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Embracing Uncertainty Without Abandoning Planning

Exploring an Adaptive Planning Approach for Guiding Urban Transformations

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Abstract: The uncertainties that are part of the development trajectories of cities challenge spatial planners in designing productive interventions. This paper explores how complexity theory can support planners in dealing with these uncertainties intelligently. It presents a dynamic, time-sensitive understanding of spatial transformations that helps to clarify the interconnected and changeable nature of the underlying processes. The paper continues by proposing an adaptive planning approach that strengthens the responsiveness of urban areas to both expected and unexpected changes. The argument is made that adaptive planning first and foremost implies a focus on influencing and creating conditions for development, followed by attention to content and process. Based on an imaginary case of inner-city transformation, the paper distinguishes key conditions for guiding spatio-functional configurations and supporting capacity building of local actor coalitions.

1 How planners are challenged by uncertainties

The certainties we humans so appreciate appear to be illusions more often than we would like. Transformations induced by climate change, technological innovation and social upheavals are well-known drivers of the *wicked problems* and *deep uncertainties* we are confronted with (Haasnoot et al. 2012; Van Bueren et al. 2003; Rittel, Webber 1973). They affect society as a whole and, in particular, policymakers and decision-makers when designing interventions to guide future developments. Uncertainties are not limited to these examples. *Unexpected* natural, political and economic events, *coincidental* confluences of gradual change processes feeding larger transformations and *unforeseen* societal responses to policy programmes illustrate how the reproduction of uncertainties occurs in many domains and at multiple levels of scale, driving towards a future which is difficult

if not impossible to predict (e.g. Pawson et al. 2011; Scheffer 2009; Walker et al. 2003). People address such uncertainties heterogeneously (Chow, Sarin 2002). Moreover, social views on which possible future should be aimed for are often *unstable* (Van Bueren et al. 2003). Accordingly, in trying to engage with the positive and mitigate as much as possible the negative, policymakers and decision-makers are continuously challenged by the uncertain conditions in which they operate (Duit, Galaz 2008; Teisman 2008).

Spatial planners in urban development processes also wrestle with how to deal with uncertainties in their daily practices. Urban areas, including cities and neighbourhoods, are dynamic, changeable environments that sometimes follow unexpected routes (Batty 2013). Meanwhile, planners aim to improve the sustainability and liveability of these places through rationally designed interventions. As early as 1969, Friend and Jessop pointed out a set of uncertainties defying planners: regarding knowledge about present and future environments, regarding actor intentions, and regarding value judgement on planning interventions (see also Christensen 1985). In today's highly connected and information-driven world, the omnipresence and potential impact of uncertainties receive increasing attention in literature on planning (e.g. Albrechts 2010; Bertoni 2010; De Roo, Rauws 2012; Salet et al. 2013; Van Woerkum et al. 2011). The limitations of traditional planning strategies and instruments in dealing with unforeseen developments are also exposed, as these are often based on prediction, stability and risk reduction (e.g. Abbott 2005; Gunn, Hillier 2014; Rauws et al. 2014). Therefore, the question that becomes increasingly prompt is how planners can strengthen the responsiveness of urban areas to both foreseen and unforeseen change, while at the same time making societally preferred development trajectories more likely to emerge.

This paper aims to contribute to this quest by exploring an adaptive planning approach. The approach is based on the idea that plan-

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ning operates in a world of ‘becoming’, in which processes of evolution and transformation are ever-present (Tsoukas, Chia 2002; Byrne 2005). It aims to strengthen the responsiveness of urban areas to a variety of possible futures by setting conditions for development. As such, it resonates with the debate on strategic spatial planning. Following Albrechts and Balducci, strategic spatial planning offers complementary means to operate in today’s complex and dynamic societies, as traditional planning instruments are merely designed for situations of stability (Albrechts 2010; Albrechts, Balducci 2013). It is presented as an inclusive, action-oriented method for transformative practices that opens up new routes of development, including analytical and normative dimensions (Albrechts 2010). Some of its key elements are: identifying place-specific problems and opportunities in a global context; mapping possibility spaces by analysing spatio-temporal conditions and constraints; creating new arenas for policy articulation by identifying and/or mobilizing actor coalitions across scales and sectors; and shaping places by selective actions on strategic issues that are embedded in and justified by a long-term vision.

The adaptive approach proposed here builds on the strategic spatial planning agenda and offers three main contributions. Starting from a complexity perspective, it exposes some of the mechanisms underlying a world of becoming, such as non-linearity, self-organization and fundamental uncertainty. An adaptive planning approach also stresses the need for places to have sufficient capacity to cope, respond and adapt to change in order to secure their vitality. This is to say that strengthening adaptive capacity itself becomes a main objective of planning interventions. Finally, adaptive planning introduces an additional level of intervention. While the strategic spatial planning repertoire is mainly oriented at fostering desired change given certain conditions, the adaptive planning approach targets exactly these conditions as the object of intervention. Put differently, adaptive planning is about influencing the possibility spaces for urban transformation with the aim to support an area in keeping its fit with the dynamic environment. Innovation, the central theme of this special issue, is considered an essential mechanism in this process.

