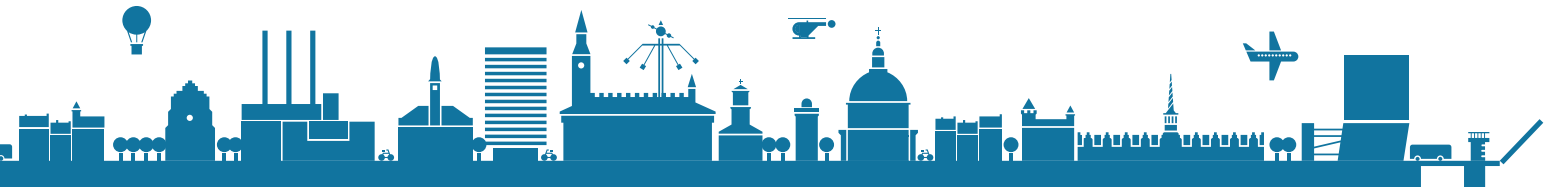

FROM HOLISTIC THINKING TO HOLISTIC PRACTICE

A Systems Oriented Design approach for Copenhagen's Cloudburst adaptation

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ABSTRACT

As climate change, technological development and liveability requirements are putting local governments under pressure to deliver new holistic aspirations to our increasingly congested cities, urban planners are facing the responsibility to manage accelerating complexity within rigid public governance systems. The city of Copenhagen has now developed visionary and extensive plans for tackling climate change effects in a new cloudburst management system, promoted to deliver innovative green-blue and recreational urban areas over the next 20 years. The road has however been a bumpy one so far, and our exploration of the field tell a story of a municipal system struggling to align administrative procedures and critical regulatory considerations to new hydraulic requirements. Following an 'infrastructuring' approach inspired by Actor Network Theory we seek to experiment with new methods within the Systems Oriented Design field to address the challenges of collaboration across planning domains in the municipal system. In our approaches to aid the Technical administrations of Frederiksberg and Copenhagen Municipalities to navigate the increasing complexity of cloudburst management, we found that planning practices and how collaborative planning is currently facilitated presents a need for systemic design capacity. To allow for a more whole systems approach to the wicked nature of intertwined urban planning problems our research concludes that mapping out complexity in collaborative work sessions and presenting systemic relations more visually, might be a way forward to address these wicked problems in a more holistic practice.

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INTRODUCTION

"Cities are the world's future. Today, more than half of the global population—3.7 billion people—are urban dwellers, and that number is expected to double by 2050. There is no question that cities are growing; the only debate is over how they will grow. Will we invest in the physical and social infrastructure necessary for livable, equitable, and sustainable cities?" (*State of the World 2016: Can a City Be Sustainable?, 2016)* This excerpt comes as an introduction to this year's (2016) Worldwatch Institute publication on the state of the world, where the topic is the future of cities, if and how they can be seen as sustainable?

Around the world climate change is disrupting ecosystems and societal systems alike. As economic development gives rise to intensified urbanisation, cities and urban centers are becoming the hotspots of future sustainability programs. One of the main challenges facing our society is therefore to match sustainability with urbanization, which is now putting a growing pressure on the systems set up to administer and govern this societal development. Thus the governance of networked infrastructures is one of modern society's greatest challenges in relation to climate change and liveability, as is also coined in the sprawling litterature on design for resilience and urban ecology (Monstadt 2009; Mehaffy & Salingaros, 2015; Copenhagen Municipality 2012; stockholmresilience.org 2016; 100resilientcities.org. 2016) . According to Koppenjan and Klijn (2004), writing from a public management perspective, `uncertainty' is a core feature embedded in all the institutional and knowledge aspects of our attempts to deal with these `wicked problems`* (Rittel and Weber 1973).

"A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems". (Kolko 2012; Head 2008; Rittel and Webber 1973).

However, both the nature of our current urban ecological `problems' and the preferred `solutions` can be heavily contested. One of the more fundamental discussions in this regard revolves around how these problems are framed and consequently approached. As Head argues, there has been surprisingly little attention in the research literature as to how wicked problems are identified, understood and managed by practitioners concerned with policy and management. The categorization of `wicked` and `tame` problems is therefore essential to address in relation to public governance, a subject first explored by Rittel and Webber in their 1973 paper "Dilemmas in a General Theory of Planning". In short, `tame problems` can be clearly stated, have a well-defined goal,

and stay solved, as they work in a rational linear way. Whilst a `wicked problem` is difficult to define and has complex cause-and-effect relationships, human interaction, and inherently incomplete information. Understanding the problem is therefore the main challenge in solving it. This is not to imply that labelling a problem as 'wicked' will readily assist in solving it. Nevertheless, it might help in generating a wider understanding of the available strategies for managing and coping with complex and chaotic issues.

In a Nordic context where the government and effectively the municipality are perceived as the main caretakers responsible for welfare, the need for public innovation in the face of the aforementioned challenges is prominent. This demand for innovation capacity in our public service systems has not only encouraged a wave of management and innovation consultants, but also set in motion a general opening-up to outside world involvement. Privatisation of public services into hybrid public-private companies, a widespread use of private contractors and consultants, and viewing citizens as co-creators are all signs of the public sector employing new strategies to address this issue (Danish government 2012; Copenhagen Municipality 2012). By employing a vision of shared responsibility for our current and future challenges, where the "municipality as caretaker" is replaced with the "municipality as facilitator" (Sehested 2009) The municipality is distributing the responsibility for innovation to the private sphere. This distribution of responsibility does not however diminish the need for public services to renew themselves. On the contrary the influx of involved stakeholders into the public domain increases the complexity of the situation.

"In short, local governments are under a pressure to modernise and improve their delivery systems, their coordinating mechanisms and their inclusive capacities vis-à-vis societal problems that fundamentally challenge these systems." (Engberg 2016, 2)

Therefore we argue, that in today's fast changing world, one of the biggest thresholds in the case of tackling climate adaptation and livability issues in cities, comes down to how we understand and work with the increasingly complex interconnected relations of urban problems.

As Head (2008) argues in his paper `Wicked Problems in Public Policy`, the "standard public management responses to complexity and uncertainty, (markets, outsourcing, regulatory prescription) seem to be inadequate" (Head 2008, 101). As the standard 'tame' responses towards complexity might no longer address root causes, our local governments are struggling to find viable paths forward, Head points towards the need for exploring new approaches; "new process responses (joined-up government, cross-sectoral collaboration, mediation and conflict

reduction processes) are increasingly being tested, and our public systems appear to require some new approaches for addressing the multiple causes of problems, opening up new insights about productive pathways for better solutions" (Head 2008, 101).

As a response we will argue in this thesis that thinking in whole systems, meaning the interconnections within and between larger systems, is a necessary approach for engaging in what can be seen as largely systemic problems, such as the intertwined `wickedness" of social, environmental and economic problems facing society today.

Hjorth and Bagheri (2006) argue that, "in order to understand the sources of and the solutions to modern problems, linear and mechanistic thinking must give way to non-linear and organic thinking, more commonly referred to as whole systems thinking". Systems thinking and whole systems thinking are frameworks that seek to explore and comprehend the nature and functioning of complex systems. Even though these approaches can be seen to complement each other, they differ in the sense, that systems thinking is concerned with the system and its constituent parts, while whole systems thinking is more concerned with how these parts connect and the meaning of these connections. To quote Rittel and Webber (1973): "The classical systems approach ... is based on the assumption that a ... project can be organized into distinct phases: `understand the problems', `gather information,' `synthesize information...,' `work out solutions' and the like. In contrast the whole systems approach "are more concerned with understanding systems as fields of relations, as opposed to defining borders and hierarchies. This provides a more holistic approach (B. Sevaldson, 2009). We will in this report argue for the application of whole systems thinking, where we explore the emerging field of Systems Oriented Design (systemsorienteddesign.net) as a framework to work with climate adaptation and livability demands.

We are inspired by the notion; "Designers, as well as those who research and describe the process of design, continually describe design as a way of organizing complexity or finding clarity in chaos". (Kolko, 2012) It is the implementation of these approaches that we find interesting, as they can be seen to provide more comprehensive frameworks for how to address and relate to complexity than is seen in current management tools within public management and network governance (Sehested 2009; Sørensen and Torfing 2011; Christiansen 2013; Munthe Kaas 2015; Enberg 2016). We are therefore inspired by the observations of Sørensen and Torfing, in their study of the danish public governance:

The combination of rising demands and res- ource constraints clearly generates a need for new and smarter solutions that can help to satisfy new demands without increasing public expenditure.

Second, professionals, public managers, and elected politicians have growing ambitions in terms of the quality of public governance and its ability to solve social, economic, and environmental problems.
As such, governments at different levels aim to deliver a more effective, responsible, flexible, targeted, efficient, and holistic form of governance. At the same time, society is becoming increasingly difficult to govern due to the growing complexity and fragmentation of social, political, and economic processes (Kooiman, 1993) {...} The attempt to close the gap between the official governance ambitions and the actual performance of public policy programs calls for innovation. (Sørensen and Torfing 2011, 847-848)

Exploring the issue of complexity in relation to both climate change and the growing pressure for public innovation brings us to the case under investigation in this thesis, `The Copenhagen Cloudburst Adaptation Plan` (CCAP), the world's first appropriated cloudburst plan (arkitektforeningen, 2016) One of the biggest and most ambitious urban planning endeavours in the history of Copenhagen, to tackle the effects of climate change in Denmark, where growing demands for livability and the prognosed increase of rainfall (DMI 2011) has been matched to "upgrade city resilience to extreme rainfall events" (Hereafter Cloudbursts.) (The City of Copenhagen 2012).

"The Cloudburst Concretization Masterplan addresses key issues of flood management and water quality, while seeking to create the greatest possible synergy with the urban environment. A "cloudburst" tool box of urban interventions, such as cloudburst boulevards, cloudburst parks, cloudburst plazas, provided the basis for a dynamic and multifunctional system. This new generation of blue-green infrastructures addresses essential city services such as mobility, recreation, safety and biodiversity, creating a strategic and feasible approach to ensure long-term resilience and economic buoyancy." (Ramböll 2015)

As the CCAP presents new and innovative approaches to the pressing demands of climate change and liveability the public system has found a way to renew its responses to the aforementioned societal problems. However for the municipal planners responsible for delivering these new public responses the implementation of the new cloudburst system present a wicked problem indeed, as this new system needs to be coordinated in a vast bureaucratic system, in novel collaboration constellations between planners, politicians, engineers and citizens.

Cloudburst adaptation - a question of improving collaborations

The two case studies of this thesis focuses on Copenhagen and Frederiksberg municipalities technical administration's efforts to tackle one of their most pressing challenges, climate change and Copenhagen's Cloudburst Adaptation Plan (CCAP) (Copenhagen Municipality 2012) effectively being implemented in the city at the moment.

We investigate how the two municipal systems within the city of Copenhagen, orchestrate and navigate the complex planning processes within the cloudburst adaptation effort. Our initial understanding of this field came out of a previous study, where interviews with several planners made clear that there is a lack of overview and common understanding on how the cloudburst adaptation should be implemented in order to get synergy with other complex planning processes in and between Copenhagen and Frederiksberg municipality and their publicly owned corporate water utilities. This frames a focus on the problems experienced by the urban planners to collaborate across professional boundaries, with many different project tracks overlapping consequently increasing the influx of stakeholders that needs to be included in the projects, where interests and requirements must be aligned.

We further investigate how Copenhagen's urban planners experience and respond to the increased complexity of co-creating infrastructures capable of tackling both climate change and increased livability demands. Not only navigating a vast interdisciplinary field with multiple political agendas, but also relating to well-known and new coordination problems within their fragmented planning systems. Being subject to a turmoil of strategies and demands from political visions to service requirements regarding sanitation, hygiene, traffic mobility etc. thus a focus on the internal coordination issues.

Urban elements and how they are framed are constantly undergoing intense negotiations in the attempt to define the good metropolis, but as stated by the municipality of Copenhagen, "Urban life is People" (Copenhagen Together 2009) and certainly, people is a key focus point in how we understand the cities strategies for its future developments. "Urban life is not only café life and tourists. Urban life is what happens when people walk around and hang out in public space. Urban life happens on the squares, on streets and in parks, on playgrounds or on a cycle trip through the city." (Copenhagen Together 2009, 4).

As much as citizen-focused planning is at the heart of Copenhagen's future visions so is green growth, as stated by Mayor Frank Jensen in a recent interview with the Guardian "We are investing in sustainable solutions, and want to use the city as a laboratory for testing new technologies," (the Guardian 2016). Be-

sides economic incentives, the general vision for what the climate adaptation plan is supposed to contribute is not lacking in ambition, stating: "We can increase the recreational area and create more quality of life for copenhageners. We can help make copenhageners more healthy. We can create synergy with other planning (Climate Adaptation, presentation, 2013) However, integrating all these strategies calls for an ever more inclusive and transparent planning system, something we argue in practice will prove a much bigger challenge.

At the moment, urban planners in the municipal governance system not only struggle with budgetary constraints, higher welfare demands, shifting political agendas, and 'wicked problems' like climate adaptation, mobility and livability (Engberg 2016). They are also responsible for creating infrastructure that facilitates mobility and connectivity while also controlling the metabolism of cities (Monstadt 2009), that now need to process intensifying rainfalls and cloudburst, occasionally overflowing the sewerage system, spreading chemicals, excrements and vast amounts of water into the city's lower areas.

The premise of the project is to investigate, synthesise and contribute formats on new approaches for working collaboratively with increasingly complex planning challenges, focusing on current and emerging practices both within strategic and operational departments of the administrations. We follow an action research approach based on Schein's (1999) perspectives on process consultancy, where the fundamental belief is that research is there to help! and not only criticize, suggest new products or ideas, but in our case seek to facilitate better organizational processes for the common good of both planners and the end users affected by these planning process.

From this point of view we wish to investigate and involve the research in real problem setting to gain meaningful insights on how a more holistic SOD approach can contribute to everyday work practices, where the organization's efforts to control and coordinate the complex planning situations play out.

"It seems obvious, but the way public services are organised inevitably influences the outcomes they achieve. Policy makers and managers are taking design decisions all the time, too often without realising it" (Colligan 2016)

Following the argument of Philip Colligan we suggest a need for developing planning systems with more comprehensive whole systems approaches. We emphasize that systemic and creative processes can open up the planning space to adjustments through experimentations and reflections on the planners capacity and available tools for relating to and working within complex multi-level governance systems.

Planning cloudburst projects in a state of uncertainty and complexity

The CCAP is projected to be implemented within the next 20 years and is sought to be planned in a process of synergy with other strategic developments of the city, such as steam conversion of the district heating system, urban area renewal, road renovation projects, bike infrastructure extensions and other greater city-planning projects, that need to be in close consistency with citizen inclusion and a strategy to create the city in collaboration with its surrounding environment. To execute this process with a sensible yet innovative and progressive energy, many different professions need to collaborate and navigate in constellations that are not yet fully designed for this type of long term intertwined project planning. Thus it creates a new planning challenge, which inevitably require new practices for dealing with complexity.

This planning process, where mapping of projects and projecting multiple hydraulic interventions together on the surface, spanning a wide array of new and complex stakeholder interests, needs to co-evolve with the regards for natural- and cultural preservation as well as technical and regulatory agencies of water treatment etc. which might disrupt the process if not properly involved in the process.

For these reasons there has been an interest from the urban planners to integrate new planning mechanisms that allow for a more visual comprehension of how these projects are coordinated and the way these planning process is carried out in reality. The project delegation, dealing with frames and responsibilities across planning systems in the project processes have been criticised for being vague or ambiguous, while there is a lack of processual overview in the coordination groups (Kalseth et al 2015).

This thesis therefore seek to explore how urban planners work with complexity within the public service systems in Copenhagen and their efforts for tackling the cloudburst issue, while focusing in on two interconnected problem areas:

> How is the increased complexity of working with many actors currently facilitated?

> How can we seek to improve the interdisciplinary planning work in the assignment of cloudburst projects in the municipal system?

As we have sought to address the issues of collaboration across different planning systems, and the overflow caused by intensified cloudbursts, in a previous design project, we found that visual and tangible planning tools can help direct the dialogue and discussions in coordinating the complex planning processes by exemplifying and illustrating the project elements to comprehend and reflect on the real life benefits or consequences of the sought solutions. This is effectively done through unfolding tacit knowledge

that might be hidden in the professional experience and understanding of the planners and engineers, who usually work within more narrow frames, but now must reach beyond their usual boundaries to execute these cloudburst adaptation projects on the surface. This is especially important when new forms of cross disciplinary teams need to work together in the city where meanings and technical rationales are no longer as unambiguous as when the responsibilities and frames of the planning systems where more professionally divided. How are the socio-technical interactions across the planning system facilitated?

By studying the on-going planning and coordination effort within the departments responsible for facilitating the process, this thesis explores two different approaches sought in Copenhagen and Frederiksberg municipality to work with current implementation issues from vision and strategy to a more practical implementation. The practice of the planning systems are of major focus as we understand that many of the core problematics outspoken in the municipal departments, relate to the culture of working where current administrative procedures known as the 'purchaser-provider-model',(Bestiller-modtager-model,Author's translation) where administrations are split up; one defining the character and specification and also assigning the specific project or service and the other part carrying out or delivering the specific task or service (Christiansen 2013). These processes are in the meantime tied to a very politically controlled system, where important decisions needs to be taken on several administrative layers, constantly complicating the dynamic process that the urban planners require to execute the projects in the proposed value chain (Simonsen 2009). This is even stated in what you could call the espoused theory of CCAP *"A hallmark of the Climate Adaptation Plan is to invest in a flexible approach to climate adaptation which can be developed gradually over the coming years" (Copenhagens Climate Adaptation Plan 2011)* Still the general picture, is one where organisational experimentation and innovation is rather limited, and therefore we take the notion that: *"Every organization is perfectly optimized to achieve the results it currently gets"* (Is it a bird 2016) quite seriously, with an understanding that the current results are not satisfying to the managers or project leaders, who struggle to deal with the cross disciplinary work challenges and creating overview of the implementation procedure and consequences of the CCAP .

We therefore explore some of the practices that complicates the implementation of the CCAP and seek to introduce new methods and work formats to achieve the espoused theories and visions from the municipalities of co-creating the city in a holistic manner versus the theories in use, where "Reflectiveness in the planning process seems to be a challenging aspect in the transition to the "service administration", since traditional planning processes

very often limit the social imagination of the planners." (Munthe-Kaas 2015) This perspective will be explained later as we look at the formats currently used in urban municipal planning. We use our position as project partners with both Frederiksberg and Copenhagen municipality to understand and discuss these planning processes, while simultaneously testing new work formats in practice to see if better collaborative work sessions can be developed.

Problem Formulation

What challenges are urban planners experiencing in relation to cloudburst adaptation and how can we aid Copenhagen's technical administrations in generating systemic design capacity and tools to navigate the increasing complexity?

To address the problem formulation and to guide the reader through the report, the following research questions have been formulated to assist in answering the problem formulation:

> Why is Copenhagens cloudburst adaptation plan complex to implement for the two technical administrations of Frederiksberg and Copenhagen Municipality?
>
> What methods and tools for working with complexity can we identify to fit the municipal planning systems needs?
>
> How can we gain access and support for experimenting with new methods in real problem settings with relevant actors?
>
> How can current meeting formats become more action based and reflective by engaging planners in more design oriented ways of addressing complexity?

The above questions can be seen as a guiding framework for our strategy to explore, intervene, and consequently better understand our empirical field in relation to if, and how we can open up for new approaches that can contribute better practices for complex urban planning in Copenhagen.

Our explorative and interventionist approach is inspired from an integration of theoretical perspectives from Infrastructuring and Systems Oriented Design, which are explored with the ontological perspective of Actor Network Theory presented in the following chapter.

CHAP.2

Framing the socio technical field between the micro and the macro relations of urban governance

This chapter will seek to describe how our theoretical, methodological and practical approaches is used to form an analysis framework that guides the exploration and intervention stages of this project. Furthermore we seek to unfold how the actor network around cloudburst adaptation can be strategically approach through a thorough understanding of a complex network of activity.

