HOW TO MAKE DEVELOPMENT PLANS SUITABLE FOR VOLATILE CONTEXTS

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Abstract

A Complex Adaptive System (CAS) approach enables a dynamic view of how spatial systems evolve, considering spatial development to be a product of multiple and interrelated drivers for change. These processes typically have a remote causality and progress in a non-linear fashion. Those promoting CAS within the realm of spatial planning suggest it can help planners to gain an enhanced understanding of spatial change and find alternative ways of guiding spatial development. However, little attention has been given to the implications of remote causality and non-linearity on planning practices in general and development plans in particular. While development planning is a dynamic process, development plans have been criticised for exhibiting increasing rigidity during their lifetime and therefore offer limited utility to effective spatial planning. From a CAS perspective, this rigidity is particularly problematic since it requires planning strategies that are flexible enough to productively co-evolve with spatial dynamics. Meanwhile, development plans are widely recognized for their capacity to set direction, unite initiatives around a shared vision and the certainty they provide for landowners, project developers and citizens. Therefore, this paper explores with help of a case study some of the issues and tensions which may arise if the CAS approach is promulgated further and leads to significant changes in the design and implementation of development plans. It shows how CAS-based principles for developments plans may enhance the adaptive capacity of urban environments, but can also undermine other features of development plans. Additionally, some alternative skills are requested from planners when strengthening the adaptive capacity becomes a central aim.

Key words: adaptive capacity, complex adaptive systems, flexibility, development plans, Blauwestad

1. Introduction

Complexity science is now viewed by a number of authors to provide considerable utility in understanding and planning the spatial (e.g. Allen 1997, Batty 2005, Portugali, 1999; Webster, 2010). Portrayed as complex adaptive systems (CAS), spatial dynamics are understood to evolve in response to changes in their context, e.g. a city in response to a financial crisis or to environmental changes. However, a

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CAS's evolutionary behaviour is dynamic and difficult to predict as responses to changes in context are non-linear and emergent (Holland, 1992). Seen in this way, spatial development is discontinuous and often involves unforeseen change, rather than smooth progression (Portugali, 2006). Therefore a CAS approach describes dynamic processes of spatial development and highlights a situational perspective; spatial issues cannot be seen as unchanging, a-temporal and independent of their context (De Roo, 2012).

While for a number of years complexity science has been drawn upon to theoretically understand and artificially model spatial dynamics, only recently has it been used to suggest alternate spatial planning practices (see Alfasi & Portugali, 2007; Portugali, 2010, Rauws & De Roo, 2011; chapters from De Roo & Silva, 2010). This paper seeks to contribute to this growing body of research by exploring the implications of understanding spatial dynamics as CAS on spatial planning practices with particular reference to development plans.

Development plans are a well established, central tool of current planning practices; they are official documents produced by local and regional authorities to guide and regulate land use change (Healey & Shaw,1993; Kaiser and Godschalk, 1995). However, development plans are known to exhibit increasing rigidity during their lifetime and therefore are flawed for effective spatial planning under circumstances with a high degree of uncertainty (see e.g. Booth, 1996; Staley & Cleays, 2005; Larsson, 2006). Underlying drivers of spatial development, such as technological innovation, socio-economic and lifestyle trends, and also local demands and capacities frequently transform spatial configurations faster than development plans are able to deal with.

Development plans are often not sufficiently responsive as they set out a predefined trajectory of change. While the aim of planning is to support the making of better future places, most development plan designing processes take the current physical, economical and institutional configuration as fundament. As this configuration can considered to be fluid, it results in development plans that do only partly match the dynamic 'reality'. Some argue they often exhibit increasing rigidity as they are formalized and are consequently ill prepared for societal, economic or ecologic change experienced during their implementation and/ or completion. According to Alfasi, (2006) and Staley & Claeys (2005) the rigidity of development plans can discourage further spatial innovation and obstruct bottom-up development initiatives. In addition, Larsson (2006) and Van der Valk (2002) argue that the strong determining power of development plans can lead to bureaucratic situations in which matching the dynamic reality and the rigid plan is time-consuming. In other words, it is argued developments plans tend to lack the flexibility to co-evolve with emerging changes.

From a CAS perspective, such rigidity of development plans is particularly problematic. A CAS approaches requires flexible development plans that have capacity to productively co-evolve with spatial dynamics, to effectively mediate and respond to contextual changes and evolutionary dynamics as they emerge. However, also and importantly, development plans are widely recognized for the certainty they provide for landowners, project developers and citizens (Neuman, 1998). Indeed,

they are important as they stimulate and direct spatial developments and engender investor confidence.

Therefore this paper considers what the CAS perspective may mean for development plans. Although the production of development plans include various dimensions (Conroy & Berke, 2004), we concentrate on the visionary product − the design – as an effective instrument to spark urban change (Neuman, 1998). We focus on development plans for district level (5-15 years) since they incorporate the challenges of variety of actors involved due to their size an high level of uncertainty, due to their time span, while often incorporating concrete implementations measures next to strategic goals. It is asked how the capacity of these particular development plans to incorporate the temporality and dynamics of spatial relations and functions might be enhanced while the certainty current development plans provide to engender investor confidence can be retained. Additionally, we question how such plans may help to improve the adaptive capacity of areas in development. This way, the paper explores some of the issues and tensions which may arise if the CAS approach is promulgated further and leads to insight in the required changes in development plans and indeed planning practices more generally.