The structure of the paper is as follows: Section 2 introduces a complexity perspective to rethink the nature and character of contemporary urban development processes. Complexity theory helps to clarify the interconnected and

changeable nature of the processes underlying urban transformation. Section 3 explores the potential of a condition-based, adaptive planning approach in guiding such transformations. Section 4 discusses what these conditions may comprise. These are illustrated by an imaginary case of an inner-city transformation in Section 5. The paper concludes with a reflection on the role of public planners and an agenda for future research.

2 *A complexity perspective on urban dynamics*

Supporting planners in developing an enhanced understanding of urban dynamics and related uncertainties, several scholars find inspiration in the world of complexity (e.g. Gerrits 2008; De Roo et al. 2012; Portugali 2011; Batty 2013; Loepfe 2014). Complexity theory is concerned with the evolution of phenomena, rejecting the Newtonian conception of the world based on reductionism, determinism and predictability (Cilliers 1998; Wolfram 2002; Heylighen 2008). These phenomena are often defined as systems or networks of which the components “are to some degree independent, and thus autonomous in their behaviour, while undergoing various direct and indirect interactions” (Heylighen et al. 2007: 125). Well-known examples are insect colonies (Bonabeau et al. 1997) and the World Wide Web (Scharnhorst 2003). Complex phenomena are dynamic, nonlinear – a small change can have a big effect and vice versa – and include interdependencies across various aggregation levels. This implies that they evolve without central coordination and are very difficult to predict and fully manage.

A key characteristic of these so-called complex adaptive systems (CAS) is their continual evolution towards an optimal ‘fit’ with their dynamic environment. They are open systems, exchanging information and energy with their environment. For this reason, they are sensitive to changes in this environment and respond by adapting their configuration. Cities also express this behaviour, responding to various contextual changes, such as demographic pressures, economic trends and technological innovations (Portugali 2006). Others argue that this is also the case for other urban units such as neighbourhoods (Wagenaar 2007) and metropolitan regions (Innes et al. 2010), in more or less similar ways. As such, portraying urban areas as CAS invites planners to consider ongoing adjustments of an area’s configuration as both

a source of and a coping strategy to address uncertainties in its development trajectory.

The adaptive behaviour of cities cannot be reduced to a set of clearly distinguishable cause-effect relations when following a complexity perspective. Instead, processes of adjustments are considered to emerge from the interaction between multiple drivers for change at various levels. We already discussed the influence of contextual changes, but cities are assumed to adjust, transform and innovate from within. These local changes include, for example, initiatives by citizens, entrepreneurs, local authorities, and coalitions between these three. One could think of redevelopment projects, grassroots initiatives or start-ups. Unsurprisingly, both contextual changes and local initiatives trigger interventions at system level by city planning authorities. Changes are stimulated, linked, regulated, mitigated, etc. depending on how they relate to the general ambitions of the city, the policies frameworks and dominant power structures. In turn, interventions at system level influence again the impact of contextual trends and the opportunities for local initiatives. Hence, casting cities as CAS emphasises the interrelatedness of changes on various levels, of which some are planned – being initiated by public planners – and others are ‘unplanned’. As a consequence, the possibilities for planners to predict and control a city’s development trajectory are believed to be limited. Developments emerge partly ‘autonomous’, beyond the scope of planners, and the way a city’s trajectory unfolds is considered to be time-specific and place-specific.

A key concept of complexity theory that helps in understanding the potentially autonomous character of transformations is self-organization. Processes of self-organization can result in a structural change of a system, such as a neighbourhood, emerging out of a number of local initiatives without these initiatives being centrally coordinated (Rauws 2016). An example could be the transformation of a mixed residential neighbourhood into a ‘student town’, changing both its function and structure. Triggered, for example, by a growing student population in a city, individual homeowners can decide to rent rooms to students. Meanwhile, private investors might decide to acquire single-family homes and transform them into dormitories. Such uncoordinated, relatively independent actions can, over time, result in changing spatial patterns on a wider scale; shop-owners adjust their range of products and opening hours to meet the demands

of the students, bars are opened and car parks are transformed into open-air hang-outs and bike sheds. The result is a full transformation of the function and structure of the neighbourhood, embracing its new identity as a ‘student town’. Planning is not necessarily absent in such transformations as homeowners and shopkeepers often have to meet certain regulations. However, the transformation at the neighbourhood level is not centrally coordinated nor designed in advanced. Instead, it emerges spontaneously and the patterns it gives rise to at system level are unpredictable in the sense that they could not be deduced from the sum of all individual actions.