Framing the socio technical field between the micro and the macro relations of urban governance

Our starting point for analysing the networked governance structures of Copenhagen and Frederiksberg municipality, rests on the ontological perspective of Latour and Callon's (1981) Actor Network Theory (ANT). ANT suggests a breach with the old paradigm of sciences, where the natural sciences and social sciences can be divided and analysed as separate domains. Instead the social and the physical should be treated as interdependent physical and metaphysical actors/actions circulating in networks. This makes sense, as you would never find pure social or pure technological research objects in the world, which in its final form leads to the rationale, that elements should never be understood in separation, as it is always defined in relation to another. Following this string of thought ANT proposes an analysis frame of 'general symmetry' where the researcher must follow the social and technological actors, and treat both with equal respect in regards to what actors and intermediaries mobilizes what actions (Callon 1986a). The network around CCAP is a good example, as it was mobilized by the massive cloudburst event of July 2011 in Copenhagen. Without this actor, the network would never have emerged as prominent and rapidly as was the case. The failure of the sewerage system thus acted as a problematization of non resilient infrastructure design, destabilizing the existing network behind classical sewerage engineering and pointing towards new systems for coping with the effects of accelerating climate change. The surface based solutions for coping with intensifying cloudburst events emerged from new translations of how to create synergy with the technical and social/recreational functionality of the city and the network around CCAP is currently in a process of stabilization. ANT is thus a conceptual framework for describing how actors, understood as both human and non-human, are constantly affecting one another in interlinked and recursive network structures. The networks are formed around a set of translations that has shaped and played out the stabilization and destabilization of relations and artefacts making up the socio-technical (Latour 2005). From this perspective ANT emphasizes the importance of understanding and navigating in these socio-technical networks by following the actors and analysing the relations between them (Law 1999). ANT therefore allows one to study both the micro and the macro scales in society simultaneously; from personal interaction between the researcher and informant and to the cultural, societal and technical norms, values and structures that reproduce these same micro scale interactions (Latour 1999). Combining the micro and the macro relations, ANT frames a 'field in the middle' that demarcate a network from where researchers, engineers, planners etc. are mobilizing efforts, knowledge, artifacts and alliances to gain

support and momentum for their endeavors (Blok og Jensen 2009). Innovating or changing situations in stabilizing or destabilizing networks depends, according to Callon, on successful translation process, which involves fours steps; problematization, interessement, enrollment and mobilization (Callon 1986). These elements can seem elemental, but nonetheless essential to the infrastructuring necessary to introduce new ideas or experiments within urban planning (Bjorgvinsön et al. 2010). Not merely analysing how networks and governance structures are formed the way they are, but dynamically seek to infrastructure for new practices and rooms for experimenting and reflecting on how planning frames are anchored around meaningful relations, objects and presentations of the world.

ANT have rapidly gained influence and attention in a wide span of scientific fields (ref), for its precise vocabulary and rich descriptions of how complex networks develop, making it useful to describe and analyse the complex socio technical developments related to cloudburst adaptation in Copenhagen, and even as a strategic reference for developing ideas within these networks.

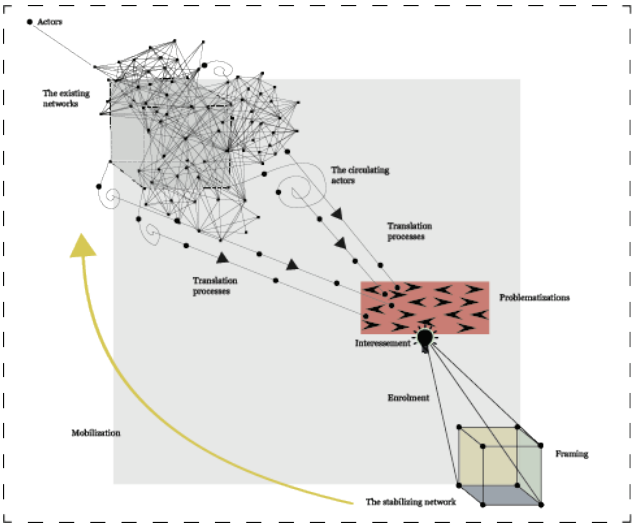


figure 1: conceptual drawing of translation process
Graphic, Authors, 2016

Introducing new perspectives on planning practices

Infrastructuring (Star & Ruhleder 1996; Björgvinsson et al. 2010; Dantec and DiSalvo 2013; Munthe Kaas 2015) and navigation perspectives on the municipal urban planning has been utilised as an approach to gain insight and test our assumptions and ideas in relation to the contexts overall developments and actions. Working with an `infrastructuring` perspective, the project is not delimited to a design phase in the development of the organization, but should be seen as an ongoing process of alignment between contexts and partly conflicting interests (Star & Ruhleder, 1996). We have investigated the field from the vantage point of the municipal planning systems in Copenhagen city (Frederiksberg and Copenhagen) based on experiences gained from our previous project on the cloudburst issue (Kalseth et al. 2015). Here we identified a `window of opportunity` for bridging complex planning issues with a need for innovation

related to the cloudburst issue, bringing experiments in urban planning from the streets to the municipal meeting rooms.

The infrastructuring perspective can be understood to undergo the following six phases: initiation, exploration, mobilization, recruitment, experimentation and reconfiguration (Munthe-Kaas 2015). We approached our empirical field with the ambition of utilising what SOD practitioners presents as `best practice` system design principles, for managing complexity within the administrative systems responsible for cloudburst adaptation (Sevaldson 2011). As such initiating an exploration of the potentials of developing new practices based on these "best practices" and their possible fit to the current practice and capacities of the planners involved.

We chose to approach the field from two different perspectives, engaging with both the municipality of Copenhagen and Frederiksberg, for so, to follow two comparative administrations close enough to engage relevant actors and processes in doing various forms of participatory design work. As Disalvo and Dantec point out; "PD (participatory design) provides appropriate methodological tools for directing the infrastructuring work needed to contend with future issues, rather than focusing solely on proximate concerns. (Dantec & DiSalvo 2013, 242). Why we from the onset of this project utilized our role as designers in mobilization efforts when placing ourselves as mediators in the field.

In our roles as design engineers we took on and was given various forms of tasks and responsibilities ranging from the production of illustrative maps to workshop formats and artefacts for interventions. Both as interessement devices (Callon 1986) for our relevant stakeholders as expanding our own understanding of their applicability and potential for our collaborating organisations. Here we sought to open up for more experimental forms of communication and interaction when dealing with complex coordination and planning issues. In order to interest and possibly recruit supporters for this approach, we have alternated between researchers and design practitioners, contributing analytic and theoretical views on identified problems at the same time as introducing new models and methods to help solving them.

To test the usefulness and potential for these methods and models within our collaborating organisations we sought to carry out experimentations on alternative possibilities through practical design moves` (Dantec & DiSalvo 2013, 16). more concerning the above mentined quote.. Formats where one combines the two can however be a good strategy to challenge and open up for necessary reflections on alternatives and possible adjustments to current practices.

CHAP.3

METHOD: (APPROACHING THE COMPLEX FIELD OF URBAN PLANNING)

The following chapter describe our approach for collecting data through our explorative and interventionist approach of challenging current practices within the administrative planning systems responsible for tackling the cloudburst issue in Copenhagen. During the course of this study we have taken on different roles, distinguishing between an ethnographic approach of inquiring/observing and an action-oriented approach of intervening/ staging. A description of where, with whom and how we have sought to build our reference frame and in depth knowledge on these planning processes is included at the end.

Method: (Approaching the complex field of urban planning)

Exploration

Following the notion that 'the best way to understand the world is to change it.', and Inspired by Spradley's (1979) ethnographic research method and action research from Schein (1999) we set out to identify both the specific challenges the municipal planners are facing, as well as probing for the deeper issues underneath these surfacing issues. We wish to investigate how the espoused theory of the municipality, (e.g. value chain document and livability report; internal document) and descriptions of how projects should be carried out, correlates with how things are actually done, to understand if the arena for planning the cloudburst projects facilitate innovative urban planning. From this vantage point we seek to get access to theory in use, and analyse where problems arise, where critical knowledge gaps occur and capacity for dealing with complexity is crucial? This exploration takes form as both ethnographic work and design work following an infrastructuring perspective (Bjorgvigson et al. 2010), as an approach to intervening and assisting planning practices to cope with the complexity of implementing CCAP. In this work we seek to inspire a systems oriented design approach to synthesize complex problems. By engaging in several translation processes (Callon 1984), we seek to design boundary objects to unfold personal observations and stories from the planners and stakeholders who are involved in these processes. The boundary object should be understood in the sense Carlile (2002) presents it : "The boundary object allows individuals to specify what they know—what they worry about—as concretely as possible to the problem at hand" (2002: 451).

This is primarily done through interviewing informants to gain a better understanding of how the planners are actually experiencing the planning situations and overall project processes. Therefore we have sought open ended questions where we treat the interviewees as informants rather than subjects to understand where the research should be explored more and which problems that arise in the implementation process of cloudburst or other municipal projects. Spradley define the difference between subjects and informants as "Work with subjects begins with preconceived ideas; work with informants begins with a naive ignorance. Subjects do not define what is important for the investigator to find out: informants do." (Spradley 1979, 29). Our interviews was therefore arranged to gain insights about where the planners confront difficulties in their work and how they currently work with project planning related to CCAP. In order to get an overview and help us navigate this rather complex field, we worked with various research approaches. Our fieldwork was largely a combination of the following:

1. Location - fieldwork in relevant departments and groups giving access to internal perspectives and processes.
2. Interaction – fieldwork focusing on meetings or communication between involved actors that gave access to different perspectives on the processes of sensemaking in the ongoing efforts towards cloudburst adaptation in practice.
3. Observation – participant observation in project and steering groups, giving the opportunity to experience challenges and problems first hand.
4. Participation - developmental work and reflections with actors, producing maps as boundary objects, planning and facilitating workshops and interventions to ongoing processes.
5. Interviews – fieldwork focusing on descriptive narratives and stories, reflecting on current actions, decisions and situations in retrospect. Giving access to understanding ongoing processes and challenges within the planning system.
6. Documents – studying the formal framework of the field through analysis of the documents reflecting the dominating practices and political agendas.

Combining these entry points, has been the ongoing methodological challenge and application potential of this thesis's fieldwork. Approaching the empirical field with an explorative approach, in order to understand how relations are built and projects carried out in practice. Within this exploration the aim is to challenge and influence by introducing methods and visual tools that can possibly help express the tacit knowledge and inherent design capacity of the city planners, which is not facilitated through their existing practices.

Collecting data for map-making and navigation

In Copenhagen's municipality we engaged with overall strategic and organisational aspects and the transfer/assignment process of cloudburst projects from one department to the other. Focusing on the upcoming assignments of the project package of 2017, how this process was formalised and intended to play out in relation to how this assignment had unfolded the previous year. In Frederiksberg municipality we engaged in more project oriented aspects, following a cross disciplinary project group partaking in a course on "climate adaptation and the Innovation of places". Focusing on this group's internal work process on a specific case study; Kronprinsesse Sofies Vej , and how this related to the overall organisational structure of their administration.

The common denominator of these two case studies was an organisational transition perspective on the challenges of climate change and cloudburst adaptation with a focus on organisational aspects and the need for changing practices. Gaining this comparative insight on how the overall strategies and concrete planning efforts of the cloudburst masterplan is taking form in both administrations, served as a starting point for a more in-depth understanding of how and what could assist capacity building and inform practices for dealing with complex planning situations.

The approach was therefore to unfold some of the opinions and practices on cloudburst adaptation from different planning perspectives, engaging in interviews with planners uncovering some of the processes and situations they are faced with, At the same time as we introduce methods for mapping their practices and the professional elements they have to relate to. One important goal of these interviews was exploring and identifying the individuals perspectives on planning and coordinating cloudburst adaptation projects and in thereby understand better the organisation's own capacity for working with complexity and how the climate adaptation effort can be used as a leverage point for implementing new approaches to public innovation and cooperation.

As our fieldwork has been both explorative and action oriented with various forms of entry points, depicting it in a consistently structured way has been a challenge. We have therefore chosen to categorise it in empirical data and supplementary data collections. Our empirical data collection was done through semi structured interviews in meetings, and observatory studies of meetings with relevant representatives from the development and operational departments within the TEA (Technical and Environmental Administration of Copenhagen municipality (Fodnote)) and the water utility HOFOR, as well as with all representatives from the project group in CEA (City and Environmental Administration of Frederiksberg municipality. We also engaged as observers in meetings held in Copenhagen municipal-

ities `coordination unit` and as participants in work sessions as a part of the Frederiksberg groups course schedule.

Document study and analysis as well as extensive mapping of both organisational structures, constellations and processes has also played a significant part of our primary data gathering and analysis (see tables of interviews, observations and mappings below). These more action oriented aspects of the fieldwork have continuously been exposed to key actors in the administrative organizations to "put them at risk" (Stengers 1997; Vikkelsø 2007, Munthe Kaas 2015) and to allow these descriptions and depictions to intervene and play a role in their ongoing internal processes.

Based on the explorative approach a selected part of the interviews were conducted in the fashion of the subjective Modelling method (Zweifel and Wezemael 2012), which allies the features of drawing and speech in qualitative interviews. A method we chose to employ both, for revealing the individual planners understanding of their organisation and the usefulness of drawing as a tool for processual literacy. As such creating a live reference point that allowed for deeper insights on the networks that unfold in the planning processes as well as the individual planners reflections on their organisational framework and roles therien.

"Combining the process of drawing and speaking in qualitative interviews represents the chance to gather information on a situation in a more complete, often more complex way and, as such, make possibilities, thoughts, interpretations and worldviews of interviewees more tangible. Escaping from linear logic and causalities, the method allows the representation of the simultaneity of processes. Drawing is in this method more than a product on paper; it is a production, reflection and evaluation process, triggering discussions and questions. It opens up possible spaces of analysis that can be discussed during the interview and permits an analysis of not yet actualised processes or of elements that will remain virtual." (Zweifel and Wezemael 2012, 15).

We found the subjective modelling technique to be a good method for opening a space for systematic discussion, about where the complex processes took place and gave us as researchers a better chance to discuss the problems at hand as we could get a visual perspective on problems from the interviewee and refer or interact with the visual representation of the planning system and situations.

Collecting data for map-making and navigation

One of the primary sources of data in our fieldwork, as mentioned earlier, consists of a large amount of in-depth qualitative interviews with involved actors within the municipalities of Copenhagen and Frederiksberg, as well as these municipalities water supply companies (Hofor and Frederiksberg Forsyning). A list of interviewees and dates on these can be found below in two separate tables for each of the case studies.

(Interviews where the technique of subjective modelling (SM) is utilised have a reference to the sketches made under the interviewees name). Following these tables of interviews a table describing observatory studies is provided. As all of the interviews, workshops and meetings we have engaged in has been in Danish, we have translated the different statements from Danish to English as accurately as possible, however restructuring sentences when the english grammar dictates it.

Case Study 1: Copenhagen Municipality - formal interviews

INTERVIEWEE:	ORGANISATION:	POSITION:	INTERVIEW DATES:
Jens Trædmark	Copenhagen Municipality TEA, city physique ,CNA	Project Manager, cloudburst coordination	17.02.2016, 9.03.2016 15.04.2016,
Per Andreasen	Copenhagen Municipality, TEA, City Development, Climate	External communications (Hofor Colab)	12.02.2016
Aske Steffensen	Copenhagen Municipality TEA, City Development, Climate	Strategic planner, coordination	17.02.2016, 28.04.2016
Jakob Hjortskov	Copenhagen Municipality TEA, City Development, Climate	Strategic planner, (old)manager of coordination	16.03.2016
Anders Edstrand	Copenhagen Municipality TEA, City Development, Climate	Strategic planner, (new)manager of coordination	28.04.2016
Jørgen Lund Madsen (SM: Ref: appendix)	Copenhagen Municipality TEA, City Use, Water and Environmental assessment	Head of Unit, environmental impact study	21.03.2016
Dorthe Stender (SM: Ref: appendix)	Copenhagen Municipality TEA, city physique, CUA	Project manager, Parks	16.03.2106
Nis Fink (Graphic recording: Ref: appendix)	Hofor Cloudburst area	Hydraulik Planner	14.03.2016

Case study 1:Copenhagen Municipality - Observation of meetings and worksessions

Who?	Where?	What?	When?
Rep. from city physique (Jens Trædmark) and city development (Henriette)	Islands Brygge, Copenhagen municiplaity, TEA main offices	work session on developing the formal transfer note (document)	28.04.2016
Coordination group (cloudburst adaptation)	Islands Brygge, Copenhagen municiplaity, TEA main offices	discussion forum for principal matters regarding the cloudburst adaptation plan	18.04.2016,
Coordination group (cloudburst adaptation)	Islands Brygge, Copenhagen municiplaity, TEA main offices	discussion forum for principal matters regarding the cloudburst adaptation plan	02.05.2016

Case Study 2: Frederiksberg Municipality (Course group) - formal interviews

INTERVIEWEE:	ORGANISATION:	POSITION	INTERVIEW DATE
Julie Frankel	Frederiksberg Municipality CEA, City Building and appartments, City development	Project Manager, Nordre Fasanvej Kvarteret	08.02.2016, 17.2.2016
Søren Kim Jensen (SM: Ref: appendix)	Frederiksberg Municipality CEA, Operations, roads and parks	operational manager	22.03.2016
Malene Stensballe (SM: Ref: appendix)	Frederiksberg Municipality CEA, road-park and environment	Landscaping Project manager,	07.04.2016,
Lars Jørgensen	Frederiksberg Municipality CEA, road-park and environment, Traffic and city area	Project manager, traffic planner	22.03.2016
Marie Louise Andersen (SM: Ref: appendix)	Frederiksberg Municipality CEA, road-park and environment,	project manager, environment	4.04.2016

Case study 2: Observation of meetings and participatory worksessions

Who?	Where?	What?	When?
Frederiksberg project group	Cafè ved buen, city renewals offices, Frederiksberg	Planning meeting	16.02.2016
Frederiksberg and Haderslev project groups	Aalborg University, Copenhagen	Course seminar, work session on citizen involvement	17.03.2016
Frederiksberg project group	Frederiksberg Water Supply company	Planning meeting	13.04.2016
Frederiksberg Project group	Kronprinsesse Sofies vej, Frederiksberg	walk and talk, internal inclusion intervention	04.05.2016

Supplementary data and research

The supplementary data collection is largely based on identifying and consulting other relevant academic writings as well as interviews with experts within the field of urban planning and systemic design. Equally we have gained a lot of the insights on the development of CCAP through previous student reports about Copenhagens cloudburst adaptation and the structures of the municipal urban planning system in TEA (Steffensen 2014; Larsen and Rasmussen 2014; Larsen et al. 2012). These reports have also provided insights from key actors in the TEA's climate adaptation work, giving us access to supplementary interview material with some of the planners who are still in the field and whom we have also interacted with.

We therefore draw on these researchers knowledge base to expand our own understanding and scope on the fields steering concepts and developments, informing our interpretation and analysis of the collected data.

The supplementary data has created a knowledge base aside from the qualitative interviews, in order to provide interesting approaches and perspectives on urban planning, that could guide the research on planning practices for understanding where complexity derives from in the urban planning context. Thus extra substance to analyse and interpret the collected primary data.

Interventionist approach

Following an action research approach, the means for learning and challenging one's knowledge is sought through interventions in the urban planning space. In the approach to aid Copenhagen's technical administrations in generating systemic design capacity to navigate the increasing complexity of cloudburst management, we therefore stage workshop settings as a space for intervention. Furthermore we seek to follow the action and assist the planning where spaces for contribution are opened up, as these allow us to do research in action, and contribute to processes. Thereby we gain insights to the planning in action, which gives vital feedback on the theories and methodologies that the research builds on.

In order to experiment and challenge the existing practices for dealing with complexity, we thus seek to apply our described experimental framework to the below described challenges of our collaborative partners, which we follow in our attempts to infrastructure better co-creative working practices:

Copenhagen municipality:

> *Develop operational formats for the assignment of cloudburst projects in 2017 package between the overall vision and development plan from 'City Development' to concrete implementation demands in 'City Physique'*
>
> *Contribute reflections and adjustments to the processes of cloudburst projects.*

Frederiksberg Municipality:

> *Contribute methods and strategies for citizen* inclusion *and organisational collaboration in cloudburst projects and apply it in the ongoing process of Kronprinsesse Sofies Vej.*

The key questions explored in this project, are aimed at clarifying and addressing some of the current challenges of complexity within the municipal planning system and how we as researchers and designers can engage with and inspire new formats and practices for tackling these. Therefore one of our initial aims was to get as close as possible to the strategic and implementary departments within the municipal administrations. Looking to identify opportunities for how the design led approach could contribute,

engage and partake in the development of the future cloudburst managing system (CCAP).

We investigated the planner's current practices by staging interventions that could challenge and explore their visual and systemic capacities; facilitating situations that both highlight these inherent capacities and point towards what temporary spaces, formats and skills possibly can foster and incorporate such new practices. With this scope we follow an approach formulated by famed psychologist Albert Bandura and later adopted by founder of the design company IDEO David Kelley as 'guided mastery', which deals with bringing forward creativeness through guided practice. In this regard 'subjective modelling' was one of the initial steps to open up possibilities of drawing and mapping systems architecture to better understand problems, and reflect on possible alterations to solve these problems, which is at the core of collaborative descision making in Sevaldson's very rapid learning processes (Sevaldson 2012) (ted.com 2012).

We approached the field by using a previous project called Skyplan (Kalseth et al. 2015) as a lever to place ourselves as mediators in the field. The tool had produced a largely positive feedback for more tangible approaches to working cross-disciplinary on the cloudburst issue. Exemplified by Jens Trædmark representing the City Physique (Byens Fysik) in Copenhagen Municipality identifying himself as our main supportive actor and later 'spokesperson' within his organisation, expressing a need and potential in utilising similar tools for working with their internal coordination processes. Consequently enabling us to gain access and start opening some doors within the more strategic departments of the administration. For our work with the Frederiksberg group our previous project on the cloudburst issue qualified as relevant expertise, and deemed a valuable contribution to their course process. A collaboration that was set-up after initial meetings with Julie Frankel from area renewal Nordre Fasanvej Kvarteret, who opened up for us to start following the project group.