This paper is divided into five sections. First, the key concepts of CAS are briefly discussed, exploring how CAS portrays reality and subsequently what kind of consequences this perspective could have for planning and governing the spatial. The second section contains a review of a development plan in the Dutch planning practice. We analyse in what sense the rigidity of a development plan can be problematic and what sources for rigidity in this particular plan can be identified. The third section discusses what consequences a CAS approach might have for drafting and implementing development plans aiming for more flexibility. It is concerned with the fundamental questions can be raised when the structuring capacity of plans and the aim for adaptive capacity promoted by a CAS approach a brought together. Taking this one step further, section four identifies possible lessons for planning practitioners on how CAS-based principles for designing and implementing development plans may increase the flexibility of these plans and the adaptive capacity of areas in development. The paper concludes with carefully exploring the considerations and challenges that planners could be confronted with when the CAS approach would further penetrate planning theory and practice.

2. Complex Adaptive Systems and a Perspective of Becoming

Already some time ago planners moved beyond the idea that they can design en shape spatial development through solely technical rational approaches. Due to the work of amongst others Simon (1957), Lindblom (1959) and Davidov (1965), the limitations of these approaches became apparent, showing the incompleteness and selectivity of information and the influence of political or power-driven motivations on decision making next to rational ones. With the communicative turn in the 1990s, increasing attention is given to the context dependency of spatial issues and the plurality of perceptions, preferences and values of actors involved in planning processes (Healey, 1996, 2003; Innes, 1995). Moreover, the idea of spatial issues being embedded in a multiple and overlapping networks gained momentum inspired by Castells work on the Network Society (1996). Due to these various factors highlighting the context dependency and multiplicity of spatial issues alternative

perspectives are explored to enhance our understanding of spatial change in attempt to support planning innovation.

Various scholars suggest complexity adaptive system (CAS) thinking may provide planners with an interesting set of concepts which could help to further develop a dynamic perspective on spatial developments. During the 1990s Batty and Longley (1994), Allen (1997) and Portugali (1999) showed the relevance of mechanisms of change based on CAS is discovering new patterns of emergence in cities. In the years that followed, this research has been refined and also extended for example consensus building (Innes & Booher, 2010), city development and property rights (Webster 2003, 2010), transitions in urban-rural integration (Rauws & De Roo, 2011) and, governance and decision making (Gerrits, 2008; Portugali, 2010, De Roo & Rauws 2012,). A central argument to all of them is that a CAS approach helps understanding unexpected transformations as the heart of spatial issues, instead of seeing them as exceptions or failures. Below we discuss the CAS approach and explore how it may cast the design of development plans.

Those inspired by CAS argue it provides a straightforward critique on the Newtonian world, assuming a world of knowable entities independent of time. CAS are embedded in and contributing to non-linear processes of change producing out-of-equilibrium states (Wolfram 2002). From a CAS perspective the world is considered to be in a state of constant flux. It provides a perspective on spatial dynamics being time and space related resulting in continuously evolving realities.

CAS are open systems, evolving through interacting contextual and internal processes (Portugali, 2006; Wolfram, 2002). It is argued that their continuous adaptation is on one hand the result of contextual interferences triggering reconfiguration in the attempt to create the best possible 'fit' with its environment. At the other hand, CAS are suggested to have internal mechanisms of adaptation referred to as self-organisation. These are processes in which the constituents of a system (individuals actors, informal coalition and organisations) alter their behaviour, undertaking actions that result in a jointed efforts to change frameworks that constitute their behaviour. The self-organising aspect is that new structures, patterns and organisations that may arise, altering these frameworks, from actions between various actors in the system without external coordination (Heylighen, 2008). In sum, the evolution of CAS can be understand as mixture of top-down and bottom-up processes, including planned an unplanned actions, which continuously create feedback and feed forward loops (Lewin, 1992) influencing one another.

This mixture of top-down and bottom-up processes creating feedback and feed forward loops results in emergence. This behaviour is not limited to a system itself, since a system is considered to be open. Therefore the process of continuous adaptation effects other systems as well. This phenomenon of interrelated systems is known as 'nested systems'- "cases are in themselves complex systems which are nested in, have nested within them, and intersect with other complex systems (Byrne, 2005 p. 105)". It does not necessarily mean they are ordered in an hierarchical way, as spheres of influence can go across such categorisations. The concept of nested systems emphasizes the interdependency of processes of change and the dynamics CAS cause while being infused by others.

The CAS approach portraits a dynamic reality that evolves to a large extent autonomously as a result of interrelated processes. Both planned and unplanned actions are considered to be part these processes, the path of development, however, presumed to progress in a non-linear way. The CAS approach puts forward a perspective of 'becoming', in which visioning, designing and decision making on planning situations should not only be sought in 'being' but should be considered as a part of on-going trajectories of change. It suggests in many situations predictability is low and uncertainty high, and challenges planners to accept remote causality between planned interventions and their outcomes.