The (partly) spontaneous character of some urban transformations challenges planners to rethink their strategies in guiding these transformations. From this section we can learn that there are at least three reasons why a complexity perspective can contribute to such a rethinking process:

- A complexity perspective draws our attention to the multiple, interdependent drivers for change on various levels that shape development trajectories. Some of these drivers are the result of planning interventions while others emerge beyond the range of influence of planners. As the way these drivers feed into each other and in interaction amplifies some change processes and dampen others cannot be controlled, uncertainties are partly fundamental. It is important that planners are able to deal with both foreseen and unforeseen change.
- It challenges planners to consider the transformation of urban configurations as ongoing processes. Taking a complexity perspective, urban areas are seen as places that are continuously shaped and reshaped by internal and external forces, always on their way to ‘become’. To be able to fully take into account these dynamics in planning interventions, planners should develop a situational understanding of planning challenges. This includes the idea that *what* should be aimed for and *with whom* to reach consensus depends on the *when and where* of a planning issue.
- As change is believed to be continuous, multi-level and situation-specific, a complexity perspective urges planners to focus their efforts on strengthening the adaptive capacity of cities and neighbourhoods. This would enable urban areas to function well under different circumstances, being responsive to both foreseen and unforeseen opportunities and threats.

3 *Towards an adaptive approach for guiding urban transformations*

If we indeed embrace the idea that planners deal with processes of becoming, then how can planning contribute to responsive cities? In other words, how can planners strengthen an area's capacity to react, incorporate and adapt to change stimulate those futures that are considered to be more sustainable and liveable? Aiming to do so, the logic of designing an 'optimal' plan and endeavouring to control urban development towards the achievement of this predefined future should be considered undesirable. After all, this would bring us back to an understanding of cities as stable entities in which transformations can be shaped by a series of successive events that can be devised in advance. Alternatively, plans and strategies which allow for continual reflection and adaptation are required in order to support a range of possible emerging trajectories. They should be able to 'seize' opportunities for socially preferred development directions and prevent problematic issues from aggravation (Lessard 1998; Van Assche, Verschraegen 2008; Van Woerkum et al. 2011). We thus take the position that the focus of planning strategies on reducing or avoiding uncertainties needs to be redirected towards accepting these uncertainties and exploiting the opportunities they give rise to.

This poses a series of challenges to planners: for example, how to be ready to exploit opportunities that are yet unknown? How can planners connect their policies and interventions to the ongoing interactions at various levels of the urban system concerned? And how to design plans and strategies that effectively support a range of possible future development trajectories? These are complicated challenges, and we certainly do not aim to present an overarching new approach in which all of these challenges are tackled. However, in making cities more responsive to change, we argue that the first and crucial step can be taken by redirecting the focus of planning to influencing and generating *conditions* under which development trajectories unfold. We call this an adaptive approach to planning (Rauws, De Roo 2016; Yamu et al. 2016).

A condition-based, adaptive planning approach is about offering a general framework for urban transformation without defining a particular future spatio-functional configuration or configuration of actor relations. The argument is that influencing the conditions under which urban areas transform, rather than defining a specifically desired configuration,

generates possibility spaces that allow an area to respond to and profit from a range of possible directions of development. It opens up development frameworks for the 'unplanned', spontaneous ways in which cities and neighbourhoods adjust to and co-evolve with changes at various levels of society (e.g. technological innovations, grassroots movements or demographic trends). We argue that an adaptive planning approach enables planners to strengthen the responsiveness of an area to foreseen and unforeseen change, while securing important societal values.

This adaptive approach is not meant to replace more traditional planning approaches. Instead it can be considered as a valuable addition to the existing repertoire of planning approaches, especially for planning interventions in dynamic urban areas and with a longer time frame. In line with our argument that planning problems require a situational understanding, the planning approach or mix of approaches that fits best also varies over time and space (Alexander 2012; De Roo 2012). Situations can, for example, be differentiated on the volatility of their context, the urgency to act or the level of diversity in the ambitions, interests and commitment of actors involved. An adaptive planning approach is in particular suitable for issues situated in highly dynamic contexts with variable and overlapping actor coalitions, while an instrumental approach can for instance work well in situations with a high level of urgency, a relatively stable context and rather crystallised networks of actor relations. Positioning adaptive planning within a repertoire of planning approaches, we touch upon adaptive capacity at meta-level, namely in the governance landscape itself. A further exploration of such a meta-framework is beyond the scope of this article, but more can be found in De Roo (2012) and Zuidema (2014). In the remainder of this contribution we concentrate on what kind of conditions planners need to focus on when guiding urban developments in an adaptive way, and reflect on the role(s) public planners can have in these development processes.