Intervening

Side-lined with our empirical fieldwork we have explored what the emerging field of `System Oriented Design`(SOD) could contribute when working with increased complexity to learn if and how urban planners could benefit from adopting some of the practices here proposed. Consequently seeking to strengthen the credibility and applicability of our systemic design approach in relation to our collaborators when dealing with the outspoken complexity of the CCAP. Inspired by Schön's notion of reflection in action (1983) we seek to challenge the participating planners to be more reflective towards their current planning practices at the same time as encouraging new ways of engaging with their cross disciplinary project work on the CCAP issue. Much of this work has been concerned with speaking about, showcasing and experimenting with the techniques within SOD throughout our empirical work, and identifying possible intervention points where we could gain access and facilitate spaces for the planners to experiment with these methods.

Based on the observations coming out of our fieldwork, one of the main challenges identified is to bridge the process divide often occurring when a project is translated from general project description to detailed action plans for implementation, involving not only many new elements but also differentiated actors for the planners to consider. As both these characteristics are constituents of wicked problems, they consequently need to be treated as such, even though there are no clear pathways for how to do this. Nelson & Stolterman (2004) has with their definition of 'soft centers' and 'hard centers', identified two scientific approaches, which organizations often take when dealing with this kind of processes, inspired by the soft values of social sciences and hard values of the natural sciences. The `soft center` revolves around analysis and is characterized "as an interdisciplinary, multidisciplinary or cross-disciplinary approach to decision-making, management or design" (Nelson & Stolterman, 2004), comparative to that of the municipal planning systems in Copenhagen, where collaboration and cross-disciplinary work are challenged, but nonetheless strong focus areas. While the `hard center` revolves around synthesis and is characterized "by the belief that there is one common core of universally valid principles and laws from which different domains, fields, disciplines or perspectives draw" (Nelson & Stolterman, 2004), a belief that can be said to hold true for many of the more technical specialised organisations within natural sciences and engineering, in this case represented by the water utilities and parts of consultancy companies.

As these two approaches, i.e., the 'soft' and 'hard' center (figure 2) are effective in complex situations that can be reduced to well defined problem areas "that are separable from the operation of the orga-

nization systemically" (Nelson & Stolterman, 2004), most critical challenges in organizations do not fall into this category. Likewise in the case of the cloudburst projects where the hydraulic premises, liveability aspects and environmental concerns needs to be navigated within the municipal systems own organisation. We therefore argue that there is a need for a bridging systemic approach that can deal with complexity in the cross section between organisations with different approaches towards complexity.

As we have previously framed the planning challenges of the CCAP as as a wicked problem, and organisations with differing approaches as problematic in seeking common solutions, the wicked problem frame can also lead to paralysis. However, "by stepping out of the reactive, problem-solving mode into the proactive, design mode it is possible to become intentional again and to facilitate desired change" (H. Nelson 1994). Our motivation for choosing SOD as a basis to work out from is partly due to this "designerly problem exploring approach", as well as we consider its comprehensive framework as a fitting model for our collaborators to experiment with and possibly adopt in the long run. Furthermore we view it as a good tool to investigate the potential wider systemic changes practicing such a framework might enable in the long run. Emphasising facilitating a learning process over "selling a method", with systems oriented design as a inspirational methodological framework.

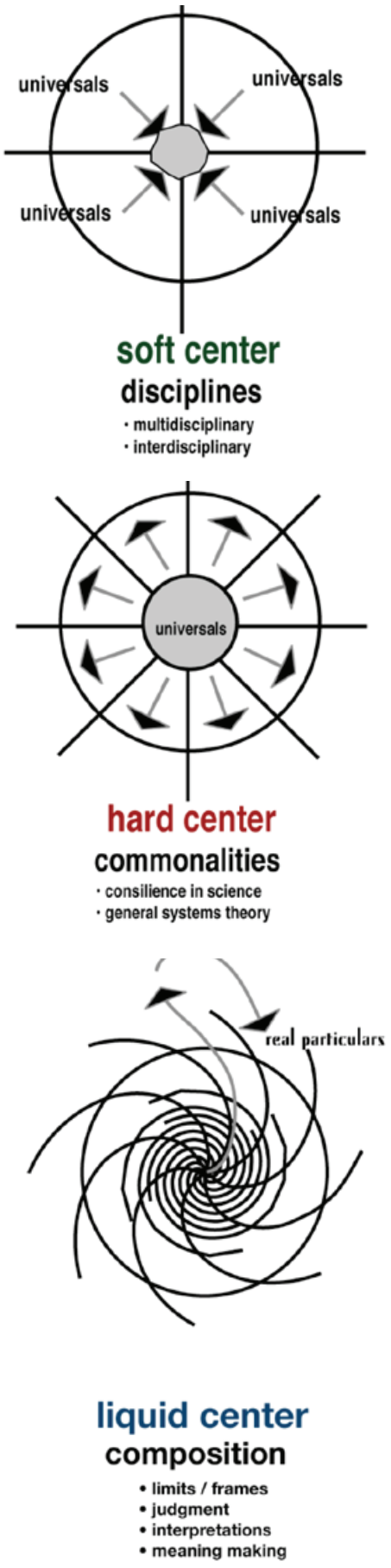


Figure 2: three centers of gravity
Nelson & Stolterman, 2004

SOD as inspirational framework

Systems Oriented Design (SOD) can be seen as a merger of systems thinking and systems practice, and design thinking and design practice developed within the field of Design Research by professor Birger Sevaldson and colleagues at the Oslo School of Architecture and Design (AHO). The research refers to three main conceptual frameworks: design thinking and design practice, visual thinking and visual practice, and systems thinking and systems practice, hereafter referred to as the 'SOD framework'. It is the exploration of this SOD framework in the form of integrated formats suitable for the planning practices in the municipal planning systems, which is the premise of our interventionist approach.

In SOD one of the prominent practices for integrating the above mentioned framework is the method of Giga-mapping, a technique embedding the context of design, systems thinking and visualisation, closely related to the SSM (Soft Systems Methodology) "Rich Picture" of Checkland P. & Poulter (2006). This type of mapping is however not new; Kolko (2010) describes a very familiar process:

"The user research sessions will produce pages of verbal transcript, hundreds of pictures, and dozens of artifact examples. Because of the complexity of comprehending so much data at once, the designer will frequently turn to a large sheet of paper and a blank wall in order to "map it all out." Several hours later, the sheet of paper will be covered with what to a newcomer appears to be a mess—yet the designer has made substantial progress, and the mess actually represents the deep and meaningful sense-making that drives innovation." (Kolko, 2010, 1)

Giga-mapping is developing this normal mapping activity observed for a while in various design practices into something more of an organized strategy. The term Giga-mapping was coined by Birger Sevaldson in the context of the 2009 SOD design studio, where the concept has later been continuously developed. "The Giga-map has proven to be an ultimate bridging device...It is easy learned and easy to apply" (Sevaldson, 2015). Even though `mapping in general is a way of ordering and simplifying issues, so to say "tame" the problems, Giga-mapping intends not to tame any problems, "but try to grasp embrace and mirror the complexity and wickedness of real life problems" (Sevaldson 2011). The intention of the practice is to co-create an "information cloud" that enables the practitioners to internalize large amounts of information in a short period of time, consequently enabling an overview and shared understanding of a complex field.

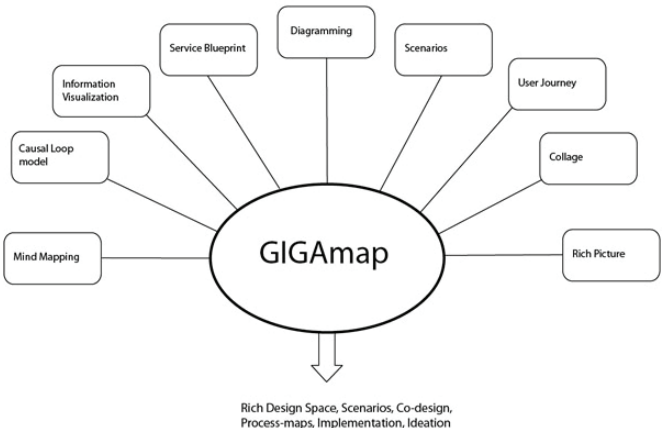


Figure 2: The Giga map framework for drawing things together . (Sevaldson,2013)

As such it can be regarded as a design artefact in itself, serving as both boundary object (Carlile, 2002) and communication device in processes of sense- and decision making. There is however "not of any importance if the Gigamap neither submits to any systemic model nor creates its own modelling of systems. The Gigamap is instead the in-between, the infill and the multiple bridging system between expertises, knowledges, models and fields". (Sevaldson 2015). The role of the Giga-map as bridging device is to detect and cover destructive ruptures in the design process. This can be "any kind of information or communication breakdowns as well as misaligned perspectives, like Implementation problems or different conceptions of a systems shape, extend, connectivity, structure...ruptures always appear between actors in the project" (ibid).

In order to apply Giga-mapping in a relevant way to the context at hand, choosing the right setting and format is however essential for contributing valuable results. As the technique does not refer to any specific type of map, but rather a mix of mapping and diagramming techniques "it is important to recognise that all examples do break established diagramming conventions and as a consequence, they mix and juxtapose information sets and ways of visualising this information" (Sevaldson, 2011). Pointing to the necessity of interconnecting information that is categorically separate in order to investigate and create connections in and between these, rendering a more holistic overview of the situation.

As the drawing and mapping of relevant information and concerns is the basis for the Giga-mapping exercise, the ordering and categorisation of this information, creating relations between seemingly unrelated issues is one of the main principles, following that "turning attention from objects to relations is a central feature of systems thinking" (Sevaldson, 2015). Practicing defining relations in regards to f.x. sequences and actions, seeking out what can be seen as connected to what and how, to figure out "what relations should be created to make the system function better?" (Sevaldson, 2016). One of the more substantial later developments within SOD and Giga-mapping is the creation of the Library of Systemic Relations, which suggests color coding and various line types for tagging and defining the relations.

Latour (2008) points out how the focus of design has shifted from objects to "matters of concern". This new paradigm requires a common language that can be used across disciplines and contexts to describe complexity, visualise how individual solutions relate to each other and with the broader system (Pollastri, 2014), consequently asking the following question to designers: "Where are the visualization tools that allow the contradictory and controversial nature of matters of concern to be represented?" (Latour, 1988). We argue that these tools are to be found within the framework of SOD, and that it is the users themselves that are the enablers of this common language, through the facilitating formats of Giga-mapping and intuitive visualisation exercises.

The motivation for exploring the methodological framework described above, is related to our interventionist approach to our problem field, as we wish to explore the field from the vantage point of the design researcher, learning through action. In order to do this we accordingly need to open up the field for experimentations of a more problem seeking and explorative nature, as described by the SOD framework. Nonetheless, understanding why the cloudburst issue, the central challenge of the CCAP, is such a complex challenge for the urban planners in Copenhagen is a natural starting point for our investigation. The various issues making up the totality of this challenge will below be described and analysed in relation to our problem formulation of aiding planners to navigate increasing complexity, in our search for staging relevant interventions to learn from.

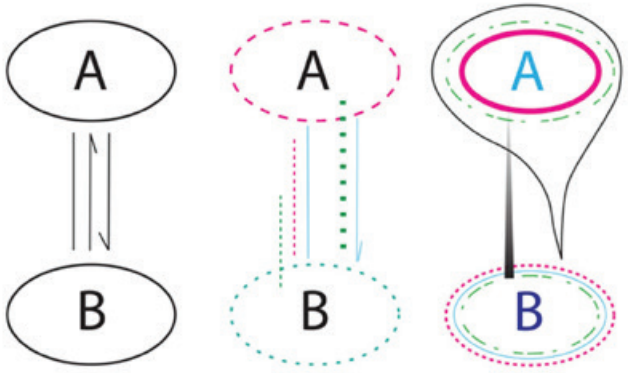


Figure 4: different ways to graphically treating relations between two entities. Line fonts and weight are used to codyfy the relations. (Sevaldson,2013)

Why cloudburst management is a complex planning issue?

The Copenhagen Climate Adaptation plan, concerning the increasing frequency, intensity and duration of cloudbursts, gained momentum after the events of July 2nd 2011, where up to 135 mm of rainwater fell within few hours, flooding the city's lower areas (DMI 2011, Klimatilpas.dk: Skybrud, Redegørelse 2011, p.4). This scale and intensity of downpour had never been recorded before and the material damages, from flooding, contaminated water etc., amounted to more than 6 billion DKK (Copenhagen Municipality Cloudburst plan 2012).

Consequently, during the last 5 years the previously stable framing of the sewerage system in relation to responsibility is undergoing major transformations, as economic calculations has shown that the development costs for expanding the existing sewerage system to create sufficient capacity would amount to more than 20 billion DKK (Copenhagen Municipality 2012a). The physical problem is partly a result of an urban planning, where the majority of the city area (approx. 70%, DAC exhibition 2015) consists of impermeable surfaces, consequently directing the water fast towards lower areas during cloudburst events, overflowing the sewerage system. Now, instead of simply expanding the pipe capacity in the sewerage system, urban planners, engineers, economists and researchers have mobilized around a new translation of the future cloudburst management system, suggesting a new approach, where recreational space and water storage or delayance is created in synergy with other urban projects seeking to integrate the livability strategy with cloudburst adaptation.

Due to the economic considerations and the interest in alternative green and recreational solutions, the 'cloudburst masterplans', was initiated cooperatively between the technical administrations of Frederiksberg and Copenhagen, their affiliated water utilities and several technical consultancy companies (Copenhagen Municipality 2013). The 'masterplans' concretize the preliminary solutions for cloudburst management, and contains more than 300 individual, but connected cloudburst adaptation project on both municipal and private roads, parks and lakes some of which are more or less interdependent (ibid). By framing the projects as one big masterplan divided into 7 hinterlands of the city districts (picture), the TEA has now applied for 12 billion DKK (the estimated cost of CCAP) to hydraulic surface and underground based solutions. These are partially funded through the citizens water tax as a co-financing scheme over the next 20 years, which will allow for a more consequent economic frame to develop the CCAP (kk.dk - 1). The political approval of this application went through in the beginning of 2016 and the Utility Secretariat (a state institu-

tion, controlling the Danish Utility finances) is now processing the application. The physical implications of CCAP are enormous, compared to other urban strategies and the mere extent of implementing one collectively framed project within the whole city is challenging recent planning trends where masterplanning has been replaced with more flexible and ad hoc local planning practices (Sehested 2009). While this masterplanning might be difficult for some, the technical experts see it as completely necessary and fears that the details might fail in such a complex collaboration system.

This return to urban masterplanning is exactly what is causing most of the trouble in the planning system, as they are not anchored or secured in only one technical domain or planning unit, but must be developed in advanced, cross-collaborative planning constellations. The cloudburst masterplan has been widely used as the best hydraulic reference point in all current project descriptions, which is troubling some of the planners in the water utility of HOFOR and Frederiksberg, who have the responsibility for the accurateness of the models and the water capacity levels, which the urban installations must be designed for. Through a former interview with Palle Sørensen, one of the main responsible for the development of the masterplans (TEA, climate unit 2015), it was stated that the development of the masterplans was too hasted from a political pressure to get the implementation started, where a 6 months project deadline meant that the plans had to be built on many technical assumptions in the models (Sørensen 2015), a statement that was further emphasized by one of HOFOR's hydraulic urban planners Nis Fink (Interview 2015 and 2016), consequently making the master plans too uncertainty based as a final reference model in projecting the city's hydraulic functions. Therefore the water utilities need for more accurate hydraulic projections and ongoing negotiations about the economic and processual agreements between the municipalities and water utilities characterizes the current planning situation.

Copenhagen is the only municipality where they have gone all in on the co financing scheme, which is a very complicated constellation. I think we have also concluded this now.. and what that conclusion then means in relation to some of these bigger projects that are agreed upon, i really don't know... but it means something that.. Should it really..? of course it should flow on the roads, but somehow it quickly gets very complex to deal with.. especially when you also want to future proof the whole sewerage to handle everyday rain. Then you get into this conflict where you can emit cloudburst water to the sea, while everyday rain you need to clense before, and how do you make a system that can handle both simultaneously? (Nis Fink 2016)

Several of these uncertainties presents one of the severe challenges in what is criticised by several urban planners in both Copenhagen and Frederiksberg for being a premature implementation process of the cloudburst adaptation plans (Steffensen 2014).

If it could be done over, i would wish that things would not have been pushed through so fast, and that the economy for the seven cloudburst areas had more clarity in the demands, like the 10 cm on the roads, and to have these demands ready before they made the cloudburst plans.(Trædmark 2015)*

What we learned from early interviews in a previous project was that CCAP had quickly gained momentum in the municipal system, because of the promised effects and seemingly very appealing business case, from a political perspective, where both recreational advantages, hydraulic economics and green growth could form in synergy. Yet these promises was maybe pressed a bit to hard as all the technical details were not set in place before the multilevel governance system got heavily involved and implemented the concept solutions. A critical perspective of Nis Fink, (hydraulik urban planners, HOFOR)

"*we carry on with the masterplan, because we do not have anything better {...} Everything in the masterplans is based on overall observations/assumptions. There are still a lot of uncertainties, but if we do like this, we will probably have less damage than we had July 2nd and it is probably worth the money." (Nis Fink 2015).*

This statement must be treated with caution as the masterplans have most certainly been built on many approved techniques and effective hydraulic models like 'Mike Urban' and 'VASP'. The risk however falls on how the discussion and reflection about the consequences of these assumptions are facilitated. Exactly the issue that the technical rationale in combination with the processual realities are not opened up for in the current implementation processes between the municipality and the water utility was highlighted by one of the key planners Jakob Hjortskov:

"The art is, to both make and facilitate the processual and the hardcore hydraulics in the same time."

This statement also relates to the fact that surfacing of water treatment, flow and storage in urban planning impose many health and social related governance aspects, involving a broader span of planning systems that also need to understand and relate to the uncertainty of the hydraulic models and social interaction with the currently modelled water flows. These new requirements for the CCAP also demand a whole new wastewater management plan, currently being developed (Københavns spildevandsplan tillæg 2015,). The new wastewater management plan has been an important parallel development in the CCAP as it should frame the

principal economic investment process between the municipality and the utility, while also determining the practical service and hygiene level for dealing with cloudbursts and increased rainfall on the surface. 'Future-proofing sewerage function by separating rainwater from wastewater' is an important element of the new wastewater management plan related to CCAP, as the wastewater treatment plants cannot deal with the projected increase in annual rainfall of 30 % within 100 years as a consequence of climate change (DMI 2011, IPCC 2015). Therefore Copenhagen's Climate adaptation plan (2012) states that 30% of rainwater on private property should be decoupled from the common sewerage system and directed towards the harbour or nearby lakes on the surface. This further adds complexity to the CCAP as it requires more public-private collaboration and financing agreements on top of the projected cloudburst adaptation projects.

Thus the The Climate Adaptation Plan points to two measures which are necessary to avoid pluvial flooding:

> Implementing adaptive measures to counteract extreme rainfall events in the city (cloudbursts).
>
> Future-proofing sewerage function by separating rainwater from wastewater.

These two measures could be seen as tame problems from a technical perspective but in a networked governance perspective they present themselves as complex or wicked problems, as an overwhelming amount of stakeholders must be included in the planning, while the network around CCAP is still in a phase of maturation and stabilization around new models of hydraulic master planning in the city.

The planning process of both Copenhagen and Frederiksberg, is required to steer and implement the solutions described in the CCAP with many uncertainties at hand, as several of the principal frameworks are undergoing a parallel development. Testing the implications and boundaries for these 'theoretical and visionary' solutions, and how they work in reality is therefore necessary. While some projects have been more or less successful to show how these projects can be developed and implemented in the city, others have not, leaving the general planning procedure still very chaotic and fragile as we will further explain for in the analysis.