What kind of consequences would CAS imply for planning in dealing with this fundamental uncertainty? According to Bertolini (2010, p.93) planning needs to 'seeks a solution through the identification of robust measures – to enhance the resilience of the system – and options which can and should be left open – to enhance the adaptability of the system'. De Roo & Rauws (2012) suggest planning should move to more adaptive strategies based on a 'situational understanding' of socio-spatial phenomena, taking into account how planned an unplanned developments meet, intersect and overlap together becoming manifest in a certain time a place influencing (perceived) possibilities and limitations for planning interventions.

If such views on planning would be implied, what then would be the consequences for development plans? Although exploratory, applying a CAS approach seems to suggest that development plans should incorporate mechanisms that enable the spatial system under concern to co-evolve successfully with a transitioning spaces and places, including permanently redefined demands over time and space. Seen this way, rigidity is a serious treat to productive planning and development plans may have to improve their flexibility.
The next section explores the issue of rigidity and its consequences on a more practical level analyzing a development plan in Dutch planning practice.

3. Rigidity pitfalls for development plans – challenges in practice

In this section we draw on development plan Blauwestad to explore the possible implications for development plans when rethought in the light of a CAS approach. Blauwestad, located in the Northern part of the Netherlands, is a comprehensive development including a diversity of functions to be realised. Although it does not represent all development plans in Dutch planning practice, similar kind of plans, such as 'Meerstad' (Van den Brink et al. 2006) and 'Wieringerrandmeer' (Woltjer & Al, 2007; Woltjer, 2008), have been designed. More importantly, it is part of a category of development plans that may not be pursued it its current form if a CAS approach gains more influence on planning.

Before analysing Blauwestad in-depth, we first briefly explain some key aspects of the Dutch planning system to provide insights in the function of development plans in Dutch planning practice. The Dutch planning system is foremost a legislative rather than a political system and heavily emphasizes protection and legal security (Janssen-Jansen & Woltjer, 2010). In this system development plans have an important role as they are a central tool in guiding future development. Development plans are intensively prepared by public planners, including participation of private

and civil actors as there is a deep rooted believed in consensus building (Van de Valk, 2002), often leading to a comprehensive designs which are then formalize and carefully followed during completion. As a consequence, the potential to negotiate the scope and substance of developments is limited (Janssen-Jansen & Woltjer, 2010).

3.1 Blauwestad

The development plan for Blauwestad (Blue city) was designed to give a new boost to a region that experienced both demographic and economic decline. The plan comprised an area of 1450 hectares with dominantly rural activities. It is part of a region that has a rich and economically successful argicultural history (Hidding, 2002). During the 1980s, however, the vitality of the region was declining. A part of the agricultural plots remain unused due to EU policies, industrial sites closed down and as a consequence unemployment was increasing, causing young and highly educated people to leave the region (Dammers et al., 2004;Bekkers & Moody, 2006).

A broadly shared sense of urgency raised support for a large scale spatial intervention, resulting in development plan Blauwestad. Development plan Blauwestad has emerged from the initial ideas of two local actors they displayed in 1989 and is eventually developed by PPP (public-private partnership) that planned to invest in total 82 million Euros (NRK, 2010)[4]. It is a grand vision and has been lauded on its integral approach combining economic development, housing, nature and leisure development, and water management measures (winner "Gouden Piramide 2005", national prize for 'inspiring commissioning'; nominated World Architecture Festival 2008 category 'Nature').

The heart of the plan is a man-made lake (800 hectares) on former agricultural land. In and around this lake, the construction of about 1200 luxury mansions (later on this was raised to 1480) with a minimum price of 300.000 Euros was planned (NRK, 2010). It was expected that building these high end properties, by making developers investing a share of the profit in the common structures, would largely cover the costs for creating the lake. This way, building houses would generate both the funds for the lake, the nature development. And at the same time it was expected to stop the outmigration of highly educated people and invite wealthy families from other regions of the Netherlands to migrate to this area giving a boost to the regional economy (Stichting Blauwestad, 1997; NRK, 2010). The project was expected to deliver 400 temporal jobs and 400 structural new jobs (Dammers et al, 2004) The lake would also make the region a touristic center for the North of the Netherlands as well as help solve some serious water management difficulties in the region (Roggema, 2010). The realisation of the plan started in 2004.

[4] Including acquisition of the land. In 2010 the total costs were increased to a total amount of 785 million Euros (NRC, 2010)