4 *Identifying conditions for adaptive urban environments*

The adaptive capacity of urban developments is fostered and constrained by a variety of conditions. These conditions include governmental rules and regulations, the qualities of the existing urban fabric, motivation and capacities of

	Moroni, 2015	Alfasi & Portugali, 2007	Rauws et al., 2014
Level of abstraction	High	Medium	Low
Approach	A nomocratic planning approach based on simple relational rules that are as universal as possible, and prohibitive rather than directive.	A self-organizing planning system based on relational code-based framework with planning-judges to weigh and decide on the acceptance or rejection of particular planning applications.	An adaptive planning approach that strengthens the responsiveness of urban areas to change, while stimulating socially preferred directions of development to emerge.
Concerned spatial elements	Not specified	Singular elements (e.g. buildings), linear elements (e.g. networks), district elements (e.g. neighbourhoods)	Urban districts
Aim of the proposed conditions for development	To provide opportunity spaces for the diversity of demands and initiatives of a city's many different inhabitants, consumers and developers. This by using framework instruments that function as filter devices; avoiding certain negative effects and leaving all the other possible outcomes free.	To allow for self-organization mechanisms while ensuring that a city remains complete and functional by protecting existing spatial elements from possible harm by newly built elements. To do so, a planning model is suggested that defines substantive qualitative relations between urban elements and that is updated over time based on planning jurisdiction.	To support the production of development plans that strengthens the adaptive capacity of the urban development area under construction. This is done by combining visioning on strategic level with design principles on operational level that generate the flexibility required to respond to changes which arise during a development plan's lifetime.
What kind of conditions are suggested?	<ul style="list-style-type: none"> • principles that are few in number, and plain and unambiguous in their formulation (e.g. public facilities should clustered around public spaces) • refer to general types of situations or actions (e.g. function transformations) and apply equally to everyone, or at least to extremely broad classes of individuals (e.g. apartment-owners) • independent of any specific end-state • must serve in the long run • merely prohibit individuals from interfering with the private domain of other individuals rather than imposing some active duty or action (e.g. avoid producing externalities of type A, B and C to neighbouring plots) 	<ul style="list-style-type: none"> • rules that provide a basis for the proposed planning legislature • guide transformations regardless of specific plans • address physical qualities (e.g. land coverage), design (e.g. material) and usage qualities (e.g. accessibility) of future planned elements • the impact of these elements on their environment with regard to its functionality, physical qualities and general appearance (e.g. 'alienation' – the newness a new development brings to an area) 	<ul style="list-style-type: none"> • rules that provide room for change (e.g. compose the overarching development plan out of multiple independent smaller scale plans) • stimulate autonomous, self-unfolding urban developments (e.g. by installing requisite carrying structures) • support learning and adjustment over time (e.g. by stimulating incremental development strategies) • create plans that are vital under different circumstances (e.g. by defining loose rules)

Tab. 1: Three complexity-informed proposals for a condition-based guidance of urban transformation.

involved actors, economic climate and technological possibilities, political aims and societal desires, and many more. All are conditional to the kind of urban developments that have potential in a particular situation. Unsurprisingly, only a part of these conditions can be influenced or generated by planners.

The adaptive planning approach that is proposed here focuses on two categories of conditions on which planners can have a substantial influence: conditions on spatio-functional configurations and conditions for the capacity building of local actor coalitions. The former concerns formal rules and regulations that have to be met when realising an urban development project, such as accessibility to public space or the spatial relations between built structures. They influence the spatial quality of projects as well as the impact of these projects on the wider urban fabric. We will argue that when formulated in a particular manner, they can also help in keeping an area open for a range of potential trajectories. The latter includes conditions that increase the possibilities for a diverse range of actor coalitions, traditional and innovative, to establish themselves and contribute to urban transformations. One can think of measures that foster information exchange or increase connectivity between actors. Local coalitions are important if planners want to embrace self-organization mechanisms in urban development and foster a continuous exploration of alternative directions of development in response to ongoing dynamics.

4.1 Conditions for guiding spatio-functional transformations

In this section, we will explore how generating conditions on spatio-functional configurations can be part of an adaptive planning approach. We start by analysing the contributions of Stefano Moroni, and Nurit Alfasi and Juval Portugali, and a paper by the author himself, co-authored with Matthew Cook and Terry Van Dijk. These three studies were selected as they are among the few that explicitly define conditions for urban development in the limelight of complexity thinking. At a conceptual level, Moroni (2015) explores regulatory instruments that are less reliant on explanation and prediction. Alfasi and Portugali (2007) discuss an alternative for the Israeli planning system by incorporating the idea of the self-planned city. Finally, Rauws et al. (2014) analyse how Dutch urban development plans can become more responsive to change. A review of their commu-

nalities and their differences (cf. Table 1) allows us to construct a preliminary foundation for an adaptive planning approach.

All three approaches share the assumption that urban development is a continual process rather than a sequential one, as in none of them end-states are defined. They also have in common that the complexity and the limited predictability of urban development processes are presented as aspects that should simply be accepted by planners. As such, the conditions introduced in the articles are not prescriptive but have a mainly relational character, offering developmental frameworks that can guide a wide range of possible future development trajectories. Based on the three articles, we analyse the types of conditions that can be distinguished.