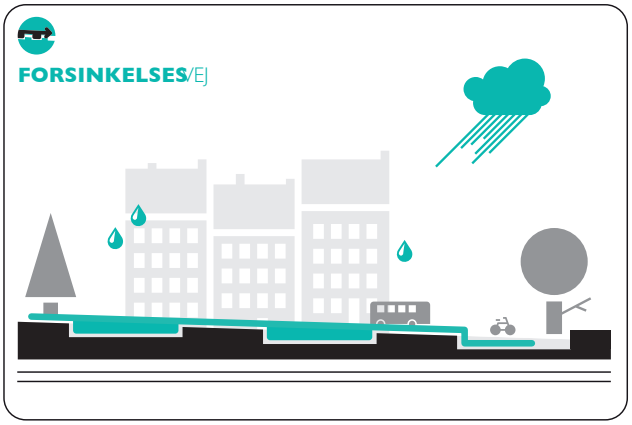
The first major test project in Copenhagen have been the 'Skt. Kjelds climate neighbourhood' project in Østerbro, which is still under development. Many of the municipal planners in the TEA have been involved in this project, and Dorthe Stender has been the main responsible for making the final project tender in CUA. She explains how Skt. Kjelds climate neighborhood has worked as a great

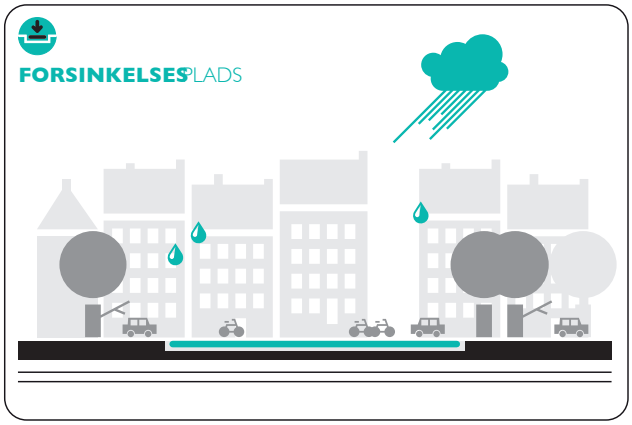
learning process for doing cloudburst adaptation, but have also developed into a prestige project. The project received a lot of money from the district renewal who started the project and later with a huge economic boost of 60 million DKK from RealDania in innovation funds, making it a difficult comparison for future cloudburst projects. The process around Skt. Kjelds has been extensive in many ways as it has been renowned the first klimate neighbourhood in Denmark and transcended a normal landscaping project both in process, attention and resources because of massive political focus (Larsen et al. 2012) (Klimakvarter.dk).

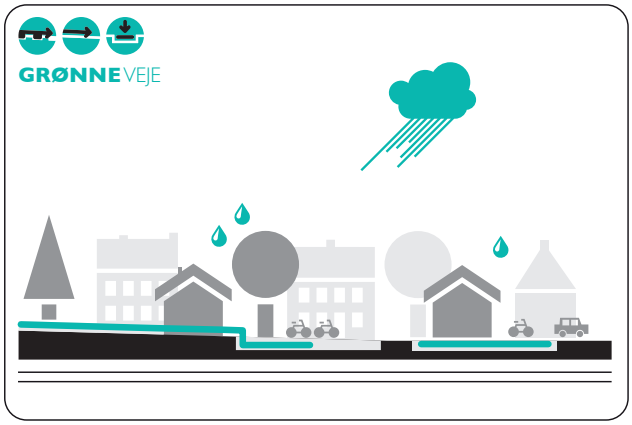
Still other cloudburst projects have been implemented in Denmark and Copenhagen, which leads to a better knowledge base on how to implement these projects on the ground. From these projects intense research networks form and circulate knowledge and ideas through inter municipal networks and platforms as; Klikovand, Vand i Byer and Vandforum. Many blogs, articles and technology gadgets or consultancies follow closely as there is room for new translations and meanings in this unstable network where planners can be perceived to move in uncharted waters.

However it becomes visible in the planning of the 300 cloudburst projects in Copenhagen that it is quite difficult to find cases/projects that are generic, in a sense where they can guide the processual structure for upcoming projects on a more detailed level. This is especially related to the very contextual nature of city interventions/installations having to work with the 'locus of the place' (stedsånden) place specific risk, implementation, coherence with other urban development projects and synergistic effects (Copenhagen Municipality 2012b). In relation to this Dorthe Stender states that: "There are procedures for all kinds of things, but no specific ones for these kinds of more project based processes which varies from project to project." (Stender 2016). Therefore one of the clear challenges in coordinating and planning the cloudburst adaptation efforts in relation to the master plan, as Jakob Hjortskov states it, is the fragmentation of the hydraulic efforts in the implementation phases: "*In the development of the 470 climate adaptation projects we think and plan it as a combined system, but we will never be able to do this in the implementation phases*" (Interview: Hjortskov 2014, from Rasmussen and Larsen 2014). Exactly this transition where urban planners need to move from an abstracted and more theoretical space, (where the masterplan in its current form makes sense) into a complex navigation of the various elements of the vibrant and living city makes the whole implementation process a complex affair. The communication and processual details is of vital importance in this stage as the translation of the hydraulic premises and visions into other planning networks and local groups is taking place, where the

stabilizing agreements within the planning frame, might be destabilized by the citizens, local politicians and other stakeholders advocating different meanings of and about the urban space. This might distort crucial elements of the master planned projects, made by HOFOR and the climate unit in TEA, rendering the bigger planning picture once more.







Model; typology of cloudburst solutions, Copenhagen cludburstplan, 2015

CHAP. 4

CHANGING ORGANISATIONAL STRUCTURES AND ROLES - HOW ARE THE PLANNERS NAVIGATING THE PLANNING SYSTEM?

To understand some of the complex urban planning relations, we focus on the urban planning structures, while many parallels can be drawn to CEA, the organisational focus lies on the TEA. The following chapter will describe how the municipal governance structure is set to plan and implement new development strategies for copenhagen and deal with the increased complexity as defined in the previous chapter.

Changing organisational structures and roles - how are the planners navigating the planning system?

Since the Copenhagen Cloudburst Adaptation Plan (CCAP) was developed in 2012 and later politically agreed upon in early 2014 an array of strategic and organisational changes has followed suit in the TEA. Simultaneously a parallel re-structuring of the TEA has taken place, while the urban planner's role in society in general is rapidly transforming. A process described by Sehested in her study of Danish Urban Planners as Network Managers and Metagovernors:

"The literature on professions describes how major public reforms since the 1990s have challenged the autonomy of professionals in all public policy areas (Broadbent et al., 1997; Ferlie et al., 1996). Subordination of professional values to political and administrative values, the introduction of business-style organizational forms and control mechanisms in professional work, greater influence accorded to citizens and other urban actors are just some of the reform initiatives which have undermined the autonomy of professionals, including urban planners in public bureaucracies" (Sehested 2009, 249)

These are all evidence of changing strategies and transition movements within and outside the organisational boundaries. Within the organisational boundaries specific changes has happened, where the previous 10 planning centers has been re-structured into 4 new departments with service areas and professionally divisioned units. This development has been formed gradually and with the help of external consultants who guides the administrative agencies to build effective and streamlined organisational models (ref).

The various units within the project development centers work with different professional approaches to plan, process, authorize and prepare the projects for consultants and entrepreneurs through public tenders. Each of the four departments 'operate' according to an official value chain and project paradigm, which describes the formal processes for planning, implementing, permitting/coordinating and operating projects. This perception of the project can thus be associated with a consumer good that is modularly assembled through different chains of specialized labor units that add value to the final product for users to utilize. The Value chain document and project paradigm* work as guidelines for how the different assignments are delivered, and the projects takes form through 'City Development' with the overall strategic focus, followed by 'City Physique' responsible for implementing and forming a concrete project. In the cloudburst setting the climate unit of 'City development' assign the projects to the unit 'development of new infrastructure projects'. A task that is at the core of this project, as will be described later in

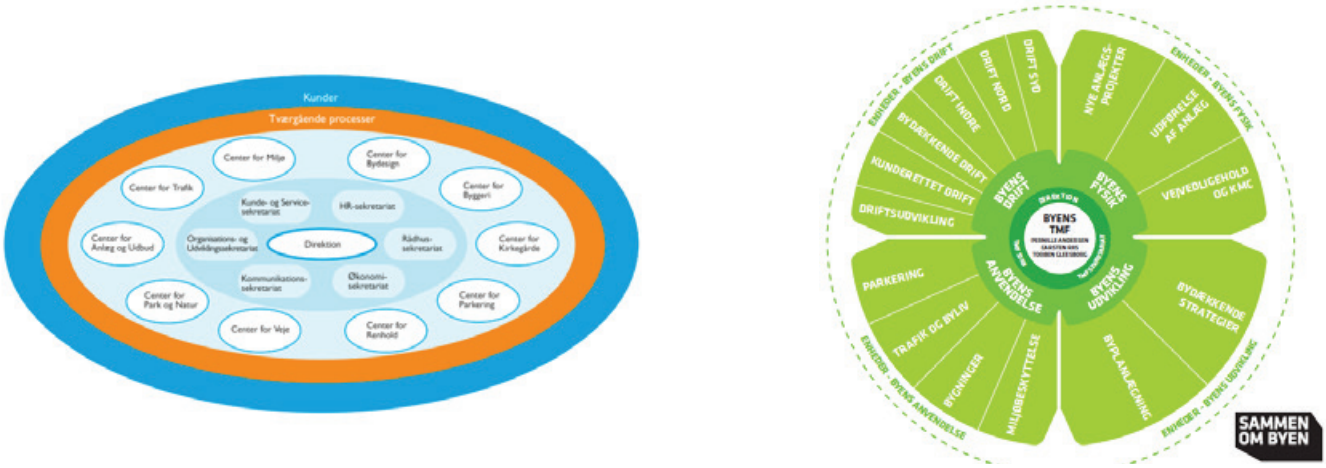


Figure 4: Above to the left the old organisational structure is presented in a diagram form (Simonsen 2009), substituted by the new organisational structure to the right (kk.dk 2015). The old planning structure of TEA have shifted in attempts to effectively make roles and responsibilities fit better in teams of more specific working areas called units.

the analysis. The final implementation responsibility is assigned to the appropriate project manager in one of 3 units in Center for infrastructure tender's (CUA) who creates the final project material, together with a project team from the other relevant units and HOFOR. Before the final tender, a program must be produced and set up in Center for new infrastructures (CNA), the program is a set of visionary, strategic and practical guidelines based on environmental-, social- and traffic-assessments and might include extensive pre-investigations and citizen inclusion, if the project is evaluated to be of high concern or big proportions. (See figure 1 Showing the projects way through TEA).

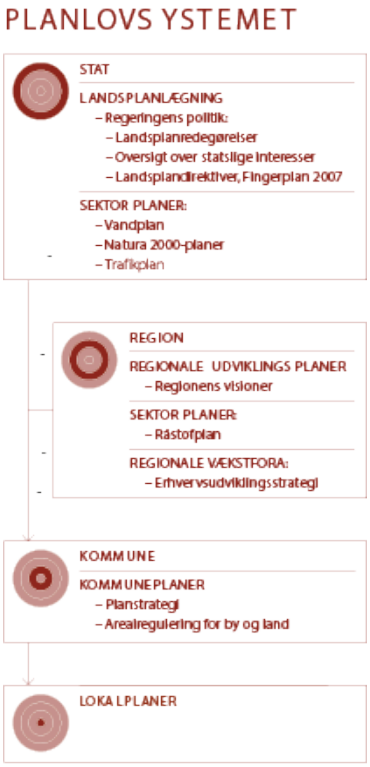


Figure 5: Planloven four levels, ministry of environment 2012

The Danish urban planning is on a higher strategic level centered around the Plan authority (Planloven) on a state, region, municipality and local level constituting the 4 different plan authorities (ministry of environment 2012). These are complemented by design manuals, local urban strategies and overall city strategies along with sustainability, urban segregation and livability strategies etc (above). These both set the concrete regulatory guidelines for urban planning, but equally the organisational/processual visions. In other words, these make up the 'espoused theories' as they formulate how and why the mu-

nicipality does urban planning like it does, which we later argue might conflict with theories in use, which is how they actually do things, where projects are managed increasingly as ad-hoc assignments with autonomous process structures.

Up through the 1980s and 1990s, the formulation and revision of Danish comprehensive municipal plans became more of a routine, and most urban development occurred as a result of projects conducted by investors and builders, or as experiments paid for by state programmes concerned with urban development (e.g. urban renewal or environmental projects). The municipal plan's function as a framework for project activities diminished. It was rather the projects that caused the plans to be changed. Deregulation, self-regulation and market principals became central to Danish urban planning, dominated by ad hoc projects (Kjærsdam, 1996; Petersen, 1985; Sehested, 2003). (Sehested 2009, 247)

From a more regulated bureaucratized planning system the urban governance has gradually shifted towards what is coined by researcher as a network governance system (Sehested 2009; Sørensen and Torfing 2011; Steffensen 2014; Engberg 2016). In this shift, public and private actors are increasingly coordinating project elements in more ad hoc settings where initiatives come from decentralized groups of stakeholders, which merge or share ideas with more centralised planners.

there has evolved a more flexible form of project planning, based on ad hoc projects. Projects have evolved from below and from outside the planning bureaucracy, involving citizens, interest organizations and private interests. Working together, public and private urban actors try to find solutions to local problems (Dear, 2000; Hall, 2000; Sandercock, 1998). (Sehested 2009)

This development in planning has lead to a greater awareness about co-developing the city and frames the municipality as facilitator of urban life rather than caretaker, as mentioned in the introduction. From our own experiences these planning frames are inspiring a more open and opportunistic planning approach in the initial design stages of projects, where visions and ideas might evolve through many different channels. The challenge however is to manage this open approach with the complex planning regulatory, still in place to secure order and ease of operations. This makes it prudent for planners to navigate as both facilitators of co-creation and experts of their professional fields where rational design decisions, must be taken in correlation with overall infrastructure requirements. Thus, the drawback of these new structures within the urban planning might be a lack of overview and increased complexity of how major city strategies like the CCAP travels and translates with projects through the organization. The major challenge is securing alignment with the political intentions, between specialized units in

TEA, HOFOR and the local planners, where tiny details about water flows might clash with how the social inclusion is framed, be it functional or aesthetic. Again the espoused theories that defines how planners work in a municipal context does not really mean, that this is the way things are done to get projects through on the ground.

Nonetheless the overall strategies and visions for Copenhagen dominate how the urban planners frame the projects under development, and how alignment through the different units who are assigned to the projects, is intended. From April 2016 the CCAP gained top strategic priority in the TEA, effectively meaning that it should be included in all urban projects with top priority in terms of synergy potential and overall ressources (Lykke Leonardsen head of climate unit TEA, 2016). Currently there is a movement and strategy in the TEA to foster and practice a more holistic urban planning process, with focus on citizen inclusion and co-creating city interventions, which is also coined in the official slogan of TEA "together we make the city" (copenhagen together 2009).

Several planners, managers and researchers describe the CCAP as a window of opportunity, to fully explore these approaches or visions within the TEA and create the city in a more 'sustainable' and 'Livable' direction (Steffensen 2014; Larsen and Rasmussen 2014; Hoffmann et al. 2015; Copenhagen Municipality 2012a). In the meantime this co-design and livability agenda also puts a pressure on the steering of the planning, to not only listen and design the project programs in accordance with several of the political visions and strategies along with various technical assessments, but also include citizens in these design processes and open up for what Sehested (2003) call a cross-pressure in urban planning. Cross-pressure is a term coined to explain how planners as a consequence of a hybrid solution between direct and indirect democracy, are required to manage citizen and political enquiries and agendas on various levels simultaneously. This pressure is also highlighted by Simonsen (2009) and Munthe-Kaas (2015) who have studied and worked with the planners, characterising the situation as: "on one hand, they experience that the knowledge base of their profession and the demands and expectations from society are rapidly changing, while on the other hand they are required to maintain the authoritarian role of the "technical expert" (Munthe-Kaas 2015). Lars Engberg (2016) further argues for the difficulties of the urban planners to actually plan and deliver good interventions in the city that increases sustainability and livability. Rather they constantly need to push boundaries of administrative frames to find out where the citizens and livability aspects clash with the classical bureaucracy and political priorities e.g. the dilemma of parking spaces vs. recreational spaces:

"Danish local governments are populated with highly skilled, reflective and dedicated professionals, but they work within the boundaries of their own professional domains and policy areas, in quite complex multi-level governance systems. Exploring practitioners' experiences with meta-governance processes, I therefore assume that steering mechanisms are not developed to 'solve' coordination issues but to pragmatically push the boundaries of the possible in relation to specific coordination agendas." (Engberg 2016,)

This analysis of the planners navigational skills in their own planning system presents an interesting perspective on the current issues that we have equally framed in our problem field, where the planners are struggling to coordinate the agendas of the CCAP with other city development strategies and correlating projects in synergy. The managers in the coordination group for CCAP are constantly seeking to make principal frames that are connected with the practical challenges, why they seemingly need a more flexible theoretical frame that can contain or work with the constantly changing practical reality.

A problem can here be seen in the fact that theory needs to work with so called knowns, while practice needs to work with the unknowns. The conclusion in this regard, as Lykke Leonardsen (leader of climate unit) has also pointed out, is that they need to test the practical installations to figure out the boundaries of the principal agreements (Meeting: Leonardsen 2016). A main issue thus appear from the low trust built into the system and that the local planners consequently lack certain frames related to the level of self governing potential in terms of making ad hoc judgment to practical solutions, versus the theoretical or principal agreements.

Especially the challenge of synergy and innovation in complex multi-level governance systems has been expressed as a critical challenge to implement CCAP in public-private partnerships (Larsen and Rasmussen 2014). Jakob Hjortskov describes this as:

"One challenge as I see it, is that we have marketed these projects in a manner where we can make a better city simultaneously with our efforts towards hydraulic solutions. But this whole combination does not present itself so clearly in the concrete efforts so far" (Interview: Hjortskov 2014, from Larsen and Rasmussen 2014, 107).

The expectations fostered by visions and theoretical solutions on how urban planners can solve livability and cloudburst issues, while simultaneously making green growth and innovative infrastructure, transcends the pragmatic reality of the implemented solutions so far. On top, the economical frame agreement between the municipality and utility (Copenhagen Municipality 2015) dictates, that the surface based solutions where the aforementioned

Urban planners; on the same page?

Through own observations and secondhand informants, we can see that optimism and pessimism exists for CCAP between planner who are working in the same municipal value chain, both in Copenhagen and Frederiksberg municipality, with their affiliated water utilities. Thus operating this ship and getting everybody on board seems to be one of the great challenges, to get alignment in the coordination and implementation of the cloudburst projects. The coordination efforts are complicated by several systemic and cultural factors, but concretely problems are rooted in everyday practices and how the meta steering of projects is carried out in multiple management levels, from planner on the ground, to unit leaders, different departments, centers and management levels on top, which are ultimately subject to level of political willpower and conflicting interests in society:

"*The city administration is a multi-level governance system, characterized by organizational hierarchy and a much less coordinated self-organizing heterarchy (Jessop 1998), making meta-governance a complex task. The hierarchical logic enables efficient vertical coordination that co-exists with non-hierarchical modes of horizontal coordination, in a system ripe with professional turf-fights, asymmetric power-struggles and every-day problems.*" (Engberg 2016, 2)

Meta-governance has been proposed as a strategy for the climate unit to steer 'City Physique' in relation to translate the network around CCAP towards a common green and recreational cloudburst plan, where the discourse around cloudburst adaptation is framed around sustainability and livability (Steffensen 2014). Following Sørensen and Torfing's perspectives on metagovernance it takes form in 3 distinct strategies 1) Framing 2) discursive steering 3) participation in self governance. These are applied by the strategical team to create a common direction and alignment between the different departments operating in networked governance structures. This might be a good strategy to include many different stakeholders in a common planning framework, yet the engineering of the new cloudburst system impose new problematizations that currently destabilize the relations within the CCAP:

"*You need to look very carefully on these models to actually find out where the hydraulic problems might arise.. It is exactly when you go into the details that you find out that it's generally very overall observations/assumptions it is built on (the concretization of the masterplan), that if you delay a lot of water, which you then direct down this area [it works], but if you don't guide it down there, it won't appear by itself! - yes of course some of it on the surface – but you need to install all these cloudburst infrastructures to get the water in the right places.. plus it's hard to see if the water in this basin will*

come up in another sewer pipe, completely under passing the cloudburst road!" (Nis Fink 2016)

This interview conversation with Nis Fink made it clear how many intricate details of the hydrological surface planning, which is complicating a smooth implementation process. Especially as the different road and park interventions must work in a networked infrastructure, while the urban planners cannot know how the city will look like 20 years ahead, especially with shifting political and managerial steering, thus making it hard to decide when synergy with other overlapping projects matters more than hydraulic accuracy or citizen inclusion. These regards might indicate that planners/engineers who are more aware about the technical details of the hydraulics in the masterplan are more sceptical of current implementation efforts, than planners working in the more social or environmental domains, where the network cloudburst adaptation has translated and stabilized around innovation and opportunity for recreational or natural habitat. Even so, handling water on the surface creates problems on the surface for biologists and geologists in the municipality, as heavy metals, human excrements and chemical substances might flow into precious groundwater reserves or fragile ecosystems when pluvial flooding spread in the city.