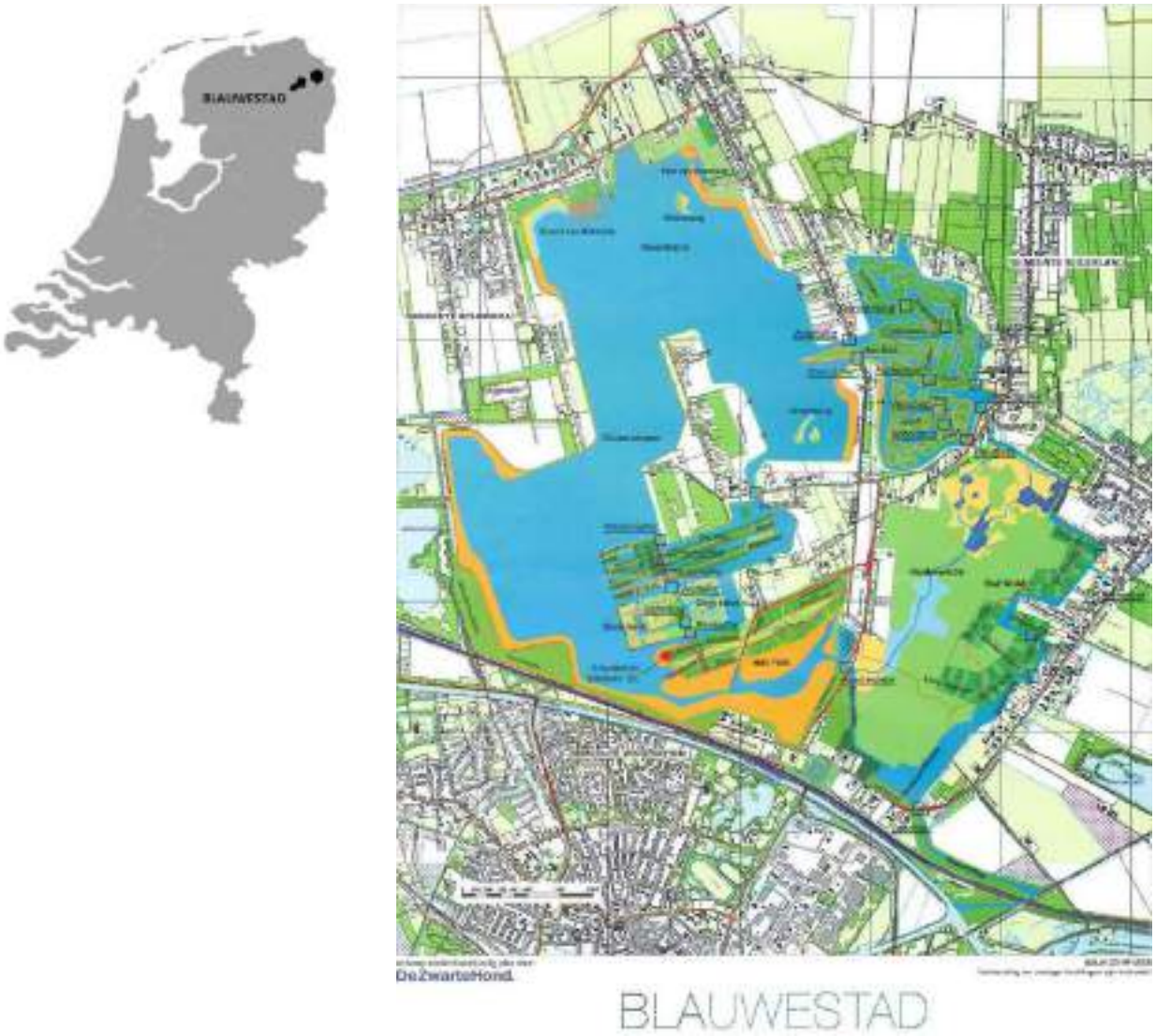

Figure 1: Development plan Blauwestad including an artificial lake on former agricultural land (800 hectares) and several thematic neighbourhoods for the construction of 1480 luxury mansions.

However, things evolved rather different than originally planned. The investments needed for completion of the plan were higher than expected (NRK, 2010). Therefore, the private project developers have been granted permission to build an additional 280 houses and to use the profits of this extra quota to address the financial shortfall (NRK, 2010). More serious is that the estimated demand for luxury houses appeared far above the real demand. Planners expected an inflow of house buyers from outside the region, presuming much higher prices and low supply elsewhere and ICT to make people footloose, enabling them to even run their business in the Randstad region, 200 kilometres away. These expectations did not materialise – not in the years before the financial crises and certainly not after.

Initiatives to loosen the strict design regulations were not accepted by the regional authorities as they would damage the desired image of luxury living in a high quality environment (NRK, 2010). However, the reputation of the project with its peripheral location was increasingly becoming one of failure and the sale of plots for private

housing construction almost came to a full halt. “The idea of moving to Blauwestad is almost similar to emigrating to another country” was the general tendency (NRK, 2010 p.110). Aggravating this, the few potential buyers could not move in because they had difficulties selling their current house due the stagnation of the national real estate market as a consequence of the financial crisis. This in turn caused the heart of the plan, a district called ‘the village’ designed to include local shops and other community services, to remain unconstructed as the lagging development around it caused neither the funds to be available, nor the residents to spend their money there.

In 2007 two of the three participating private developers quit and the financial risks to the public parties involved have increased substantially. In 2009, the PPP was dissolved and the regional government had to take the financial loss (28,8 million Euros) and full reasonability and financial risks for completing the plan (NRK, 2010). In 2010, with only 183 of the eventual 1480 plots are sold (Provincie Groningen, 2010), the development plan was adjusted, extending the duration of implementation and rescheduling the expected number of plots sold each year from 150 to 40 (Provincie Groningen, 2010).

3.2 Sources of rigidity in Blauwestad

Surely, the development plan for Blauwestad can be considered as a powerful vision. It was able to bring together a diverse set of stakeholders around an innovative and inspiring new future for an area in decline. Meanwhile, the recent progress that shows the difficulties that can arise when the initial development strategy needs to be adjusted due to changing circumstances. We will review development plan Blauwestad to find the essence of its rigidity.