From Moroni's nomocratic planning approach, the most generic and liberal of the three, we can derive the importance of securing the quality of life in areas under transformation. Operating in dynamic situations that sometimes follow unexpected trajectories, Moroni argues that planners are responsible for setting conditions that reduce possible negative effects and leave all other possible outcomes open. He refers to these conditions as "framework-instruments", merely meant "to prohibit individuals from interfering with the private domain of other individuals rather than imposing some active duty or action" (Moroni 2015: 257) (e.g. avoid producing externalities of type A, B and C to neighbouring plots). As such, flexibility in urban development processes is provided while undesired consequences are mitigated. This is not to say that prescriptive tools, which he calls "patterning-instruments", should be fully abandoned. According to Moroni, "framework-instruments must be used to regulate private activities, patterning-instruments to guide public actions" (2015: 262). All in all, the first type of condition that we distinguish for an adaptive planning approach is about *securing the quality of life under a variety of potential development trajectories*.

Introducing urban codes for the 'self-planned city', Alfasi and Portugali also look for ways to increase flexibility in urban development processes. With their codes on – amongst others – physical qualities (e.g. land coverage), design (e.g. material) and usage qualities (e.g. accessibility), they propose to guide urban change regardless of specific plans. With these codes they aim to increase opportunities for more incremental urban development. However, they add the importance of context sensitivity in the application of these codes. While

Moroni argues that conditions should be as uniform as possible, Alfasi and Portugali introduce the idea of the planning judge. It allows for a more situation-specific guidance of urban areas in transformation, as these judges decide, based on generic-relational rules, whether developments are appropriate in the particular context.

We follow Alfasi and Portugali in their call for context-sensitive flexibility. Some potential positive or negative development opportunities in the short term are closely related to the particular situation in the 'here and now'. Conditions tailored to this situation may therefore more accurately trigger or mitigate these development opportunities. Of course, the tailoring of conditions for development can limit the adaptive capacity of an area in the long term as the virtual and actual potentials of situations yet to come are difficult to identify. However, in line with Alexander (2012), we argue that spatially and locally qualified conditions can still have general-relational character. For example, in an area with a growing local economy due to some attractive historical landmarks for tourists, conditions can be tailored in order to utilise the economic and place-making potentials of these landmarks. Meanwhile, these conditions can still be formulated in such a way that they can productively guide a range of potential development trajectories. In this particular situation, a condition for development can, for instance, be that new projects have to contribute to the identity the landmarks provide to the area and that the sightlines to these landmarks have to be respected. In this way, the unique potentials of an area are acknowledged and future development trajectories are left open as much as possible as well. In sum, the second type of conditions for our adaptive planning approach is about *generating context-sensitive flexibility in the pace and direction of development*.

In earlier work, we added a third dimension to the debate by arguing that adaptive planning is as much about triggering societally preferred development directions as it is about strengthening the responsiveness of urban areas to change (Rauws et al. 2014). The proposal is to combine the implementation of conditions with visionary elements of plan-making that create a sense of urgency among stakeholders, trigger new initiatives and legitimise public investments. As such, societal ideals can be integrated in an adaptive development framework.

Advancing the argument further, we embrace the idea that adaptive planning includes a normative dimension. In any other way, adap-

tive planning would be limited to triggering a kind of social Darwinism: strengthening the self-reliance of urban systems to 'survive' in dynamic environments (Davoudi 2012). Setting conditions cannot and should not be done in isolation from societal values, norms and agreements (including political agreements), for example on poverty reduction or protection of vulnerable ecosystems. Collective ambitions on creating a better future – one which is, for instance, believed to be more socially just, economically viable or climate change proof – should also be part of planning frameworks (Rauws, De Roo 2016). However, a risk of looking ahead is that the produced images and persuasive stories on potential futures are again translated into plans that project a particular future urban configuration. This would undermine the openness of actors to alternative, non-envisioned trajectories of development. As an alternative, we suggest integrating societal preferences regarding future trajectories in the defined conditions for development. For example, if a city aims to reduce its impact on the environment, energy neutrality can be conditional for new developments or transformation projects. Translating societal preferences into such a qualitatively formulated condition instead of detailing quantitative norms, improves the area's responsiveness to changing demand and unexpected events, as well as to unforeseen innovations. In the case of energy-neutral building construction, the latter can, for example, include a new solar energy technique. Hence, the third type of conditions we identify is about *stimulating the emergence of societally desired development trajectories*.

To conclude, discussing the selected works helped us in formulating three types of conditions that we argue are to be key for guiding urban transformation in an adaptive way:

- Securing the quality of life under a variety of potential development trajectories.
- Generating context-sensitive flexibility in the pace and direction of development.
- Stimulating the emergence of societally desired development trajectories.

In combination, these conditions can strengthen the adaptability of an urban area to a variety of possible future spatio-functional configurations, while offering opportunities to foster the emergence of those development trajectories that are preferred over others.

In concluding this section we briefly discuss how conditions on spatio-functional configurations can be established and applied. Who defines these conditions? Is there a hierarchy

among them? And how can the 'fit' of a proposed development be evaluated? As the types of conditions that have been identified closely relate to the central values, ideals and ambitions of communities (defined in the widest sense: citizens, entrepreneurs, policymakers, decision-makers etc.), we argue that defining these conditions should be embedded in an open and democratic process involving a diversity of actors. While we acknowledge the extreme difficulty of undertaking such a process (Brand, Gaffikin 2007), we also believe it is a crucial step in establishing a development framework that is inclusive and cross-sectoral, and that receives public support.