There is however evidence of a strong political and public desire to implement the new green-blue infrastructure associated with the cloudburst adaptation plan, as it frames a desire to transform the city more healthy and livable (politiken.dk 2016). Nonetheless this does not clear the technical issues of implementing the plan as Palle Sørensen, (cloudburst master-planner in climate unit), stated on the difficulties of presenting CCAP to the politicians: "*The art of acting in an area where technology says there must be a lot of large projects, while politicians want the small quick successes. How do you communicate 300 projects economics, conservation, etc.? when engineering and environment do not know all the answers, and therefore possibilities of politicians not saying 'yes' arises {...} Possible information is chewed many times. it is difficult to be loyal to your story/ research, but at the same time not making it too heavy.*" (Palle Sørensen 2015) These communication considerations frames the difficulty of winning political consensus on the complex planning issues of cloudburst adaptation, which means that these project descriptions between planners and politicians often remain at a fairly abstract level (Copenhagen Municipality 2015). While, when consensus does finally come, action follows, and therein lies the dangers of having strong visions but fuzzy intent: someone will make specific plans about what to do, but will the choices reflect the original vision? (Sitra 2011) These questions challenge the fundamental systems architecture that is designed to implement the green and innovative solutions that has been proclaimed in the CCAP. For the same reasons new steering groups in

the TEA have been formed to secure that the principal frames and processual koordination, is set clear for the project managers in the specialized units. As we were invited to sit in on two of these meetings where the department/unit managers were coordinating principal CCAP issues we will later analyse and discuss how such initiatives can assist planners to cope with the aforementioned complexity.

Returning to how the municipal governance structure is capable of implementing innovative cloudburst solutions in Copenhagen municipality, the following chapter will analyse how innovative city planning is sought and have developed through different organisational strategies.

Model; cloudburst vision, tredje natur, 2014

CHAP. 5

URBAN PUBLIC INNOVATION - THE INTROSPECT FOCUS

Returning to how the municipal governance structure is capable of implementing innovative cloudburst solutions in Copenhagen municipality, the following chapter will analyse how innovative city planning is sought and have developed through different organisational strategies.

Urban public innovation - The introspect focus

The agenda and movement of public innovation in Copenhagen is not only interesting as a multifaceted and dynamic processes of transition or change, but also as a particular expression of present cultural perceptions on how to deal with current complex societal challenges. The innovation agenda behind climate adaptation in Copenhagen is massive and penetrates every municipal report, published about the Copenhagens Cloudburst Management Plan (CCAP). Furthermore the innovation agenda is set on some important parameters; technology development, economic savings, livability, resilience and citizen inclusion (Copenhagen Municipality 2012a; Copenhagen Municipality 2015).

"*Climate change adaptation efforts create the opportunity for green transition through development and use of new, innovative solutions. The action plan focuses on the potential for growth in this respect.*" (Danish Government 2012)

"*A green and blue city - adapted to a future climate = more quality of life; We can increase the recreational area and create more quality of life for copenhageners. We can help make copenhageners more healthy. We can create synergy with other planning.* " (presentation of the CCAP, Rasmussen 2013)

It is clear that green growth and synergy solutions is of major importance for CCAP, but for this to happen, collaborative planning is one of the major criteria to inspire and facilitate innovative urban projects and technology development. However one must raise the question of how the visions can translate to foster the creativity and out of the box mentality that innovation requires. Writing innovation into every single official paper will most certainly make the planners aware about the need for new solutions, but will it facilitate a process where planners gain capacity to manage cross disciplinary innovation processes? In this regard Sørensen and Torfing emphasizes the cultural practices embedded in collaborative planning, or network governance, where the rules of the game dictates the problem setting.

"*The processes of collaborative innovation are embedded in institutional arenas of interaction that can be analyzed as governance networks. The institutional arenas of interaction provide rules, norms, routines, cognitive scripts, and discourses that structure the actions of the social and political actors (March & Olsen, 1995) and create particular patterns of interaction that can be analyzed by Social Network Analysis (Considine et al., 2009). In relatively self-fregulating partnerships and networks, the actors negotiate and amend the rules of the game, and the institutional arenas may, therefore, be gradually transformed in the course of interaction.*" (Sørensen and Torfing 2011, 860)

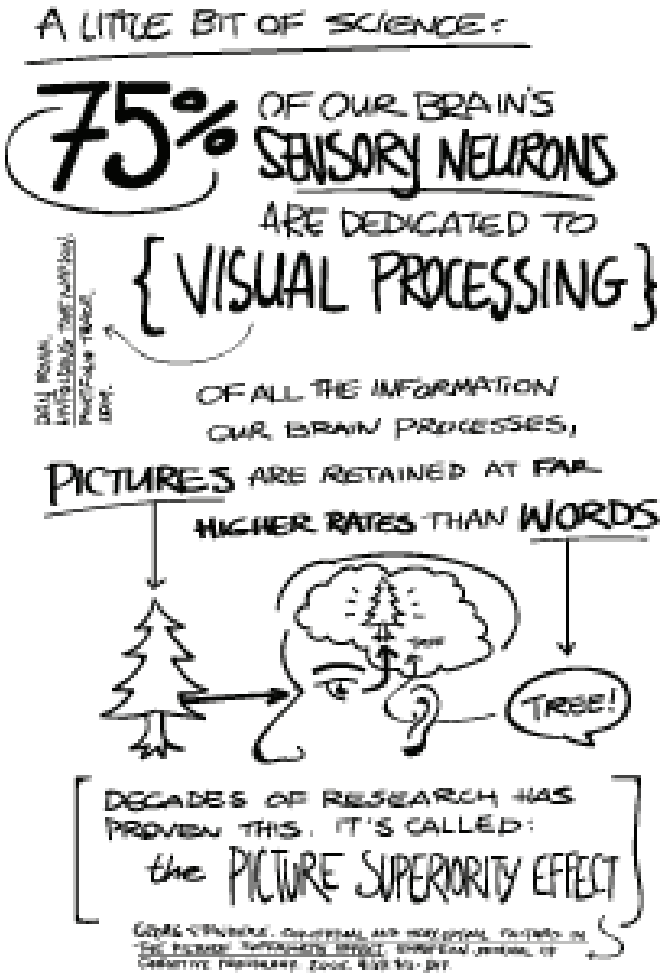
As we follow a group of planners from Frederiksberg in a course on innovative cloudburst management, we see new arenas of interaction unfold and facilitate a more creative and reflective planning approach, where citizens are perceived as co-creators of the urban space. From these new arenas of interaction new social networks emerge to foster more holistic planning while also anchoring a sense of ownership and creativity, that is different from the regular project structure, where projects undergo what can be defined as a stage gate model (Brønnum and Clausen 2015). Framing a new approach on innovative process, we seek to complement and intervene in this process where room for experimentation is opened up, while complexity of regulation and physical regards still clouds the visions of new approaches to planning. We observe, that what defines many of the conversations around concrete implementations of the visions and ideas for Kronprinsesse Sofies Vej, present difficulties towards pragmatic realities in the departments, where authorities or regards for traffic and operations, and especially budgetary frames, undermine transformative innovations of the road. Still we can use the perspectives of Frederiksberg as a comparative model for dealing with many of the same organisational and structural challenges facing the TEA and the processual planning efforts of CCAP. Even though the two case studies present different problem settings, the organisational structures and material of CCAP frames a similarity that is useful in discovering methods for dealing with increasing complexity in the planning.

As we have investigated why Copenhagens cloudburst adaptation plan is complex to implement within the multi-level governance system of the technical administrations we see that the wickedness of the problem is given by several factors. Especially the incomplete knowledge about the fundamental hydraulic flow and the contradictory nature of political visions and a long term organisational learning process; a so to speak paradox of momentum in terms of how CCAP is strategically steered, given by the fact that one aspect is to keep the momentum on cloudburst adaptation efforts, as well as keeping political and citizen enthusiasm running. While on the other hand the fundamental process plan and business case for the projects might destabilize the alignment with utility planners as they experience the technical details of the plan being too superficial in the rush for synergistic development. There lies a problem from the professional planners to engage political resources in the more complex aspects of cloudburst adaptation. Furthermore wickedness is given in the interconnectedness of the cloudburst problems with other infrastructural problems, given by the promise of 'innovative synergy with other urban strategies'. Therefore many actors must be included in the planning, effectively increasing the need for better coordination mechanism and a holistic approach, where different professional backgrounds can interact on a

constructive level and gain an overview of all the different opinions about the planning process and sought solutions.

This leads us to a more concrete focus on the institutional arenas of interaction where public innovation challenge some of the established planning practices and coordination tools. In this regard we focus on how good planning settings emerge and why a more reflexive and holistic planning space is necessary. We see the prospects of enriching the planning meetings, and communication constellations, in general with a more visual approach, where tools from systems oriented design can facilitate the visualization of a more comprehensible administrative procedure, which can be subject to reflection and intervention. Ultimately there is a need to bring different professional perspectives and technical rationales in better alignment with the multiple strategies that dominates how problems are framed across planning departments.

Thus we now go into the more explorative stage of the project to find out how the different planning rationales can be combined to create better delivery systems in Municipal system.



Model; visual processing, Xplain, 2013

Interdisciplinary planning of cloudburst projects

To set the scene for our empirical discoveries, the notion of technical rationality is once more highlighted as we embark on concrete projects where new planning problems need to be solved, but where the setting for solving these problems might not inspire planners to deal with complex coordination issues. As we have explored two different case studies in Copenhagen and Frederiksberg we bare in mind, that rationality is sought through informed and moral decisions, which in turn comes from richness of information material and communication with others, a socio-technical understanding so to speak.

"From the perspective of Technical Rationality, professional practice is a process of problem solving. Problems of choice or decision are solved through the selection, from available means, of the one best suited to establish ends. But with this emphasis on problem solving, we ignore problem setting, the process by which we define the decision to be made, the ends to be achieved, the means which may be chosen. In real-world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problem situations which are puzzling, troubling, and uncertain."(Schön 1983, 40)

With the general notion of professional practice one could further ask, how we can confront or tackle a puzzling, troubling and uncertain set of problems in the CCAP? Recent focus on urban planning has turned away from focusing on the aesthetic, social and functional output of planning, while instead increasingly focusing in on the processes, professions and practices involved in the planning itself (Healey 2004; Sehested 2003; Agger 2005; Sørensen and Torfing 2011; Pløger 2009; Simonsen 2009). The perception of good urban planning is challenged in relation to a democratic discussion and how we include the end users in restructuring urban life, while also focusing on the policy frames and capacity of planners for doing so.

But how does the municipal ambitions and goals translate into the planning practice and implementation of the CCAP? and what are the challenges within complex urban planning for accentuating these visions? We would argue that the core challenges lies in the everyday work settings, where planners are required to navigate in a system that is driven by overwhelming amounts of policy, political visions and rigid organisational structures (Sørensen and Torfing 2011). In addition, Healey (2004) argue that difficulties in public innovation can be correlated with the past decades focus on NPM, still applied in the Danish public system (Sehested 2009), which removes focus on organisational reflection and capacity development by using budgets on auditing and outsourcing most of the development processes:

"tying public spending down with too many regulations and "audit" requirements will undermine the ability of local governments to innovate in their own cultures, to become more imaginative and able to take imaginative "risky bets"." (Healey 2004, p. 91)

These imaginative risky bets is normally associated with the first steps towards innovation and new ways to develop organisations. But heavy steering and regulation might limit creative or effective processes within the organisational frames, which correlates with our observations in meetings and from direct comments in interviews. As Malene Stensballe, an urban planner from Frederiksberg municipality states:

"some of the quota bindings sets the agenda, so there is no recipe for how to do the processual planning {...} the room for experimentation gets compromised by the political guidelines and authorities/regulatories" (Stensballe 2016)

Quota binding and municipal authorizations thus tie the processual model quite firm to the managerial system put in place, while it may still conflict with the more ad-hoc networked governance structures, that are opened up for in various project phases to get things done, or to set a new vision or political strategy in effect (Engberg 2016; Sehested 2009). This can also be related to the difficulties in translating the assignments from the climate units strategic and visionary space to the landscaping and infrastructure planning departments. As Julie from the Nordre Fasanvej area renewal programme states:

"The climate adaptation units visions and strategies often collides with the pragmatic realities and routines, that the landscaping departments relate to." (Fraenkel 2016)

An indication that projects must be done in certain ways, while the visions and theoretical solutions in the cloudburst plan might not be aligned with these established rules. Especially the overwhelming complexity of planning that these new projects bring with them, as a new player in the field. The same alignment of project plan and practice was stated in one of our early interviews with project manager Dorthe Stender from TEA, City Physique

"Often we lack some guidelines / methods for discovering critical issues early in the process {...} There is a need for greater continuity between the various planners that works on the projects and bridging the gap from theory to practice as early as possible" (Stender 2016)

The lack of proper inclusion in early cloudburst project planning became evident in the statements from the planners who work further down the value chain, and actually had to implement or operate cloudburst projects. As frustrations about discovering

critical issues late in the process ('Fire extinguishing') and securing alignment from how the project's visionary background arose, to what the budget, regulatories and local citizens/politicians allow. This gap between strategic and practical planning became a common denominator of cloudburst issues in both Frederiksberg and Copenhagen, how theory and practice was seen as disconnected, which is also formulated in previous research studies on how projects are translated from the climate unit to the infrastructure units in TEA (Steffensen 2014).

Some of the main reasons for why the departments become disconnected has to do with what Per Andreasen (Climate unit) states as the persistent power struggle between generalists and specialists within the municipality, but equally the departmental barriers between the different planning domains, where different success criteria or demands define the planning approaches (Steffensen 2014). The most critical barrier in this regard is between the City development and the city physique, where cloudburst projects needs to translate from a visionary to a more concrete project. Steffensen point out the need for City development to address this gap, by focusing more on project maturation on a more context specific level, rather than plan solution goals, which is more abstracted and overall objectives of the projects (Steffensen 2014, 50). This was also highlighted by several of the planners in both Copenhagen and Frederiksberg municipality, but managerial success criteria and assigned roles and responsibilities of the departments might complicate such strategic movements within the units. One could therefore argue that it is the professional practices and communication means which constitutes for why the coordination of such big plans are super complex to manage. Technical or social rationality influences how we translate urban space into departmental success criteria, as processes, problems and solutions are framed with different knowledge bases. What we find as striking is the general tendency to shy away from taking action on how to surpass the issues of misaligned knowledge bases and problem solving approaches.

Seeing how the growing demands for synergy in urban planning is stressing the different departments abilities for process planning, our perception is that public expenditure can be better spent on addressing the complex problems in relation to aligning expectations, visions and practice in and between the involved organisations, here mainly the municipality departments and their affiliated utilities, rather than focusing on audit requirements and formalised management tools. From our interviews we understand that the effects of a very rigid planning structure are felt clearly by the planners, yet finding leverage points for addressing the system barriers are not visually represented in the problem solving settings.

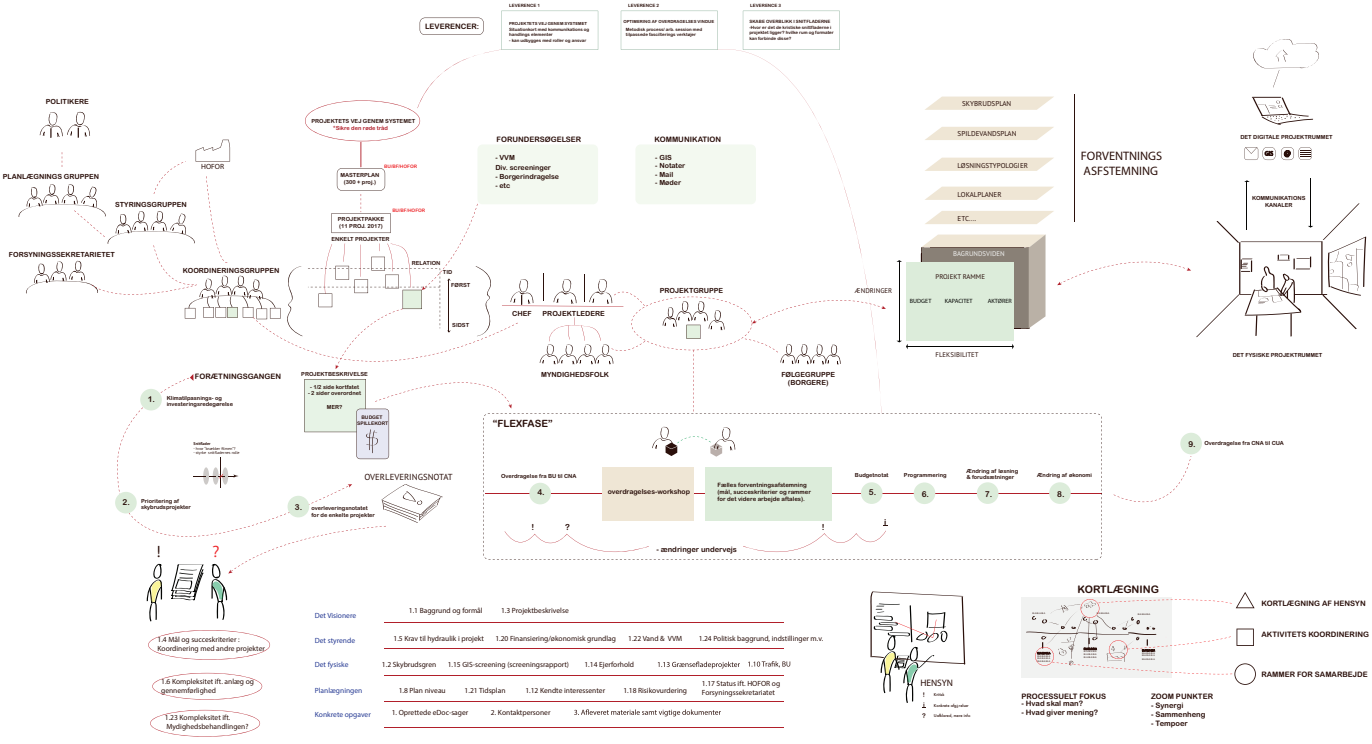
Thus it would seem that the threshold for holding complexity between management levels and in meetings are compromising the visions and innovative intentions of CCAP, and therefore proposing new organisational structures could be counter beneficial, even though necessary in the long run. Rather we propose embracing and increasing the threshold for dealing with complexity in the existing systems and unfold problem areas, projecting critical regards visually and more systematically, allowing for cross-disciplinary intervention into the areas of concern, and facilitate better capacity for dealing with structural or contextual problems. Thereby creating the capacity for planners to navigate and communicate organisational breaches or malfunctions in the system themselves. This is the motivation for implementing Systems Oriented Design (SOD) approaches, to facilitate more rich design spaces, that can be used as an effective tool to relate various problem settings and capture the inherent complexity; "Mapping the actors and flows that characterize a system to create a structured and detailed representation of complexity that can be used to generate ideas for system interventions at different scales. Giga-Maps are an example of tools used for this purpose" (Sevaldson, 2013).

By following an action research perspective, our design process would not evolve into a real problem setting without enrolling and mobilizing key actors in the project. Thus we sought to infrastructure SOD perspectives through interviews, where subjective modelling (Zweifel and Wezemael 2012) was used as an early experimentation and introduction to systems mapping. A technique that also proved useful in unfolding some of the initial problematizations, forming different perspectives like; , "*the climate adaptation strategy can feel like hitting a brick wall because it's to be integrated in all projects and therefore can slow down all other city renewal processes" (Fraenkel 2016, area renewal) and "Going from vision to practice we need to open up for the right channels" (Jensen 2016, Operations)* The different key words and perspectives allowed us to analyse and further synthesise current and future planning formats. Equally we framed our project around other problematizations and interests, by ending each interview with questions about where the informants saw good or bad relations in the organisational setup, and what meaning they put into these (represented in their graphic depiction of the planning system). Building further capacity to relate everyday obstacles to the overall systems architecture (organisational structure), we have therefore sought to translate a network of actors, that would allow for experimentation of planning practices related to the complexity of implementing CCAP.

We found that a major part of the infrastructuring work when bringing new thinking and practices into organisations, is not just about the methods suggest-

ed and their proven effects in other organisations, but in a large degree revolves around approaching and interesting key actors at the right time, mobilizing good 'spokespersons' (Akrich et al. 2002) as well as seeking out the appropriate spaces in which to explore these suggested methods. Here one can say that design thinking becomes much more a change strategy and tool for interessement than an end product in itself. By visualising and articulating work format ideas, and framing them across problem settings, we used principles from participatory design (PD) in interviews to co-create the content for new working formats and find out where design thinking approaches would be beneficial. The following chapter will therefore unfold how we explore these different problem settings and analyse what SOD approaches can contribute to resolve pressing issues. We structure this into our two case studies Copenhagen and Frederiksberg municipality.

Model; Systemic mapping of CCAP, Interessement device, authors, 2016



CHAP. 6

FROM THEORY TO PRACTICE IN CCAP - MEETING FORMATS AND PRACTICES

We found that a major part of the infrastructuring work when bringing new thinking and practices into organisations, is not just about the methods suggested and their proven effects in other organisations, but in a large degree revolves around approaching and interesting key actors at the right time, mobilizing good 'spokespersons' (Akrich et al. 2002) as well as seeking out the appropriate spaces in which to explore these suggested methods. Here one can say that design thinking becomes much more a change strategy and tool for interessement than an end product in itself. By visualising and articulating work format ideas, and framing them across problem settings, we used principles from participatory design (PD) in interviews to co-create the content for new working formats and find out where design thinking approaches would be beneficial. The following chapter will therefore unfold how we explore these different problem settings and analyse what SOD approaches can contribute to resolve pressing issues. We structure this into our two case studies Copenhagen and Frederiksberg municipality.