Why was Blauwestad so vulnerable to various types of changes? Primarily, the plan included an integral development strategy that first required upgrading the spatial qualities of the site, before rest of the plan could commence. Therefore, high upfront investments had to be made (118 million Euros by public actors, NRK,2010) for acquiring the land, constructing the road infrastructure to the building plots, and constructing the artificial lake. This was considered necessary to put the area on the map, before a single plot would be sold and the first house could be built. The upfront investment, and the interest rate making this amount grow, was to be recouped later on by developing houses.

A sound balance sheet demanded a minimum amount of plots to be developed yearly and a certain final number to cover the at least the public investments. The balance was tight - raising 73 million[5] Euros from the profits of 1480 houses means collecting 50,000 Euros per house on average, when leaving out interest rates on the investment and excluding 32 miljoen of subsides (NRK, 2010). Slower development, other types of land use or lower final numbers would automatically result in a financial loss. Moreover, the full construction of the lake, street grid and even the street-lighting in advance set the spatial design for a long period.

This resulted in a rather prescriptive real estate program, focused on attracted wealthy people from both regional as national market. Especially the group from outside the region was expected to give a boost to the region’s economy. The

[5] In 2009 this was already increased to 118 million (NRK, 2010)

feasibility of this strategy was soon considered to be doubtful. The projected 1480 high end plots was massive compared to the limited national demand on luxury housing (RIGO, 1995). Moreover, only 28% of the plots sold until 2007 in Blauwestad was bought by people from outside the Northern part of the Netherlands (Companen, 2006 p.65). The other plots are obtained by regional house owners, who could afford high investments and of which a part delayed their investment anticipating on the construction of the Blauwestad (Companen, 2006). Thus, the supply was exceeding the demand and part of the investments in the region were redistributed instead of new investments were attracted.

It led to a financial lock-in that caused the development's rigidity. It might have been a master plan, with room for reconsideration of parts of it. But the high investments made it impossible to reconsider the remainder of the plan – future choices were taken hostage as they had to recoup the investments. The financial burden and, in addition the set spatial design, dramatically constrains the range of choice, causing high vulnerability to changes in context.

4. Discussion: are flexible development plans desirable?

In exploring the possible relevance of a CAS approach for the design of development plans, we have assessed the Blauwestad development plan. It has illustrated when a development path can become rigid, the development plan's contribution to this process, and, accordingly, what challenges can arise. The question we concentrate on in this section is whether more flexible plans, as a CAS approach seems to suggest, would help to prevent these situations and could strengthen the adaptive capacity of a development area.

4.1 Tensions between making plans and seeking adaptiveness

However, we first need to critical asks ourselves what tensions could emerge when one would argue to increase the flexibility of development plans. A CAS approach, how appealing and elegant in a theoretical sense, can raise a number of rather fundamental questions when it is tried to apply in planning practices. Complexity thinkers implicitly draw the use of planning into question, in the very logic of their argument (Portugali, 2012, p.55). Therefore we pose three counter questions to a CAS-approach for development plans below.

Question 1 would be: *How flexible can a plan be, without ceasing to be a plan?* In the flight from the rigidity of plans, a CAS approach would opt for maximum flexibility. But a 'flexible plan', in its ultimate consequence, is an oxymoron. When all future actions are possible, open to consideration on points in time to come, by definition that means we don't have a plan. We can't set out a course of action and at the same time declare that course completely relative and open for reconsideration at any time.

Not only would it be semantically impossible, it would also discard all benefits from agreeing on a course of action. Despite the downsides of rigidity, we cannot ignore the structuring, stabilizing and synergizing role of development plans enhancing the robustness to overcome external pushes and internal stresses. In general plans are designed to represent current strategic choices with regard to possible futures (Hopkins, 2001). Thus, in order to steer spatial change, planners have to organise a

coherent set of actions across a range of interdependent actors. That is the purpose and right of existence of plans: they align interests and actions in situations of dispersed power. As Hoch (2009) explains 'plans offer provisional accounts of future outcomes that users intend to accomplish by changing the relationships represented in the current urban situation' (p.236). Making plans flexible may equal re-inviting uncertainty and mistrust, resulting in loss of performative power.

Hence, a balance must me struck between the adaptive capacity and the certainty development plans contribute to. In CAS metaphors: there is a tension between the degree of flexibility and robustness. Therefore, discussing flexible plans has to consider the loss of being able to unite across actors and mobilise concerted action. How flexible can we be without loosing all?

Question 2 would be: *Is it possible to foresee all alternative trajectories?* A consequence of adopting a CAS approach can be that planners should aim for flexible plans so unexpected future situations can be accommodated without costly redesign and rebuilding. Although a potentially valuable intention, given the need for efficiency and the dynamics of contexts for plans, a complication arises.

Is the implicit assumption that we need to anticipate on changes with high degree of unpredictability in context not fundamentally a paradox? When we make spaces in such a way that alternative uses may be already considered in the design, it implies that we foresee and define these alternative uses already. At the same time, we dismiss the possibility of planners being able to predict the future, so this would be a contradiction. We cannot design in such a way that *any* no matter how unthinkable future need would be accommodated, because every design will accommodate some uses and render space unsuitable for others. So, on what basis is decided what particular range of flexibility is aimed to achieve in designing a development plan?