We distinguish two aspects that can help in the operationalization of this process. First, differentiating the degree of generality in the formulation of conditions, and in those who decided on them, based on the spatial scale that is addressed. Conditions that apply to a city as a whole can and should be formulated in a more generic way. They can, after being explored and discussed publicly, be determined by representatives of stakeholder groups, following the principles of a representative democracy. Building on Marshall (2009), we suggest that moving towards the more local scale of, for instance, a neighbourhood, communities can decide to further tailor some of the conditions that were established at a higher scale, or set additional ones. This allows them to address the place-specific qualities, problems and opportunities they perceive. The smaller the geographical unit, the more representative democracy principles can be replaced by those of participatory democracy, contributing to a sense of ownership of the process and place, and unlocking the tacit knowledge of its everyday users. At all scales, the three types of spatio-functional conditions are key, but conditions that are meant to secure the quality of life are often rather universal, while those related to generating context-sensitive flexibility and stimulating desired directions of development can be expected to be more place-specific. In sum, the proposed multi-stage way of formulating and deciding upon conditions for development can help in finding a workable balance between the generic and the specific.

The second aspect is about the enforcement of conditions in urban projects. In general, we consider most systems of building permits and development approval that have been developed for traditional land-use planning also applicable to the adaptive planning framework proposed here. A pre-condition for the success-

ful functioning of such enforcement systems is that conditions are formulated and explained in a clear and unambiguous way. For instance, by using images, infographics and digital planning support tools instead of guidelines using technical jargon. However, how to proceed when the open and partly qualitatively defined conditions result in confusion or even dispute between the project proposers and those evaluating its permissibility? For these situations, the proposal by Alfasi and Portugali (2007) to establish some sort of planning judge can offer a solution. In our view, such a judgement can be given by a committee of independent experts, for example, consisting of public planners and urban designers from another city. They can weigh up the arguments of both parties and decide on which interpretation of the conditions is most appropriate given the situation at stake and considering the original intentions of the defined conditions. Setting up such an evaluation system offers a way to work *with* the complexities of urban transformation instead trying to *reduce* these complexities.

4.2 Conditions for capacity building of local coalitions

Strengthening the responsiveness of urban areas to change requires more than opening up development frameworks for a variety of possible spatio-functional configurations. The generated possibility spaces also have to be utilised in order to indeed improve an area's fit with its dynamic environment. Therefore, planners have to open up their practices for self-organization mechanisms in urban development (Boonstra 2015). As self-organization processes are unpredictable and not guided by collective intent, planners have to reach out to the diverse range of local actor coalitions which all take part in reshaping the urban fabric. These coalitions emerge from the temporary, changing and multiple interactions in cities, in which public planners are not necessarily leading. Nevertheless, we argue that enabling these coalitions is crucial in supporting an area's capacity to adapt to changing circumstances. Property owners, citizens and entrepreneurs often have valuable (tacit) knowledge on how a place functions, which they use to generate innovations in response to a shifting context. In other words, contributing to self-organization mechanisms, these coalitions do not only optimise existing urban configurations, but also generate novel ways to use, develop and brand urban areas.

We suggest that planners can support the involvement of actor coalitions in urban development by means of capacity building. Drawing on community engagement and community initiative literature, this concerns influencing the available means, motivation and social capital of local coalitions, processes of mobilisation, and the responsiveness of formal institutions (Lowdnes et al. 2006; Bakker et al. 2012; Denters 2016). It is beyond the scope of this article to comprehensively discuss the enabling conditions for these five aspects. Limiting ourselves to a few examples, one can think of providing relevant data on the area and its context, improving connectivity between actors, and offering support in making the steps from idea to implementation. But supporting the initiatives of various actor coalitions should not result in high levels of inequality and social exclusion. Particular groups may easily organize themselves to serve their interest while others may have less capacity to do so or are quietly excluded (Uitermark 2015). Such effects might be partly mitigated by including a condition on peer learning, which stipulates that those receiving public support are required to share their knowledge and skills with other emerging coalitions. The challenge for planners is to facilitate local coalitions in developing their initiatives and as such trigger the self-innovating and self-stabilizing capacity of urban systems, without fostering socio-spatial segregation.

5 Condition-based development: an imaginary case of inner-city transformation

Based on the types of conditions identified above, this section offers an illustration of how an adaptive planning approach might look in practice. An imaginary inner-city transformation project is taken as an example because of the high level of complexity these projects typically show. Inner-city transformation projects, for instance, often include fragmented ownership positions, historical functions and structures that one wants to preserve, and a broad range of directly and indirectly involved actors (Healey 2007; Bosselman 2012). Taking an inner-city transformation project as an example is also relevant as these kinds of projects are increasingly dominant over greenfield development in most Western European cities (Thomsen 2011). We run a thought experiment to identify what kind of conditions can guide such a transformation project and discuss to

what extent these conditions contribute to the adaptive capacity of the area.