From theory to practice in CCAP - Meeting formats and practices

unicipal administrations (Copenhagen and Frederiksberg) within the same city limits (Copenhagen) both facing the same overall challenges of the CCAP, the combination of the two has been an interesting comparison. Copenhagen municipality being of a fairly bigger size than Frederiksberg municipality, the organisational challenges are here considerably greater. We consequently chose to follow the municipality of Copenhagen from this larger organizational perspective, exploring their strategic, coordinative and organisational efforts in managing the ramifications of the CCAP.

In Frederiksberg municipality we followed a group of planners undertaking a course on "innovative climate adaptation" (ref) and here explored the issues of the CCAP from a more experimental perspective, gaining a better understanding of how planners navigate the rules and regulations in the attempt to create innovative cloudburst solutions with citizens.

Next follows a description of our journeys into the two municipal administrations of Copenhagen, where we did our in depth exploration of the two identified main problems of increased complexity when working with many actors, and the assignment of cloudburst projects between departments. Alongside and in the end of these descriptions we will account for how we have sought to intervene and infrastructure possible pathways to inspire a change in practices towards these challenges.

Action research in Copenhagen Municipality and Water Utility HOFOR

Our involvement with Copenhagen municipality and water utility HOFOR started as an open project proposal to assist the planning process within the municipal departments on how they collaborate and design project processes. This proposal was founded on an earlier project from 2015 where several key actors had expressed the need for better communication and work formats across the different planning departments/systems, which operate in the field. Leading to a workshop and planning tool, where representatives from involved planning systems interacted on a more visual and tangible level, making discussions about priority, project initiation and phases more visible through the tool elements (Picture). What we learned from this intervention, was that design thinking and more visually structured and facilitated workshops was embraced as a beneficial supplements to the regular meeting practices, where problem setting is primarily facilitated through verbal and written inquiries and discussions. Especially the issue of 'black boxing' (Latour 1999) project elements and processes, where much of the rationales behind project elements and professional knowledge is kept tacit opposed to explicit, was one of the main problems identified in the current coordination efforts in the TEA as Jens Trædmark stated:

"What is important for us *(City physique, 'ICP' unit)* is, that we can try and work this together and break down some of the processes in the projects, or somehow find a method that can illustrate the complexity which is in the heads of everybody {...} It could be good to open up for this tacit knowledge, and get more clear descriptions of the projects that needs to be made." (Interview: Trædmark 2016).

This insight to the overall problem of overview and making the subtle layers of project elements more explicit when assigned between the various departments in the municipal value chain, inspired us to do a broader field study within the TEA. To create a viable organisational intervention it would be necessary to understand how other planners were experiencing these problems and the general implementation of the CCAP and what elements and formats that could aid this process. From this vantage point we sought to set up a collaborative project with the two main responsible departments: Climate unit and 'ICP' unit in city physique to form the basis of a participatory design process, and open up a space for new approaches to planning practice within the TEA.

The requirement for the collaboration to take place, was that we got all the relevant departments involved, thus creating the grounds for interdepartmental commitment to the project, securing value for the municipal resources put into it. The project

proposal was therefore brought up in the coordination group consisting of the relevant department managers where it was given green light. Important for the project was that it sought to build on existing efforts made to coordinate the projects between the departments, and equally evaluate how the current efforts had worked in this regard. Specifically our workshop formats, should have a clear output strategy, thus not only facilitating a more reflective approach to urban planning, but focus on gaining a better overview of the project elements and critical regards, to take informed decisions on. The initial project proposal can be found in appendix (app;2)

To focus our research collaboration, there was a mutual desire to center the efforts around one of the 11 projects to be assigned from the cloudburst package 2017 (budgettet for initial preparations in 2016) and look into one of the projects with a more complex implementation process, where many strategies had to be coordinated to create synergy and alignment between planning departments. The lack of overview already became present, when we could not get an indication of what project would be suitable and most relevant in the ICP unit. Instead, it was recommended that we approached the strategic department to find the right case and initiate a closer collaboration with the responsible strategic planner. After several mail correspondence a final go from the Climate unit manager was in place to initiate a co-design process on workshop formats, which could inspire and be linked to some initial workshop ideas from the climate unit. However there was a concern that we would take steering and introduce completely new workshop formats, as it was already a struggle to assemble people from different departments to workshops they intended for in the assignment of projects from one department to the other. Equally a concern was aired, that we should not disrupt some of the earlier process work from the climate unit related to the administrative procedure, currently being developed. These indications had to be taken seriously as our intentions to experiment with SOD methods would be represented by the climate unit, and we therefore had to translate our approach into the current work processes. This would however prove to be more complicated than expected.

In the meantime interviews with representatives of various departments was prepared to give an insight to what the planners perceived as the current difficulties in planning and executing the CCAP. To find an appropriate case study we addressed the responsible planner in the climate unit, who recently published a report about the difficulties of aligning and steering projects between the climate unit and city physique, clearly still a relevant problem, as deciding on a case relevant for improving this collaborative planning was still not clear (Steffensen 2014). Instead we got valuable insight on the challenges in project package 2016 (the first of its kind) where an

array of problems had initially spawned, like the instance when Trædmark (ICP) had been assigned to do a project on a proclaimed municipal road, which turned out to be a private road. After several processual 'rookies' so to speak, it lead to a requirement for the whole administrative procedure to be described and systematized, as the previous procedure for CCAP had proven to chaotic and unorganised. One of the main reasons for the internal critique of CCAP's implementation process, could be tracked to a set of crucial mistakes, in the 2016 package, which is important to highlight as this also set the scene for many of the inputs we got in interviews. A good example of these concerns arrived from the environmental assessment departments stating:

"The assignment of projects between city development and city physique should be more systematic and include more of the uncertainties that the screenings has uncovered {...} HOFOR often change in the projects without reporting to city development, as a result we get squeezed in our requirements and have to apply for new authorizations of the project" (Interview: Jørgen Lund Madsen 2016)

The response to the general problems in project package 2016 was a 16 page description of project phases and administrative procedures, including diagrams, checklist and workshop suggestions, pinpointing the overall roles and responsibilities along the project line (Internal documents). A document that also received critique because of its extensiveness, yet very overall descriptions of workshops, responsibilities, diagrams etc. to be part of the line of work. In a latter meeting with the author Jakob Hjortskov, he explained how it was an attempt to revitalize some of the old administrative procedures to cope with CCAP and to write the whole story as a best available 'process dummy'. The administrative procedure, gives a clear insight in the administrative process of aligning the different departments along the value chain to the new requirements of CCAP, framing how the municipal system currently deal with complexity; long listed documents and faceted processual structures with many stage gates along the way. However, new management approaches was also emerging as the assignment of projects should include 'flex phases', where workshops and checklist (overlevering og screeningsnotat) should create a common understanding of the project frames, requirements and strategy. In this respect the checklist could travel in the organisation digitally, while the workshop would create a space for more detailed understanding, discussion and inquiry. Especially the workshops had been something the ICP unit had wanted, but as it was explained:

"The weighting of the projects is ineffective {...} It was planned that we should have more common meetings, but it never came because of time pressure" (Interview: Trædmark 2016).

The common meetings had also framed some of the metagovernance strategies (Sehested 2003) proposed by Steffensen (2014) in relation to 'participation in self governance', between city development and city physique. Yet these workshop formats had not manifested to concrete formats in the Climate unit, which relates to a general problem, that many good intentions for more holistic and collaborative planning came to a halt when the everyday tasks and time pressure from coordinating projects with other departments hit. The assembly line is constantly moving so to speak, and projects need to move forward once they are approved politically. Thus, the espoused theories stays at an abstracted level in terms of how it relates to everyday practice and requirements of the planners. We would argue that this is rooted in a general distant position that all the middle managers between planners on the ground and politicians in the top have to the actual project processes they are allocating time for. And with the old NPM audit requirements still in place, the strategic departments are in hectic processes forced to stick to routines and strict project requirements like checklists rather than spending time on solving the root problems for misaligned project assignments, which might be the different professions and planning rationales between city development and city physique, also highlighted by trædmark in our project meeting:

The goal could be that we gain somehow better consensus about what we are talking about. Because when you just sit there discussing the projects without any project material, and think that everybody know what you are talking about, it can get quite messy when you got a lot of different professions at the table. It becomes a feeling where you think you agree, but that you really had two different projects in mind all along taking each different considerations. (Interview: Trædmark 2016).

Here we saw an opportunity to infrastructure SOD approaches to facilitate workshops that could bring different departments together and map out some of the complex planning processes within the administrative procedure referred to earlier. however we learned that a collaboration agreement from one or several managers and planners, did not mean that time was allocated on the ground for actually co-developing workshop formats.

Aligning expectations for cloud-burst management

Throughout the fieldwork in the TEA we gradually gained insight into some of the different perceptions and levels of steering in the administrative procedure, regarding the cloudburst planning. One of the crucial observations in this regard, was how some planners perceived the CCAP as a more fundamental change in how project processes are designed at multiple levels, transitioning into more blue-green infrastructures and new holistic approaches, while others perceive it as an extra design criteria, rather than a fundamental change in the whole planning and design approach of the municipality.

"Right now the whole TEA organisation is changing (because of cloudburst adaptation). The classical model with hierarchies that branch out etc. it's all being turned around now" (Conversation with members of climate unit)

In the other allay, we interviewed the manager of environmental preservation who stated that:

"There should not be a completely new procedure and a separated organisational structure for Cloudburst adaptation. We need to focus on what is different than the regular projects {...} Cloudburst should run as every other project in the end" (Interview: Madsen 2016)

To get planners on the same page and develop a capacity for dealing with complex multi faceted processes and agree on the implementation plan for CCAP these projects impose some barriers for the overall development of projects in the TEA. The barriers are identified as possible stages of "paralysis", when complexity becomes overwhelming and gets side-tracked by budgetary or coordination misalignment or crucial mistakes like; forgetting essential property relations or environmental regulations etc. leading to what Morten Ejsing (City use, environmental assessment) pointed out as 'fire extinguishing' where mistakes are corrected for by extraordinary measures. In other words, "the unprofessional style". This happens as a consequence, as no one has the overview of elements and planners getting involved with different planning approaches/responsibilities without proper co-creation and coordination approaches integrated in the planning of the project. In relation to this Hjortskov explains how there is a crucial difference in the planning rationales between city development and city physique:

"We don't make a time schema, we work more from step to step, solving pressing issues as they arise. here the development team clashes with the implementation project, which is two different disciplines. the project management you need up here is different than the one you need to make the physical installation." (Interview: Hjortskov 2014, from Steffensen 2014)

You could argue that the strategic planning, in city development (in its espoused theory sense) is more about making holistic planning and securing that the visions are actually followed through in the organisation, thus guiding and steering different interests into the overall objectives of sustainable city planning and making sure that they are realistic to implement. Where city physique is more concerned with, how the implementation is actually carried out, who will be included, how and when? Here the visions from city development must stand its test and deal with unforeseen obstacles, multiple project timelines running parallel with different technical details, regulatory requirements etc. all of which might change the budget, timeline and initial idea. Opportunities for development on the contrary, lies in the restructuring and realisation of the general complexity within planning projects, and therefore to utilize a windows of opportunity to redesign and improve the facilitation of more reflective and holistic planning approaches.

A holistic approach to tame problems?

In January (2016 Danish Association of Architects awarded the Municipality of Copenhagen their prestigious "lille Arne" award for their visionary cloudburst plan (CCAP). The jury's reasoning sounding:

"The municipality receives Lille Arne on the grounds that they through their holistic approach has made a virtue of necessity, and transformed depressing physical requirements (cloudburst adaptation) into a visible good for the city…. By going factual and scientific to the task the municipality has succeeded in cutting project costs and avoid overly hidden, expensive engineering solutions, while increasing the added value for citizens through new, attractive urban spaces" (arkitektforeningen.dk, author's translation)

This analysis generally frames the perception of CCAP as affording an innovative approach to the general planning challenges of climate change adaptation. However, as the CCAP is still in its early stages of an estimated 20 year long voyage, steering these visions in place can be seen as a rather rough course, the unfolding and integration of the overall strategy into more tangible methods for navigation can therefore be seen to hold big promises for realising CCAP's holistic premises. Thus, for the municipalities to facilitate and foster this holistic thinking approach, it is required to go beyond managerial strategies and into the actual practices of the organization, in relation to how employees meet and interact internally/externally and consequently work with these issues. You could call this the particulars of meta governance, meaning how you actually set up the specific spaces and facilitate planning practices within meta governing processes.

The administrative procedure describes the project phases in nine steps as a linear thinking process with

bullet point outputs of each phase, as problems are solved in the line of work (Hjortskov 2016). This can be characterized much like the approach that is taken towards tame problems:

"For any given tame problem, an exhaustive formulation can be stated containing all the information the problem-solver needs for understanding and solving the problem --provided he knows his "art," of course. This is not possible with wicked-problems. The information needed to understand the problem depends upon one's idea for solving it. That is to say: in order to describe a wicked-problem in sufficient detail, one has to develop an exhaustive inventory of all conceivable solutions ahead of time. The reason is that every question asking for additional information depends upon the understanding of the problem--and its resolution--at that time. Problem understanding and problem resolution are concomitant to each other. Therefore, in order to anticipate all questions (in order to anticipate all information required for resolution ahead of time), knowledge of all conceivable solutions is required." (Rittel and Webber 1974,161)

From this position, creating an effective administrative procedure, one must have knowledge of all the conceivable solutions in the organisational line of work, which is clearly not the case as we have accounted for earlier. Thereby we argue that another strategy must be applied to handle the growing complexity of implementing CCAP, one where processual framing is collaboratively constructed along the way. As such it is not only about holistic thinking in this regard, but more about holistic practice, applying methods proven to enable such capacities could therefore be seen to aid in the process of navigating the specific projects within the administrative procedure for CCAP. This is not to say that formal documents are not necessary as a guideline to frame how the projects way through the system should optimally proceed. Rather, without any of these initial steps to approach the processual strategy, management will be even less aligned to a common framework. We simply suggest that the workshops intended in the project phases illustrated in the administrative procedures (internal document) might create a much higher resolution to the understanding of the problems from relevant departments and the actors involved.

"The transfer process between city development (BU) and city physics (BF CUA) is somewhat vague, being that the descriptions from BU are on a superficial level and BF (CUA) need it to be on a more concrete level." (Interview: Stender 2016).

The rich problem setting format

From this setting point we approached several of the planners to render a richer picture of how they experienced and interacted in the cloudburst project processes. The rich picture was facilitated through drawing and conversations in combination; the notion of subjective modelling (Zweifel and Wezemael 2012). Something that was equally relevant and needed in the actual planning situations, as stated by Nis Fink:

"The (general processual) problem is related to the municipal authorizations, how does this process run parallel with the ideation phases? Cleansing requirements and preservation, how are these made visible in relation to planning process? There are different pace layers in the development {...} Get as much as possible integrated in the same map, so you can see visibly where there is collision of intentions, and so we can find out what the collisions are constituent of." (Nis Fink HOFOR, 2016)

In this interview we chose to experiment with the technique of graphic recording (right) to create a detailed visual map of the elements presented, that we could later use for our own design process. Thereby we gathered elements from interviews, reports/documents and administrative procedures, and mapped them out to create a rich design space of our own research process. Contributing a better overview of

Figure4: Graphic recording interview; Nis Fink 2016

the different actors and problem settings, as seen in figure 4 (oposite page). Simultaneously these rich process pictures was translated in interviews and workshop formats to facilitate discussions about the organisational structure and the problem settings. In the subjective model of Dorthe stender from CUA, we could discuss and interact in the organisational mapping and she could illustrate visually where the problems of misalignment occurred, what currently worked and what did not, in relation to other departments and work phases. It here became clear how HOFOR and the implementation department in TEA was quite disconnected in the actual administrative procedure, unfolded by the retrospectively looking at the process. Consequently it was argued that the project had to be defined more clearly in the Climate unit to set the implementation process more clear in relation to what hydraulic solutions should be made. However, in a meeting between Climate and ICP about the checklist/transfer memorandum, the Climate unit expressed that the development units in city physique have the better resources to actually see the details and obstacles in the project's physical context. This misalignment of expectations can again be related to how the different planning approaches and professional rationales clash in the municipal value chain because of the low resolution in the project picture, experienced from both parties. The Climate unit is afraid of, (and not obligable to) making specific and rigid project descriptions, they are mainly responsible for the the overall strategy and to make sure the hydraulic projects get integrated in synergy with other urban projects where it makes sense. In the meantime different principal discussion about responsibility and finances must be put in place between the utility and TEA, adding an extra layer of uncertainty. This makes it hard to frame the project economics and more specific elements and procedure, to the frustration of planners in City Physique. Therefore it becomes necessary to learn and iterate on the administrative procedure along the way, as the 11 projects from package 2017 will most likely still present many new challenges in relation to future proofing the sewer system with private citizen money and the economic frame agreement between HOFOR and TEA in relation to cloudburst projects (Copenhagen Municipality 2015). We therefore propose formats that can allow for more reflection and iteration on the administrative process as each project travels through the organisation, here mapping sessions inspired by the SOD approach can create a richer picture for aligning knowledge bases and creating a better overview of the problem setting and present different examples or challenges related to how the urban context should be treated in the planning frame related to CCAP. (These will be presented in the intervention chapter further down.)

With these ambitions to inspire new practices in the planning system the room for experimentation becomes ever more important as we initially set out to

co-create the work formats. Our ambition was to involve users and front-line workers in the design process, capitalising on their own ideas, knowledge and expertise, and uncovering some of their latent needs and desires. For this we needed closer insight in the Climate units intention on the workshop explained in the administrative procedure for the CCAP.

In order to relate the above section to the below it is necessary to point out that the previously described investigation process is to be seen from vantage point of assisting the Climate units work on the assignment of cloudburst projects, while the latter accounts for how this vantage point has shifted and been reconfigured to include new actors and levels of the organisation. The following section will first describe how and what this turning point has contributed to our further investigation and collaboration frame, succeeded with a cross explorative analysis on how we interpret these new insights in relation to both our case studies (Copenhagen and Frederiksberg). Lastly we account for how these insights has been used to problematize the current practices through conversations with our main spokespersons, in order to suggest and open up for experimenting with the proposed SOD framework

The collaborative efforts with and within TEA - Reframing the project

A turning point in this infrastructuring work came after a meeting with the author of the administrative procedure and key cloudburst coordinator in the Climate unit; Jakob Hjortskov. After presenting our initial work and ideas, he expressed a general interest in our involvement, and proposed that we should generate the workshop formats together alongside him and the Climate team in the municipal office. However a week later, Hjortskov informed us that the whole collaboration would halt, as a new job opportunity was given to him in HOFOR, and none in the climate unit had the insights or resources to work on the workshop formats, as there was a lot of uncertainties around the process for assignment of the cloudburst projects. The administrative procedure, (as it was described), was questioned, leaving the unit in a state of reconfiguring major parts of the procedure, consequently scrapping the workshop ideas in the first place.

As we had already commenced a lot of the research work and had been invited to a collaborative work setup, this made us realize how fragile these municipal change constellations could be, as we experienced a relapse into known municipal practices with checklists and discussion meetings. Mails, phone calls and meetings with key persons, made it clear

that there were conflicting views, and our research was still relevant. The collaboration challenge was reformulated by the Climate unit manager (Lykke Leonardsen) so we would follow meetings both on management and planning level, to propose "creative and exciting adjustments of practices being realistic in regards to how the municipal system works and further demonstrate, that they could save time and money, while increasing quality with the same use of resources" (Meeting: Lykke 2016). This meant that we could further explore the problem settings in different managerial levels, creating a better understanding of how the administrative procedure was iterated in the municipal system.

Cross-exploration of municipal strategies and meeting practices

In the strategic meetings of the coordination group, principal economic distribution were the main themes, yet the project context and administrative procedure was the focal point of the discussions. Many of the discussion topics came from the planners who had discovered issues, which was broader than their department managers authority. e.g. how to coordinate and communicate the future proofing of the sewer with local residents and area renewal projects, when the principal models and solutions had not been completed. Another example would be how waste management could disrupt cloudburst adaptation plans:.

"Here we have two conflicting political concerns, on the one side it has been said that moving many of the infrastructural elements out on the road and under the roads is favourable, which has resulted in a lot of projects with this focus; Underground waste handling (Skraldesug), underground corridors and storage of cables etc. and now with the focus on cloudburst and hydraulic capacity this space is needed for water handling. " (Conversation from coordination group meeting 18.4.2016)

This was in our view a very prominent discussion, which took place as it point towards a conflict of municipal strategies, making crucial priority settings necessary in the future. Equally it was something that had been discussed in the Frederiksberg group, while similar for both was the distanced relationship between the discussions and the concrete actions that had to be taken in this regard.