Question 3 would be: *On what scale do planners want adaptive capacity and where not?*
In urban landscapes the capacity to adapt is never absent. And neither is structure and planning. Even in highly regulated planning systems, room to self-organize exists on the scale of people's daily walking patterns. People together create new routes, reconfiguring the urban fabric (see Helbing, 2001). At the same time, also highly chaotic spatial processes produce rules. The formal and informal rules that come into existence in illegal settlements and refugee camps are illustrations.Such processes can be explained as enslavement; due to information compression order parameters emerge, enslaving other directions of progress (Haken, 1983; 2000).

Does adaptive capacity in the context of development plans, then, mean we just wait what the joint result of individual or small-group actions will amount to? Or is the production of plans a spontaneous result of self-organization already? There will always be openings for diversity and alternative paths of development, within a certain web of regulations that pose boundaries to that freedom. Every planning system, as well as every plan, is a temporary agreement on where these limits are. Therefore, we consider regulating structures, such as development plans, to be to some extent *a product of* self-organisation, and for sure *a precondition for* self-organisation, rather than the opposite of self-organisation. Structures are a precondition because although they may be blamed for setting limits, they by doing

just so, also define spaces allowing freedom of action - structures and actions are countermoulds (Giddens, 1984).

Conclusively, spatial change is self-organised and self-structuring at the same time - on different levels and moments. We cannot, and do not need to, choose on which particular level planners should remove all planning barriers for self-organisation and which not. In the context of design postulating specific futures Marshall (2012) rejects the choice between designing or not, stating that '…any settlement or built environment will feature design somewhere, at some level: and so the question becomes an argument of scale.' (p.204). Key to this paper is how combinations of structuring aspects and room of self-organisation can be integrated in development plans on district level to strengthen the adaptive capacity of these environments.

4.2 A framework for development plans

What kind of framework for development plans would allow combinations of structuring aspects and room of self-organisation in development plans? Let us start by stating development plans do have a vital role in inducing desirable spatial change. They can have both a persuasive and prescriptive role. While the latter potentially limit the flexibility of the plan and could be reformulated with help of CAS-based principles, the first has to be safeguarded.

Captivating grand visions remain crucial to reveal shared values and devise innovative ideas that blend seemingly contradictory demands and as such trigger initiatives (Rauws en Van Dijk, forthcoming). However, planners may need to relinquish ambitions for comprehensive large scale designs. In an attempt to retain the persuasive capacity of a plan while increasing its flexibility during implementation, we suggest both can co-existence. Though, on different levels of planning. The visionary elements should be considered on strategic level. Converting a persuasive vision into concrete implementation measures needs to be done on operational level. Here the CAS-based principles are required to guarantee the adaptive capacity.

Operational decisions should not have the same level of ambition as the vision has. This does not mean to separate plans a created, but the persuasive and prescriptive elements are valued on different levels. Of course, the two levels are intertwined, strategic and operational elements of the plan feed into each other. Nevertheless, distinguishing the two within a plan may help the actors involved to acknowledge the implications of the unknown futures they are confronted with realizing a development, despite its possible synergizing and mobilizing effects and innovative ideas. In the next section is discussed how CAS based principles can connect both level and respectively their visionary elements and implementation measures.

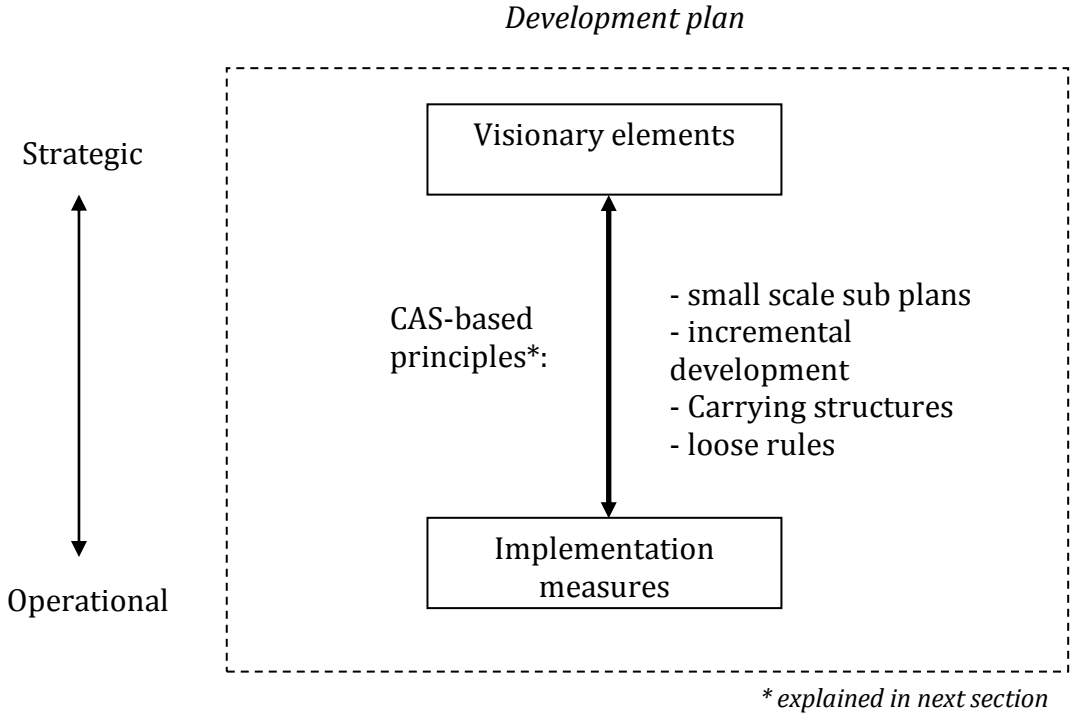

Figure 2: A framework for flexible development plans. CAS-based principles can help to link the visionary elements and concrete implementation measures in such a way the adaptive capacity is strengthened.