Let us assume that our imaginary project concerns a former industrial harbour site. The storyline is that the harbour has lost its functionality as a result of newer and more modern harbour areas elsewhere. Due to its location in the centre of the city, next to the historical heart and the shopping district, the area has the potential to make the transition to a multifunctional, high density urban neighbourhood. Aiming to increase the attractiveness of the city and to renew its economic profile, the municipality is eager to develop the site. However, the context is far from stable. Next to the long-term uncertainties about how technological, ecological and demographic trends will affect the area, planners also face short-term uncertainties: the various landowners differ in their capacity and willingness to contribute to the transformation, citizens and politicians argue about which projects have priority, and due to a period of economic decline investors are hard to find. How, in such a situation, with multiple uncertainties, would an adaptive approach be of help?

Ideally, urban development projects start with considering how the project can contribute to the central values of the city (e.g. inclusiveness, economic vitality and sustainability) and its related ambitions (e.g. poverty reduction, boosting innovative businesses or reducing the city's consumption of fossil fuels). To identify potential paths of development, influential contextual trends are identified, actor networks are mapped and distinctive qualities of the area are traced (Boelens 2009; Hartman et al. 2011). Traditionally, the next step would be to design an integral plan for the area for the next 10–20 years, including a fully developed real estate programme, an estimation of land rates and a detailed zoning plan. However, as an adaptive approach to planning aims to increase the responsiveness of urban systems to changing circumstances, demands and opportunities, a different route is taken.

The starting point for development is the existing urban fabric and the actual and virtual potentials that are seen by actors involved. With actual potentials, we refer to niche developments that have already taken place in the area. With regard to our former harbour area this can, for example, include fishing boats converted into houseboats or the transformation of a former warehouse into a fish restaurant. Virtual potentials are about the opportunities, ideas and dreams actors associate with the area

or specific spots within this area. For instance, realizing heat-exchange systems by linking the heat grid of buildings to the harbour water reservoirs, or a coalition of actors who want to turn a shipyard into a music club or theme park. The aim is not to define how these potential developments can fit into an area's configuration that is envisioned for the longer term, rather the objective is to turn these potentials into a first step of an incremental development process. This process is about connecting the current dynamics of the area and its distinctive qualities with the ambitions in the long run, while securing the area's capacity to adjust its pace and direction of development over time.

5.1 Spatio-functional conditions for adaptive inner-city transformation

Discussing a regulatory framework that can guide the incremental transformation of our imaginary case in an adaptive way, we apply the conditions on spatio-functional configurations introduced earlier: conditions that secure quality of life under a variety of potential development trajectories, conditions that increase the context-sensitive flexibility of the development process, and conditions that stimulate the emergence of societally desired development trajectories.

For the first category, the precautionary principle can, for example, be a condition for development in relation to safety and environmental issues (Rijswick, Salet 2012). Additionally, conditions can be defined for the accessibility of public space, the degree of alienation between buildings, and the financial safeguarding of and spatial reservations for primary infrastructure and services. As we believe that quality of life also includes 'the right to the city' for all socio-economic classes of society, a minimum percentage of social housing per hectare can be another condition. With regard to the second category, generating context-sensitive flexibility, the redevelopment of the former harbour area can, for instance, be guided by a global land-use plan, in which only broad categories of functions are defined. One can also consider allowing temporal use of existing spaces or pop-up structures for the creation of temporary new spaces. This temporary development can stimulate the exploration of alternative configurations to reduce start-up costs and to support place-making activities (Silva 2016). Another option is the implementation of zoning-independent development rights, in which landowners can trade development rights

(e.g. type of function, density and height). This allows planners to roughly set the programme for the area, without defining the urban configuration.

The third and final category includes conditions that foster the emergence of preferred developments trajectories. These preferred trajectories can be related to general societal ambitions, for instance, to enable the transition to climate-proof cities, or area specific preferences, for example, strengthening the water-urban interactions. Considering the ambitions for the transformation of the harbour site, a more general ambition to reduce the environmental impact of the city can be translated into the condition that new developments have to be energy neutral. Area specific ambitions can be reflected in, for example, the condition that all buildings should have a public function on the first floor in order to stimulate the area indeed becoming a multifunctional extension of the centre area of the city. Another condition can be that building transformations should result in a physical orientation to the water, including a publicly accessible space between the building and the waterside. In this way, the harbour feel of the area is strengthened.

In sum, the conditions included in the regulatory framework set the general boundaries for the spatio-functional configurations that may emerge over time, both with regard to quality of life standards and desired identity and qualities. At the same time, a specific configuration is not prescribed nor is the pace of development. This allows the actors involved to respond in a flexible manner to changing demands, new opportunities or arising threats.

5.2 Enabling adaptive inner-city transformation through capacity building

As argued in section 4, an additional set of conditions is essential for an adaptive development of the harbour site. These conditions concern the capacity of local actor coalitions to contribute to urban transformations and fuel self-organization. In the context of the harbour site, self-organization mechanisms may trigger a shift in the area's focus towards leisure development, for example. When various actor coalitions see the area as a potentially attractive place for bars, shops and recreational activities, such as cooking workshops, an open-air cinema or waterbike rental, their initiatives can collectively result in a spontaneous transformation of the economic profile of the area towards the leisure economy.