" There is lots of things that moves into and under the street levels, which will affect us when we want to make climate projects" " We need to make a decision on how we are to tackle this issue!" " Will have to go to the politicians and say we have identified this to become a problem?" (Operations) " now that we know these 300 projects (of the cloudburst plan) we can go in and see where potential conflicts may surface" (Implementation/tender). (Conversation from coordination group meeting 18.4.2016)

In relation to our task, what we found most interesting was not only all the complex decision processes about the principal implication of changing infrastructures, and discussing roles and responsibilities in this regard. What came as striking was the abstracted perspective on the implications of the problem settings. There were several instances where we heard the notion "*Are we speaking about the exact same thing here?*". As the representative of HOFOR felt he had to explain the details of the future proofing of the sewer strategy, we noticed that several of the members looked quite incomprehensive. Afterwards we noted how he had to draw a sketch of the explained topic for himself, which was kept personal, thus we realised that the there was no rich material or boundary objects to communicate from in these meetings. The agenda was written and when the material was discussed, the members struggled to express themselves on the same level, as they obviously had completely different knowledge backgrounds and professional domains to account for.

As this tendency was confirmed by other planners we had approached, we could conclude that this is a cultural premises that has evolved from the countless meetings the municipal system currently fosters, where preparation time and richness of information is substituted for quantity of meetings and a sense that sketching and drawing together as communicative tools practiced by designers or architects is not a constituent of the municipal planning practice. From these observations we would seek to problematize the meeting practices related to the initial design challenge from Trædmark and propose experiments of new planning practices inspired from the SOD framework.

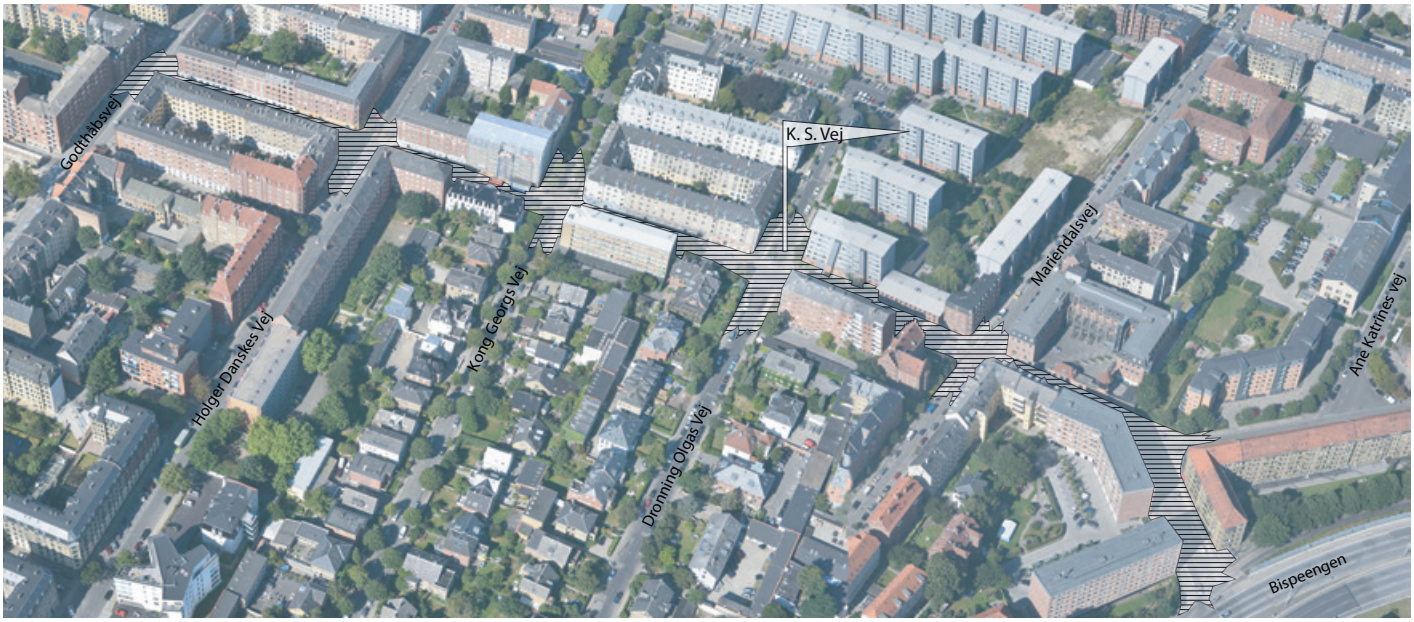
In order to gain support and try out some of our proposed methods it has been important to create interestment from key actors within the municipality. In Copenhagen Municipality our main spokesperson Jens Trædmark from City Physique has been an important ally throughout our project work. As we from our previous project on the cloudburst issue had formed a good relation, and sensed a mutual interest in trying out other approaches to their internal planning meetings, opening an opportunity for more practice based experimentations. As such Trædmark can be said to have acted as a spokesperson with common interests, why we sought to translate his need for more overview in the planning process and the managers interest on creative suggestions for an efficiency improvement of the administrative procedure, with the practice based methods to approach wicked problems, inspiring us in the field of system oriented design.

Much the same was also the case in our collaboration with Frederiksberg municipality, where Julie Frankel from Area Renewal acted as our main spokesperson within the course group. The translation work was here more concerned with bridging Frankel›s inter-

est for creating good interventions towards the citizens, and our ideas for how to anchor the project in their organisation inspired by the SOD framework.

In relation to the above segment we will in the following account for the nature and unfolding of our collaboration with Frederiksberg Municipality, where we have followed a group of planners undertaking a course in innovative climate adaptation. We see this investigation as an interesting complementary study into Copenhagen's municipal efforts on the CCAP, as we here focus on general potentials in offering alternative approaches to the issue. We will describe how we understand and are inspired by the course's motivations, and what we consequently learned from following and working with the group on their case study on Kronprinsesse Sofies Vej.

Model; Area renewal, frederiksberg (egenarts analyse, 2016



KRONPRINSESSE SOFIES VEJ

Introducing Frederiksberg municipality and Water Utility

Our engagement with Frederiksberg Municipality began as an opportunity to follow the planning practices of a newly formed group of 7 planners from roads, service, park, environment, local development and the water utility. The group had attended one of four scheduled seminars in relation to "climate adaptation and Innovation of places" where they had agreed on Kronprinsessse Sofies Vej, a semi-traffical road in the north of Frederiksberg, as a case study for innovative climate adaptation. The road was chosen, as it is within the area of city development, while also a necessary project for solving the projected cloudburst floods in the area. We engaged through the partial project owner Julie, a city planner with architectural background from the urban regeneration programme (områdefornyelse) in Nordre Fasanvej Kvarteret.

Through two introductory meetings, we gained an understanding of the project and some of the overall difficulties in relation to implementing climate adaptation projects within the planning system of Frederiksberg Municipality. From this information we could draw many parallels to the difficulties occurring in Copenhagen's cloudburst planning, e.g. issues like, the strategic division within the climate unit navigating all the city development projects, meanwhile disregarding projects or agendas of other units in the municipality. A concrete example would be the contention between the temporary installations and experimental projects of the area development unit, that would not meet the criteria's of cloudburst adaptation and the permanent hydraulic functions, necessary for the climate unit.

The course description introduces the objectives quite well and has been an inspiration for the focus of this thesis: "A lot of municipalities are facing the implementation of concrete climate adaptation projects and many places there is visions of working better cross sectoral and use this new challenge as a lever to think differently in the city planning. The course offers an opportunity to follow these ambitions and work with development and realization of the innovative ideas and projects" (Author's translation) Our focus is thereby connected to this course and we use the insight and capacity building within the project group in Frederiksberg to investigate how such efforts are further integrated in the organisational practice and the concrete meetings where the road project is formed.

Planning processes for Kronprinsesse Sofies Vej

In our initial presentation of the project and observation of their design consideration for the road and the process plan we gained insight in the concrete issues that was at hand, such as the overarching problem of traffic and parking versus the social and green-blue infrastructure that should be the core design of a climate road. Thus the on-going planning process, had to incorporate a lot of regulations, political considerations, technical details, as well as a social understanding of the citizens. At the same time these perspectives needed to be related within the concrete planning context, to find solutions that could transform the initial thoughts and ideas to a real landscaping project and a good process for intervention. It is important to note that this project is of a special character, meaning that the project managers have not been assigned to do the project, but had chosen to work with it as a more hypothetical project, while simultaneously adding it to the other 56 projects that is evaluated in the "Frame application" to be budgeted by politicians and the "water utility secretariat" to the hydraulic masterplan of Frederiksberg (Frederiksberg Water Utility 2015). Therefore it is a real project but not a part of a normal project course within the municipality and as consequence less hours are devoted and the project is perceived less real in a sense.

In the scope of this thesis where the increasing complexity influencing planning practices have been of focus, following this group of planners has been especially interesting. Both regarding the more experimental nature of the course setting, but also in relation to how the group organised themselves around the project they were working on. As they were not instructed how to organise but were given a curriculum to follow as part of the course, the group can be said to have some interesting aspects of self-organisation. The fact alone, that they had the chance to form a cross disciplinary project team early on in a project proved a valuable model, exemplified by Lars Jørgensen (parks and roads) when asked the question of whether he thinks 'this way of doing planning will save time and money?' "Honestly speaking?... Yes, actually I really think that in the end it does save a lot of time.." (appendix) A view he was not alone to inhabit, as the whole project group seemed eager to continue this more continuative and shared collaborative process. Proving the value of freeing time from their schedules where they as a group could do citizen involvement, idea generation and cross-departmental early knowledge sharing, allowing for shared understandings and values.

After observing the group for some time, we realised that even though meetings were well structured around a specific theme, like citizen involvement, the discussions would often diverge between solution based aspects on the one side and problems on the

other, resulting in a fragmented overview of content and work tasks, seemingly distorting the collective vision of the project as a whole. Another aspect worth mentioning is how the collecting of material on the project was carried out and organised, were the lack of a dedicated place to meet made it easy to lose track of the project. Even though they most often met on "Cafè Ved Buen" at Area Renewals offices, the space was not seen or appropriated as a project room, and no such rooms existed at the city hall either. For us it became apparent that it was in the meeting spaces, where they met and discussed the particulars of the project we potentially could get to create a "more dynamic setting".

As the concept of a dedicated early project team has been recommended as a good innovation model to apply when working on complicated and manifold projects, there is also seemingly a need for better infrastructuring around that format to not only work in scrum teams (scaledagileframework.com), but also apply more agile methods for collaboration. We argue that by applying system oriented design frameworks to urban planning it is possible to increase the capacity to reflect and make interventions in the municipal planning system they design within; thereby becoming more self organising towards taking responsibility and action on current misalignments between the innovation strategy and re-occurring municipal roadblocks (literally and figuratively speaking). Something we argue in the end might create more innovative frames for the cloudburst projects to unfold within

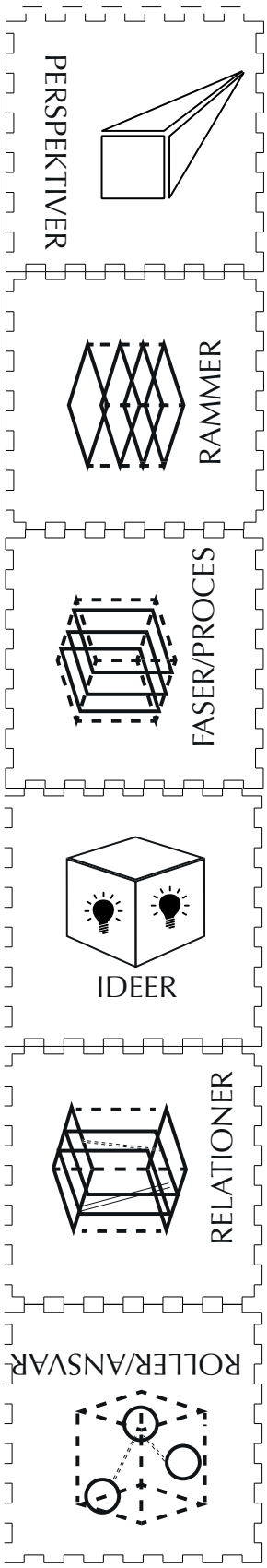
Based on the problems we have seen unfold in the municipal meeting rooms above described, the next section will detail what practices are currently exhibited in relation to how these can be complemented by the SOD framework and the concept of the rich design space.

Fitting the rich design space into meeting practices

In the fragmented and fast paced context of the municipal planning systems, dedicated project rooms are hard to come by, as there exists neither established culture nor sufficient physical space for accommodating these. This is based on our observations from the many meetings we have attended, and official statements declaring "the rooms are to be cleared between every meeting"(internal rule of thumb) , and through interviewee statements like ; "we unfortunately have no dedicated project rooms, but we would really like them, there is a lack of specific meeting rooms for these purposes!" (Malene Stensballe, Project manager, Frederiksberg). Virtual spaces are however well established in the planning domain, with internal e-doc systems, web communication tools, and the GIS - platform (Geographic Information Systems) as key reference points, with the GIS platform as one of the main virtual communi-

cation channels and coordinative mechanisms within the organisation. However, as Jakob Hjortskov, former manager of coordination in TEA states in a previous study (H.Rasmussen & S.T Larsen 2014): "It is dangerous to make GIS into the device that is supposed to solve the coordination problems" further elaborating that " GIS can provide 25% of the solution, the rest needs to come about through better communication amongst the employees, e.g. by establishing some administrative procedures, that functions across administrations and across the public and private" (Hjortskov 2014).

Currently, the municipality's virtual spaces are supplemented with a rich culture for arranging various pre-planned formal and informal ad-hoc meetings of informative, coordinative, and decision-making nature. An example of one of these coordinative measures in Copenhagen municipality is the creation of three overarching management groups (planning group, coordination group and steering group) intended to take more principal decisions in relation to cloudburst projects. Through our fieldwork we have observed and partaken in a number of meetings in Frederiksberg and Copenhagen Municipality, both regarding specific projects and more principal coordinative matters handled in the dedicated steering groups. Providing us with a relatively good insight on how these various meetings forms are conducted, what content is included, and how they are facilitated. We have observed a general lack of shared frameworks for how overview is created and communication facilitated, as discussions often became abstract missing common reference points. A situation further complicated by the need to include many actors, elements and considerations at the same time, influencing a general indecisiveness, especially in regards to processual planning efforts. Keeping all these considerations within a written agenda, facilitated through text documents and discussion makes it hard to relate the various elements with each other and agree on problem statements and actions to take. Another problem can be seen in how the outcomes of these meetings are collected and accordingly how they travel in the organisation to further communicate how roles and responsibilities are understood. All these problems point towards a need for new meeting formats that might foster a change of practices, why we propose opening up for more experimentations in how meetings and work sessions are facilitated and by what tools.



Illu: design of "facilitation" cube for use in workshop, Copenhagen municiplaity, 2016 (design. authors)

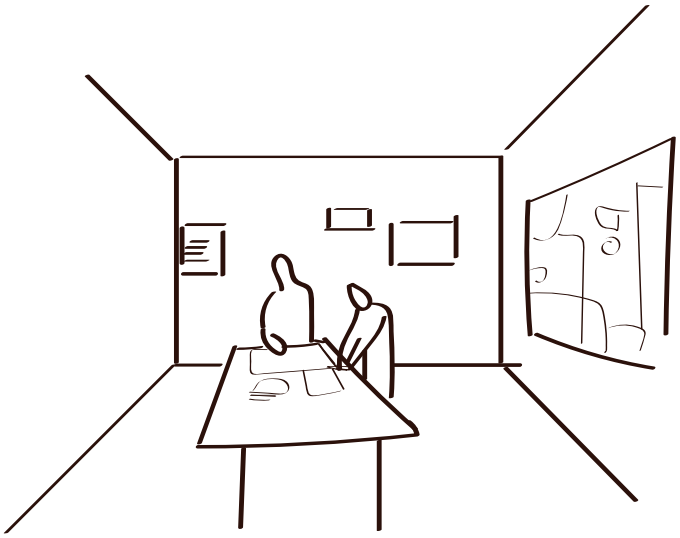
Designing intervention workshops

Under follows a description and analysis of we sought to intervene current, and inspire new meeting practices by the creation of two independent workshops inside our collaborating municipalities related to their on-going cloudburst projects. First the concept of the "rich design space" and the "very rapid learning process" from within the SOD framework will be explained in relation to the municipal planning system, and second the two workshops will be described and analysed in relation to the implementation of this framework.

Creating "the rich design space"

An important aspect of enabling successful mapping session is identifying and facilitating the spaces in which these mappings can occur. This both entails defining the task at hand in regards to what processes and situations the mapping are to address, as well as the intended outcomes of these. Last but not least it entails setting up the spaces where the mapping activities can be carried out with the relevant actors concerned, referred to by Sevaldson as the creation of the "Rich Design Space" (2012). According to Sevaldson(ibid) such a space is especially well suited for addressing the issue of `richness` in complex processes, seeking to include all relevant information layers for the task at hand. For our context this entails taking into account the physical, technical, organisa-

tional and social aspects, as well as the virtual media and information spaces in which the cloudburst projects unfolds. This space is usually set up in the form of a mixed physical and virtual project room, where a team working on a specific project, over time exhibits and orchestrates large quantities of information that "embraces many types of investigation, from analytical to intuitive" (Sevaldson 2012). In relation to how we have utilised the concept of the rich design space, it has been in the setting of workshops exploring how the method could see to benefit more action based meeting formats. Our application of the method can as such be seen as a 'provotype' (Morgensen 1992, 25) by "confronting them with situations which represent a new experience" (ibid) provoking a situation for us and our collaborators to learn from.



Illu: sketch for presentation in workshop, Copenhagen municiplaity, 2016 (sketch. authors)

Facilitating "Very Rapid Learning Processes"

The methods that make up the rich design space are usually guided through a process by Sevaldson (2012) coined the "very rich design space" (Sevaldson 2012, systemsorienteddesign.net). The method is a combination of "The Rich Design Space", allowing for access and socialisation of large amounts of information, and the "Giga-map" as a technique for internalizing the information explained by Sevaldson as a: "a tool for reflection and analysis, and for making research results explicit" (ibid)

The following will present some of the main guidelines and techniques from SOD and how we see these best employed within the context of urban planning, a framework that also informs our interventionist approach and experimentation with bringing theory into practice. The guidelines are complemented with expert interviews concerning our case studies, with professor Birger Sevaldson (AHO) and designer Adrian Paulsen (Halogen) two of the main contributors within the research on SOD. The facilitation framework is inspired by the instructive text: "Professional applications of Systems Oriented Design (SOD): Developments in practice (Paulsen & Romm 2013) and semi structured interviews with the aforementioned researchers regarding SOD in relation to our case studies.

In our interview with Adrian Paulsen (interview: Paulsen 2016) he points out that, "When bringing Giga-mapping into the reality of the consulting world it's important to address the issue of time and resource constraint. This made us develop a guide for categorising what was relevant to get out of our Giga mapping sessions" (interview: Paulsen 2016) This point is further ellaborated by Paulsen and Romm (2013) "we found four main types of recurring Giga-map structures; contextual, sequential, relational and exploratory" (Paulsen & Romm 2013, 4), in the text these are instructed to be utilised when a project exhibit the following characteristics:

> Explorative: used when conversations appear on a more strategic level moving organisations or situations from A-B. For instance when path in between the two is unknown.
>
> Contextual: Relates directly to the area of focus (physical or organisational) when something is supposed to work in a specific way.
>
> Sequential: Chains of occurrences such as time based processes, journeys and continual scenarios.
>
> Relational: Governing structure of the people and actions being mapped out resulting in conversation about and depictions of networks.

"People need to train their ability to see and comprehend systems, we have a tendency to want to simplify the complex." (interview; Paulsen 2016)

Working in a new way with unfamiliar tools and formats "the workshop environment calls for creating a fine tuned ice-breaker mood" (ibid). One of the biggest challenges for getting participants to engage is getting them over the threshold of interacting with each other through visualisations, drawing and writing on a big piece of paper. It is therefore recommended to include some warm-up exercises that can familiarise the participants to the format and the techniques at hand. Paulsen further (ibid) explains that it "will help to make a sketch of how you see the system map, based on the informed knowledge you have gotten through your research, e.g. Interviews and document studies" (ibid). In order to engage the participants "it can be useful to provide "ingredient list" that symbolises some of the main elements of the case that the participants can use or give feedback on" (ibid). This can for example be technical details, physical maps, timelines and pictures.

As the mappings in themselves can be a fairly chaotic exercise the workshop should be set up in a rather structured way, however not too rigid. Starting out with the theme, in our case from "assignment of project". Focusing in on: What effect do we want to create/accomplish? Considering: What kinds of conversations do we want/need to have? Utilising

the maps as guidelines to steer the process. It is advised to focus in on specific areas, where the method referred to as the ZIP-Analysis is recommended as a way to develop the Giga-mapping session. ZIP stands for Zoom, Innovation, Potential (Sevaldson 2102) and the analysis is applied by marking the Giga-map with one of the three points when and where it is seen fit for the overall scope. The concept is tentative and there are other points that could be used, e.g pain-points, risk points, or the more common leverage points, that can help defining intervention points that could have an impact on the whole system. Sevaldson (2016) also suggests the term `Intersection point` to define a point where two or more systems intersect, in relation to the cloudburst issue this can be exemplified by how the sewage system intersects with freshwater flows, downpours, and seawater. Besides these guiding principles the VRLP and the Giga-mapping exercise is suggested to be facilitated as a relatively open format, where one define a theme and some related zoom-points to analyse and steer out from "and feel into the direction it wants to take" (Paulsen 2016)

"the Giga-map is a natural component of the Rich Design Research Space. It is displayed on the walls of the physical design space and it is represented on the project blog" (Sevaldson 2012, 5).