5. Practical design principles for flexible development plans

When we focus on strategic decisions are made operational and how CAS-based principles may help to strengthen the adaptive capacity of an area, several preliminary lessons for planners can be deducted. The example of the Blauwestad development plan reveals the essential pitfalls of rigidity. Backed up by practical implications found in current literature, this is what CAS may mean for development plans.

First of all, the main flaw of the Blauwestad was not its visionary ambition or its end-state image that it pursued. Uncertainty does not mean we should stop making plans. On the contrary, plans help create sense of urgency, direction and agreement (Rosenhead, 2001, Albrechts, 2004). Blauwestad might have made it just one of many plans that turned out not to be viable, unrealistic under altering circumstances, necessitating it to change plans and try other ways. But in the case, unviability has led to serious implications.

The pitfall of the Blauwestad plan was not drafting an ambitious plan *on paper*, rather it was the massive pre-investments *physically and financially*. Making a plan is an innocent act. But embarking on an overambitious operational program of investments resulted in serious challenges later on. Doing these investments made it difficult to (i) develop in a much slower pace, (ii) change the future land use, (iii) refrain from implementing part of the plan. Dramatic changes in context of Blauwestad, showed the necessity of a combination of these three measures.

Concretely, adaptive capacity, on the specific level of scale of development plans on district level, is best secured when they meet the following principles:

- The overall plan, in its implementation phase, is composed of multiple independent smaller scale plans. From a CAS approach a mosaic of self-sufficient small plans would be preferred over large scale plans (see also Alfasi & Portugali, 2004). Large scale plans have a long time span due to their size, making contextual changes (political, economic, societal) very likely. The small scale plans cover a relatively short time period, making them less susceptible to change. In addition, aiming for a degree of self-sufficiency of these small scale plans causes them to be less dependent on the success of other developments in the area.
  In case of the Blauwestad a division into in a number of sub-plans would have meant an increased functionality of compartments in future situations were other sub-plans are developed with a delay or even aborted. The risk of high upfront costs would have been limited.
- Incremental development Related to the first principle, integrating an incremental development strategy in development plans could be suggested from a CAS approach. It means evaluating former steps (i.c. small scale plans) to enhance next steps, building on successes. At the same time incremental development creates opportunities to include newly emerge contextual trends and self-organised initiatives.
  With respect to the Blauwestad an explicit incremental strategy may have led to an approach with more attention to learning and adjustment. As such failures of one sub-plan would not have impeded the reconsideration of initial choices made for the next sub-plan.
- The development plan may need to install carrying structures required to make the small scale projects possible. These are frameworks that support and connect the, to a large extent considered, autonomously emerging initiatives for further development (see also Hartman et al. 2011). The notion of 'carrying structures' originates from ecology and expresses the population level of a certain species supported by the life infrastructure present conditions of the ecosystem, e.g. quantity of food, habitat and other (Xu, 2008). In a similar way we can refer to carrying structures in urban settings, such as road and public transport networks, blue-green networks, or data networks. These can function as frameworks self-organised initiatives can easily link-in to, increasing opportunities for initiatives to emerge and therefore contribute to a vital urban system. When these structures are expensive (as the lake in Blauwestad was), the carrying structure can be divided in independent parts, so that pre-investment comes in stages.
- For the smaller projects define loose rules based on core objectives instead of detailed regulations. A set of basic, general and often qualitative rules defined within a development plan, such as 'mixed use' or 'energy neutral', is meant to guide development of an area. This is in contrast with detailed, quantitative and narrow defined rules on how objective are supposed to be met, as from a CAS perspective this may undermine or not recognise the opportunities created by self-organised initiatives. Initiatives which include ideas that do contribute the area's potential but cannot be realized within existing set of rules as they are, following a CAS approach, derived from the 'being' insufficiently taking into account the 'becoming'. In contrast, loose rules do not try to cover all possible

urban forms, not do they advocate any particular way of living (for similar kind of discussion see Alfasi & Portugali, 2007). Loose rules guide future development paths and embrace diversity in further evolution instead of regarding it as a risk which needs to be reduced as much as possible.
The tight financial balance and a predetermined group of future inhabitants, causing strict standards, defied flexibility to co-evolve effectively with a changing context Blauwestad was embedded in. In constrast, loose rules possibilities to adjust to and make use of the opportunities that arise fitting with the general aim of the development are widened. In case of Blauwestad loose rules such as 'low dense living in open space' and 'water-oriented development' could have been defined while leaving options open for multifunctional land use, architectural variations and flexible plots sizes increasing the adaptability of the development plan.

The introduced principles can help in designing more flexible development plans that strengthen the adaptive capacity of an development area. However, one could argue that a principle such as a incremental development strategy may undermine the inviting capacity of the plan. In case of Blauwestad the construction the lake at once, the future living environment for potential house buyers becomes real. Also at major sites that need newly installed highway access or public transit, this problem occurs. Some investment may be inevitable to spark the development at all. Still, when risks are so large, a phased gradual installation should be considered. With regard to the Blauwestad this could for example have meant the smaller access roads were only constructed or upgraded after a minimum level of traffic has been reached and the location for and scale of shops and other services was not predetermined, but tuned on the speed and scale of housing developments.