To utilize the potential of diverse actor coalitions, conditions are required that support the emergence of surprising collaborations between, for instance, local entrepreneurs and retired fishermen, alongside or partnering with traditional coalitions between project developers, municipalities and construction companies. Discussing these conditions, we limit ourselves to the three examples introduced in section 4: improving the availability of relevant information on the area and its context, fostering the step from idea to realization, and supporting the connectivity between actors.

The first condition can include the provision of open source data on the history of the harbour area, trend reports on demographics, technological developments and economic pressures on various scales, or an interactive digital map showing the initiatives that have already been launched. This enables a wider range of (potential) local actor coalitions to explore development opportunities for the area. The second condition concerns fostering the transition from idea to realization. Here one can think of providing analyses of best practices in harbour redevelopment. This can inspire actors and help them to identify successful transformation strategies. Another possibility is to create experimental zones where prototypes can be tested. The third and final condition concerns increasing the connectivity among actors, as this can, amongst other things, boost the emergence of new (innovative) actor coalitions. Implementing an online platform where supply and demand of space or services can be matched during the transformation of the harbour site can increase actor connectivity. Also, the appointment of ‘matchmakers’ who are responsible for coaching local coalitions and updating them on other initiatives and networks in the harbour area can be of help. Finally, alternative forms of financing projects can increase connectivity. In the harbour case, crowdfunding can, for example, be used for the creation of a temporal, artificial beach on one of the empty industrial plots in the area. Or a business development zone can generate collective financial resources to upgrade the public space. Hence, we argue that a combination of conditions can enable the emergence of local coalitions that play a role in urban development, contributing to the self-innovating and self-stabilizing capacity of the harbour area.

To conclude, urban development trajectories, such as the transformation of a former, inner-city harbour area, often involve many uncertainties. In this section, we illustrated how a

condition-based, adaptive planning approach may improve the responsiveness of the area in dealing with these uncertainties. The main principle behind the approach is that the conditions generated for development increase the area’s capacity to deal with and benefit from a variety of potential spatio-functional configurations, as well as actor coalitions and their initiatives. The specific way in which the conditions have been operationalized for the presented case indicates that they are situation-dependent to a certain degree despite their generic and relational nature. This teaches us that conditions for adaptive urban development should be embedded in processes of structural monitoring and learning. Only in this way can the balance between the generic and the specific be recalibrated from time to time, allowing for development frameworks that support an area’s adaptive capacity in the long run.

6 Epilogue: implications for the role of planners and a future research agenda

In response to the uncertainties that challenge planners in guiding urban transformations, this paper explored an adaptive planning approach. Starting from a complexity perspective, an emphasis was placed on how the changeable nature of the multiple and interdependent processes underlying urban transformation give rise to non-linear development trajectories. In such a dynamic context, keeping a fit with their environment is key for urban areas in securing their vitality over time. Therefore, an adaptive planning approach is focused on strengthening the responsiveness of urban areas to both foreseen and unforeseen change, and aims to enable urban areas to function well under different circumstances. We argue that this approach requires a shift in the focus of planning strategies: from content (i.e. *what*) and process (i.e. *with whom*) towards conditions for development.

We discussed conditions for spatio-functional configurations and for capacity building of local coalitions that allow planners to develop frameworks for adaptive urban transformation. But what does a condition-based guidance of urban change mean for the role of public planners? We argue that an adaptive planning approach invites planners to adopt the roles of trend-spotters, matchmakers and facilitators alongside their more traditional roles as experts or mediators. As trend-spotters, planners are required to keep an eye on contextual trends, as well as on emerging local initiatives, and to

develop proposals for adjusting conditions for development when necessary. As matchmakers, planners are expected to link emerging projects and local coalitions, and to point out opportunities, synergizing new projects with existing urban functions and structures. As facilitators of urban change, planners are requested to promote innovation and experimentation, and to 'coach' the local coalitions that propose them. Planners, by taking up these roles, can co-create the city with traditional and non-traditional actors in urban development.

Exploring an adaptive approach to planning also brings forward issues that require further research. For instance, to what extent and in what way can powerful actors be seduced into cooperating with the opening-up of planning systems, when they run the risk of weakening their own positions? A better understanding is also needed of how an adaptive planning approach works for actors less well-organized or skilled; as with the open development framework planners face the risk of primarily serving the interests of well-informed elite. Furthermore, a recent study by Savini (2016) on urban development projects in the Dutch city of Amsterdam showed how actors tend to undermine the adaptive capacity generated in development frameworks by signing contracts under private law, with the aim of increasing legal security. How to overcome these barriers when moving towards a more adaptive approach to planning? We invite practitioners and academics to further research these issues with an aim to developing a comprehensive theory on adaptive planning, its opportunities and its practical limitations.

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