19, 2019). The case study suggests that an agglomerating process of projects of various natures is possible to design in which conflicting mindsets can be facilitated.

The interplay between project and process identified in the three cases calls for the adoption of a landscape perspective as it helps understand spatial change as the combined effect of the simultaneous actions of planning, constructing and maintaining a site.

Practice-theory dynamics

In urban planning processes data and knowledge are well structured (Davoudi 2015), which reduces port-city dynamics to neatly formulated problems, ignoring their systemic and situational complexities. They escape traditional urban planning protocols and conventional knowledge production as no single field of knowledge, no discipline or no organisation alone can embrace the complexity and multidirectionality of transformation. Design's ability to perform differently than planning in terms of how knowledge is generated from ongoing design action invites for an interplay between the designer and the site. The iterative character of design furthermore allows for an oscillation between the designer's intent and how it is played out in the situation, as well as reformulations of actions and intents through interconnected loops of asking questions, testing hypotheses, evaluating applications, reformulating the questions etc. Such iterations preferably happen in collaboration between professional and academic actors which emphasises the transdisciplinary nature of design research, as practised in this study.

In the Ile de Nantes project, the iterative design-based transformation method leveraged a swarm of projects with different missions, temporalities, stakeholder constellation etc, which eventually lead the developer to reject the method in favour of a more conventional planning approach. The importance of transparency in terms of how decisions are made is an important lesson from this case study – not to reject the Plan-Guide method but to improve it and inform design and planning scholarship, offered to similar forthcoming port-city transformations.

The Frihamnen project was aimed at testing not only new park programmes but also new ways of working. The actors who have been involved in these tests carry with them experience and knowledge that represents great values and investments in time and innovative power. The results of the process are being noticed and celebrated, but the personal lessons and the knowledge developed from these are not given the same weight. One of the designers in the placemaking project (personal communication, March 8, 2019) stated that the test has not prompted any organisational or structural changes, which will be required when implementing this way of working in regular operations. We find that obsolete structures and thought models can lead to implementation gaps where significant, but unusual knowledge, is lost. The capacity to communicate new knowledge within and between design and planning processes demands new practice-theory dynamics.

The designers of the *BayCity project,* aimed to clarify what actors that were operational during what stage of the process; allowing for interpretations of what influence various actors tentatively might have on the process's performance. The architect describes how the public hearings allowed for multiple "first person perspectives" to be voiced (personal communication, February 19, 2019). Together with their a priori collection of information as well as reoccurring field visits the complexity and fragmentation of data grew. The architect stated that a top-down approach in that

situation would be overwhelming as there were too many interests and point of views to mitigate (ibid). Hence, bottom-up processes in which stakeholder interests do not necessarily need to be treated equally was a productive way forward.

Conclusion: a call to share knowledge 'on the ground and on the go'

Facilitating more dynamic port-city planning procedures calls for new mindsets and tools as well as expanded coordination and communication in transformation processes. In this paper we have demonstrated that port-cities, as extreme examples of transforming post-industrial cities, studied from a landscape architectural design research perspective, can raise transdisciplinary knowledge about the dynamic 'mean-time' between port and city. Adopting a landscape perspective, we have identified the designerly work modes of iterating, prototyping and simulating as approaches to more dynamic, adaptable and therefore more sustainable port-city transformation procedures. It became clear that this knowledge is useful to improve planning practice, namely to mediate competing processes occurring on different levels simultaneously. Mediation requires a changed protocol of coordination and communication within planning practice, and this demands that knowledge be shared within the process, not 'horizontally' from one stage of the transformation project to another, neither 'vertically' from one hierarchical level to a subordinate level, but in a collaborative process that handles knowledge 'relationally' in a networked system, which strongly resonates with the tenets of transdisciplinary science, as introduced above.

The transition to such knowledge sharing 'on the ground and on the go' is not trivial, it needs training of all actors involved. The study of the three port-city transformation projects also identified which capacities need to be built to transfer the designerly knowledge into planning practice:

- the capacity to act pragmatically and in reaction to the ever-changing circumstances found on site, in order to activate an understanding of urban transformation as management;
- the capacity to understand what can be done and when, in order to enable intellectual navigation between fixity and flexibility;
- the capacity to work incrementally and at different speeds, in order to synchronize multiple temporalities;
- the capacity to imagine urban futures for port-cities and other post-industrial cities beyond conventional urban models, in order to ease the creation of new urban imaginaries.

A comprehensive capacity building project for dynamic port-city transformation arguably needs more research to take shape. With this paper we intend to stimulate interest for such research in the design disciplines. Especially researchers from landscape architecture, used to study dynamic processes, seem to be well equipped to further develop research agendas for port-city studies while fully embracing the discipline's potential of experimentation across practice and academia in the context of transdisciplinary science.

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