When major pre-investments are nonetheless considered to be inevitable, massive investments such as the creation of a big artificial lake can still done when actors agree this the only way forward. However, they need to accept the risk of the limited futures paths this investment might fit in with or the unexpected effects it may have. Therefore investments may not return in the form of planned profits and adjusted without doing new investments again. Thus, doing such investments should be guaranteed losses can be taken. Put differently, the degree of flexibility in development planning is a choice and therefore attached risks should be presented as a choice as well.

However, not only the financial viability, but also the political approval to development plans is likely to be compromised by loose rules. As Sager en Ravlum (2005) showed, politicians have difficulty limiting political authorisation processes to a strategic level, that focus on the general outline of plans instead of their details. Questions raised by their electoral body often leads politicians to feel the need to engage in discussions about details to secure the interests of their voters. Therefore, loose rules would at least require efforts of planners in convincing politicians to stick to strategic level decision making in particular. In addition, when developments are guided by loose rules, what uncertainties arise for investors and who is responsible for deciding whether proposed initiatives fit the development plan? The starting point should be maximum transparency in advance about the requirements initiatives need to meet. This should avoid that initiatives are frustrated by requirements faced later on in the development process.

Hence, some practical lessons about how the adaptive capacity of the Blauwestad could have been strengthened are identified. Taking a CAS approach have resulted in a set of criteria that allow planners to create flexible development plans without disregarding their visionary power.

6. Conclusion

To conclude, reviewing the development plan of Blauwestad from a CAS perspective learns us about the 'why' and 'how' of flexibility of plans. Strategies have to be included to design development plans that enable an area to co-evolve successfully with changing contexts.

The Blauwestad development is an innovative and persuasive design postulating a new future for a region in decline. A design that was apparently able to unit numerous actors around a shared vision and motivated them to work jointly on a more regional transition. This capacity can, at least partly, be ascribed to the comprehensive design. However, this comprehensive design turned out to have limitations when the implementation of the Blauwestad plan evolved differently than expected. As those adopting a CAS approach would argue, a situation that by planners should be considered as rather normal instead of exceptional due to dynamics behaviour of spatial systems and their environment.

A CAS approach presents a way of understanding of spatial development that steps away from the Newtonian world view that still seems to dominate today's planning practice. Planning scholars exploring the implications of CAS thinking, argue it provides interesting concepts that help to further develop a dynamic perspective on spatial developments and their underlying processes. Moreover, it is suggested a CAS approach would require a shift of attention from the 'being' to the 'becoming', meaning planning issues have to be considered as part of on-going trajectories of (non-linear) change.

What that means to the design of development plans we explored in our paper. Complexity theorists that address planning take a number of positions toward reality and the role of plans, that can easily be misunderstood or exaggerated, as if planning has no function at all. And CAS thinking does imply a number of internal tensions, as we saw in Section 4. However, by applying a CAS approach we can learn that incorporating a degree of flexibility in the design of development plans may help to strengthen the adaptive capacity of environments.

Three main lessons can be derived from this paper. First, designing a development plan requires a distinction between visionary elements and implementation measures incorporated in the plan. A development plan contains both, as the first refers to the capacity of development plans to provide an appealing, uniting and mobilizing future image while the latter contains concrete designs for realizing this future. Each of the aspects requires attentions from planners and although they are interrelated different qualities can be attached to them. The overall idea is that visionary elements are needed to set direction and inspire actors, while implementation measures are needed to ensure initiatives in line with the vision can be realized but also that alternative development paths remains open.

If a distinction between these two main components of a development plan is not made properly, rigidity is a serious risk. This turned out to be the case in the Blauwestad, as in the development plan visionary elements of the plan were insufficiently linked to implementation measures that would guarantee a degree of flexibility while appreciating the desired future the plan puts forward.

Second, CAS-based principles can help to link the visionary elements and implementation measures within a development plan. The principles provide a set of strategies by which visionary ideas can be translated into operational strategies while strengthening the adaptive capacity of an area. We have distinguished five principles: small sub-plans, incremental development, carrying structure and loose rules. The combination of these principles results in development plans the do provide a direction of development and, in addition a degree of certainty, while enlarging opportunities for incorporating unexpected change. Therefore, CAS-based principles can assist in making a successful link between the two aspects.

Third, when major pre-investments that reduce the flexibility of a plan are nonetheless considered to be inevitable, these can still done when actors agree this is the only way forward. However, they need to accept the risk of the limited futures paths this investment might fit in with or the unexpected effects it may have. Put differently, the degree of flexibility in development planning is a choice and therefore attached risks should be presented as a choice as well.

As illustrated with the principles above, a CAS approach to development plans should respect the values of making plans, but focuses on implementation mechanisms that allow reconsiderations in the future. They enable the plan under concern to co-evolve successfully with a transitioning spaces and places, strengthening the adaptive capacity of the development area. Acknowledging planning is part of world in constant change, the crucial task for the planner becomes to balance flexibility and robustness taken in the account the both space- and time-related conditions. This paper has shown development plans can become a helpful tool in this process.

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