CHAP. 7

UNFOLDING THE SOD FRAMEWORK IN COLLABORATIVE WORKSHOPS

As we have argued, this project can be seen as an ongoing infrastructuring process of creating connections and interessement, where the workshops in themselves are to be viewed as the culmination points in a longer list of interventions. They act as valuable interventions in our effort to translate our ideas and proposed methods to a more concrete and practice-based format in order to get direct feedback. The approach managed to gain support because it was connected to existing agendas of knowledge management and process optimisation in the municipal administrations, offering an experimental room to learn in, while at the same time addressing concrete work tasks. The two workshops are to be seen as equal but differ in scope due to collaborative frameworks and ambition, as we have seen the Frederiksberg workshop an add on to an already ongoing course process, while we in the Copenhagen workshop have more invested as it is framed a concrete task, part of a more formal collaboration. Consequently more emphasis has been put on the description and analysis of the Copenhagen workshop, where the most resources have been invested.

Unfolding the SOD framework in collaberative workshops

As we have argued, this project can be seen as an on-going infrastructuring process of creating connections and interessement, where the workshops in themselves are to be viewed as the culmination points in a longer list of interventions. They act as valuable interventions in our effort to translate our ideas and proposed methods to a more concrete and practice-based format in order to get direct feedback. The approach managed to gain support because it was connected to existing agendas of knowledge management and process optimisation in the municipal administrations, offering an experimental room to learn in, while at the same time addressing concrete work tasks. The two workshops are to be seen as equal but differ in scope due to collaborative frameworks and ambition, as we have seen the Frederiksberg workshop an add on to an already on-going course process, while we in the Copenhagen workshop have more invested as it is framed a concrete task, part of a more formal collaboration. Consequently more emphasis has been put on the description and analysis of the Copenhagen workshop, where the most resources have been invested.

In the following section we describe our workshop "from vision to action" with the Frederiksberg course group, our first attempt of practicing the SOD framework in the municipal urban planning context. Based on this experience we later designed the workshop with Copenhagen Municipality, which will be described in the section following this.

Frederiksberg group: "From vision to action", workshop 05.04.2016

As mentioned previously, this workshop was focused on trying to bridge the gap between vision and practice by encouraging a more visual dialogue and mapping out both ideas, technical specifications and actors on one big piece of paper, co-creating what in SOD is referred to as a Giga-map, seeking to translate this "rich picture" of the context into a sequential map, and specifying actions and deliverables for the next phases of the project work. Our main objective was to learn where there might be opportunities for anchoring the overall course objectives of cross-disciplinary work and inclusion of liveability aspects in the participant's daily work practices and overall organisational structure. In this regard it was important to get a clear understanding of the participant's individual and collective design capabilities. Our main goal was to illustrate how the overall visions could be broken down and translated into specific actions and deliverables, creating greater awareness of the importance of anchoring vision in action as a way of steering the development process and ensuring a shared direction.

Exploring the format

Six out of seven participants showed up for the workshop, which, for the convenience of the planners, was held at the Frederiksberg City Hall where they all except one (Julie Frankel – urban city renewal) have their daily work. Collectively the group represented all relevant municipal planning departments responsible for climate adaptation projects: parks and roads, environment, climate, operations, as well as a representative from the private water utility in Frederiksberg.

We had divided the room in two by setting up two big tables in the centre to change the atmosphere to a more active setting. (picture). When all the participants had arrived they were asked to take a seat around the table where we introduced the workshop's purpose and timeline. As the workshop focused on experimenting with visual tools for communication, a short drawing exercise was used as a warm-up to break the ice and activate the group; a method that actually got the people less keen to draw, much more exited (Method; Squiggle birds, from Dave Gray) (Picture).

We swiftly moved on to the next exercise, introducing and specifying the group's own visions for Kronprinsesse Sofies Vej. As we had unfold their vision statements (appendix) into 5 elements (the social, the blue - green, the healthy, the creative and the safe), we asked them to form two groups of three and specify in 3 minutes what these elements meant for their case study. In 3 minutes (picture) Inspirational pictures were lined up next to them on the table to be used as reference points. It took some specifying and exemplification of how the for example the social vision could translate into mean concrete meeting points and thus interventions in the street. The exercise fostered some interesting discussions and reflections regarding the translation of visionary elements into practical elements, such as "Can 'the healthy' be interpreted as mean less traffic and can this relate to the citizens wish for a safer street?" (Malene Stensballe) We rounded up the exercise up and informed how the content would be put to use later in the workshop, making sure that every step would be linked to the final rich project picture.

Before moving the participants out of their chairs and over to the other table where the maps were laid out, we introduced the concept of the "action cards" which they were instructed to use every time they encountered a situation that called for a later work delivery to be made. We wanted them to focus on the context map, instructing them on how we would like them to engage with the map from technical, governing and citizen aspects, as was also indicated by the map's layout. The map was divided into three parts, in the centre was the road, on the right an indicated area for the planning elements and on the right an indicted area for the citizens

and outer world involvement (picture) To set the scene, we first asked them to agree on what scenario we were going to plan for. The representative from Frederiksberg utility was asked to take the lead in writing this down on top of the map, where he stated that we were planning for a 100 year downpour event (Explain in footnote).

Inspired by our interview with Marie Louise Andersen (cloudburst handling) the day before, where she stated that "in cloudburst projects I would always start from what is in the ground, and work my way up from there", we continued with the hydraulic perspectives. Utilising the cross section of the road as a reference point, initiated a longer discussion on whether the road should have a tilted profile. This discussion moved the mapping exercise towards the overview of the road, and resulted in a range of sketches on possible solutions, which a tilted road could mean. (picture) These proposals consequently triggered many questions on the more technical and regulative aspects which were also written down on the map. The use of the `action cards` was encouraged whenever a specific task surfaced, such as finding out how many parking spots could be removed.

Involving the planning related elements (right side of the map) such as regulations and frameworks proved to be a bit harder, as the group was in a ideation phase more than an implementation phase. There were however several concerns regarding planning elements being brought up as ideas were discussed. Some of the more critical elements, like the traffic flow and parking spots were plotted on the map. Most importantly, the ideas they had for the road were linked and discussed in relation to technical concerns, which was the main goal of the exercise. As a roundup of the exercise, the participants were asked to link the visionary elements they had previously defined with the contextual map they had now created. Using the colour dots from the vision sheets (picture) they plotted in where the various visionary elements could be seen to fit the physical elements and ideas on the context map. (picture)

We then moved over to the sequential map, where the goal was to define intervention points based on the ideas from the previous mapping and develop an action plan for implementing these. We asked the participants to first define their thought about the intervention, and then 'back cast' a plan for implementing them, defining roles and responsibilities in conclusion. Agreeing on which ideas to test as interventions, and committing to doing the legwork for making it happen proved to be a challenge. We handed out some action cards and made agreements for the group's future work tasks. As a final exercise they were asked to use the colour dots from the vision statement exercise and match the elements in the context map with their intervention ideas in order to illustrate the relation between vision

and practice more visually and reflect on the nature of these relations. The most interesting statements from this exercise resulted from the fact that most of the participants could clearly see how the ideation stage diverged from the actual implementation stage, enabling them to point towards some of the underlying problems for this.

"The challenge is that it's easy to talk about ideas and possibilities on one hand and problems on the other, but combining these in one holistic understanding takes time and effort, and a lot of cooperation" (Malene Stensballe)

Bridging over to Copenhagen Municipality

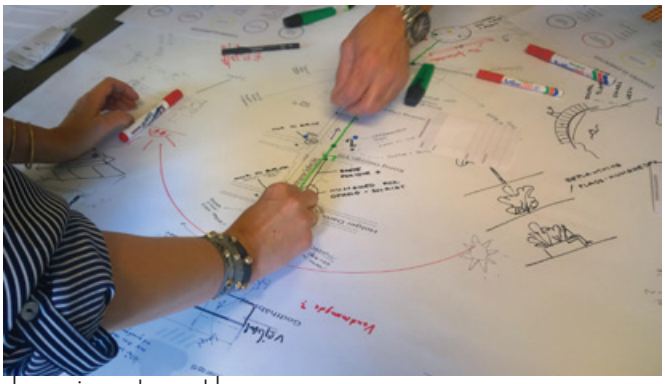
One apparent problem in the general discussions of the above described workshop was structuring focus around the different urban elements brought up, as when the participants were writing down important planning considerations related to their own departments. For example, regarding the option of making the road a one-way, it was only after considerable efforts to direct attention that the group noticed the critical concern. This can be seen as a weakness of keeping track of multiple concerns simultaneously. An option to address this could be to include a more explicit turn taking, so that everyone can be heard and issues unfolded without it becoming too intimidating or time consuming. Here it would make sense to introduce a rotation system when adding content to the map. This could help to ensure that mapping develops consistently according to the issue discussed at any given time. However this is a balancing act, as the participants should be free to express or add whatever content they feel relevant when a critical concern is related to the urban element or topic, in order to enable a process that is not too rigid, but simultaneously aids a form of structured interaction with the maps.

From observations in the planning meetings attended throughout the project, we understood that more than the physical elements of the context had to be included to grasp the complexity of urban planning. This realization came from discussions and statements like; "All of a sudden it becomes confusing with all these documents!" and "the garbage suction, which might get implemented creates extra complexity in these projects as these new technologies brings in a lot of regulations/governance and inflexibility". Therefore the formats prepared for the workshop with Copenhagen municipality are accordingly set-up to account for contextual, processual and administrative elements.

Warm-up

Visiion mapping

discussing the many elements



drawing together

Contextual Giga-map of the project (kronprinsesse Sofies vej) after session

The "flex room" concept, processual reflections and assignment of cloudburst projects in Copenhagen municipality, workshop 24.05.2016

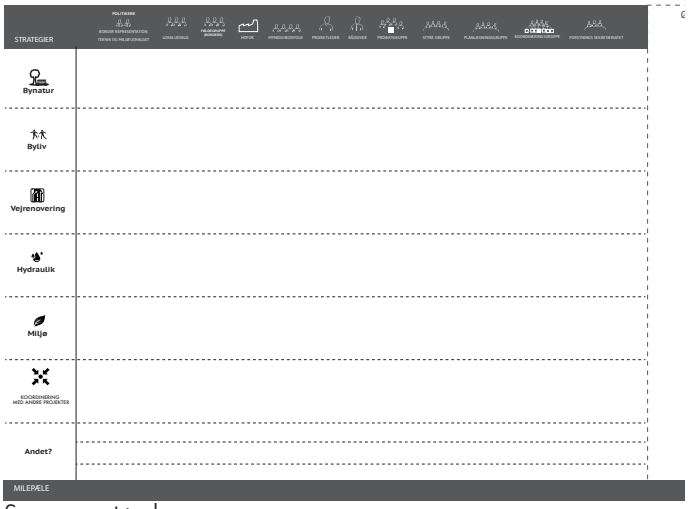
The following segment will describe and reflect on the unfolding of our workshop with representatives from Copenhagen city and HOFOR the 24th of May 2016. The workshop can be seen as a joint effort between Jens Trædmark (City Physique) and us, where he, as an official body, instigated and hosted the event in which we acted as process facilitators and organisers. The goal was to gather relevant actors in an experimental co-working session, to both test a new method and format for the transfer of a specific cloudburst project (Vejlands Allè) and to reflect on the overall planning process for these kinds of projects.

Attending were: Jens Trædmark (City physique, ICP), Stefan Werner (City physique, ICP), Ann Lilja (City physique, ICP), Anne Hansen (City physique, ICP), Ayla Gretoft (City use, Environmental preservations), Morten Ejsing (city use, Environmental preservations), Henriette Berggreen (City development, Climate), Rikard Nannestad (City physique, roads) and Mads Popowitz (HOFOR, area responsible, Rain and Sewage). In the last part of the session the department managers from Climate (Lykke Leonardsen) and ICP (Anders Asmind) were invited to receive and give feedback on the format's potential further usefulness.

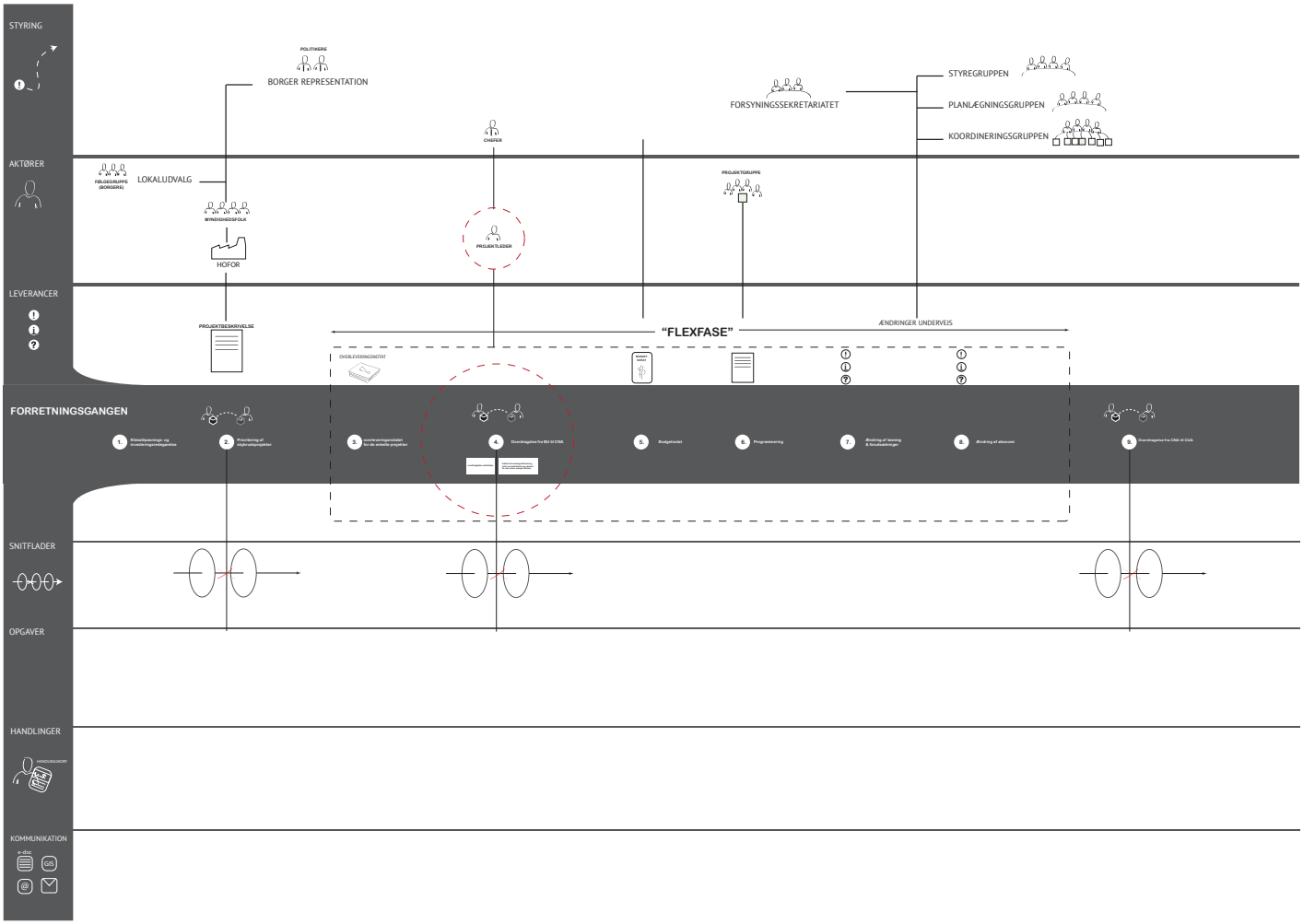
The format for the workshop was introduced under the title "flex room", and was set up as a temporary "rich design space" (Sevaldson, 2012), restructuring the meeting room to create a more action based atmosphere that could foster more active participation. The participants had in advance been sensitised to the project material as well as the format, to aid the expression of different professional knowledge bases of the group. This knowledge sharing was systematically encouraged through the formats of the mapping exercises, which content was based on our research on CCAP's planning processes. The prepared templates were inspired by the Giga-mapping method and the overall setting informed by the notion of the "very rapid learning process" (Sevaldson, 2012) from System Oriented Design. The intended outcome was to foster strategic conversations and dialogue on critical issues, to pinpoint problems and to create an overview of the projects many aspects, for the participants to better internalise and interact with them.

The workshop was built up around the following 4 phases; Contextual, sequential, explorative and relational; starting out with the contextual mapping exercise related to the area of focus, Vejlands Allé, and the participating planners administrative frameworks, in regards to this area. Followed by the sequence mapping exercise, which here can be seen as a combination of the explorative and the sequential mapping exercises, as we wanted to frame a more

Contextual map



Sequential map,



Relational map,

iterative format. Lastly the relational mapping exercise is to be seen as an on-going process concerned with relating the contextual elements, planning elements and actions being mapped out.

To introduce the formats we started out with a presentation of our work and our analytical reflections on the general challenges concerning planning and execution of cloudburst projects, as well as our ideas for how the proposed format and techniques could potentially contribute to alleviate some of these challenges. To exemplify how and why we had designed the workshops format, we presented key quotes from our more explorative interviews, thus linking statements as:

> *"Important that city physique can see where the problems originates" (Interview: Madsen 2016)*

> *"The transfer between city development and city physique should be more systematic and include more of the uncertainties that the screenings has uncovered" (Interview: Madsen 2016)*

> *"Develop a regulatory plan that describes tasks, roles, relations and time aspects" (Interview: Madsen 2016)*

As we wanted to promote an active participatory atmosphere we swiftly moved on to doing a small warm-up session / ideation phase, where we asked the participants to draw a relevant cloudburst implementation suggestions and explain to their sideman how it could be relevant for the Vejland Allé project. After ideas had been drawn out and shared in the group we moved on to the first collaborative exercise, the contextual map. After a short introduction to the exercise, we asked the participants to map out the frameworks and formal considerations they needed to address when going into the projects. This more formal bureaucratic part of the mapping was seemingly something that they easily related to, and also something that was given top priority throughout the workshop.

The two maps of the area was also actively used as a way to discuss the projects more technical and geographic boundaries, where areas and roads were marked and put in connection to the cross sectional view of the road (pic). Seeing how these maps were used, and based on feedback from the participants, it would make sense to include much bigger more detailed maps, which could be drawn and written on where street names could be included. "which street is this? it would be nice with some street names here" (Gretoft).

The part of the map with the cross sectional view of the road was harder to activate and fill out, even though the elements were used actively as reference points to talk out from. e.g. when an element was drawn out on the map people quickly went

into more general discussions on the issues that they saw most problematic for the process, here it could be argued that introducing the sequence map as a side-lined format to follow up on some of these discussions as they were unfolding could be a good idea for a future format. However this could also be seen to conflict with the more systematic process the format aimed to facilitate. Even though some had more aversion from actually drawing out their concerns and inputs, the map worked as a good boundary object to talk from and was actively used in every discussion.

"I find this exercise a good way to open up our thoughts and discussions in another way, should in no way be solution based, but rather to get more clear on how we all relate to and work with the project" (Berggreen)

"The combination of the three maps where you have a cross section, a overview of the area and the larger context becomes a really strong tool for getting an overview of the area, especially when explaining it to someone new to the project" (Werner)

Bridging over to the sequential mapping session was a challenging balance act, as many interesting discussions had broken out amongst the participants that we didn't want to disrupt by bringing the focus over on the mapping exercise again. We therefore chose to start out by building on one of the on-going discussions related to the uncertainties surrounding the hydraulic aspects of the project, seeking to activate Popowits from HOFOR as the hydraulic measurements are generally seen as a rather fundamental uncertainty in many of the cloudburst projects. He could inform that these measurements were still pending further recipient overview, which would not be ready for some time still, resulting in a decision to set this defining point a little bit delayed from the start on the milestone timeline (pic). Consequently enabling the rest of the milestones to be set in relation to this point, with Trædmark as host of the workshop taking the lead in making sure the rest of the milestones were mapped according to the group's overall considerations.

"Moving over from the contextual map to the sequential we're having a really difficult time. Fumbling around, trying to figure out what comes first in what order etc.. it gives a good picture of how complex it is with these projects.. (Liljan)

However agreeing which of these considerations would define what should come first and in what order, showed not only to be a rather contested issue, but also brought up many principal discussions in regards to accountabilities in between the two municipal departments (city physique and city development). However many of the discussions concerned issues where the final decisions could not be taken within the authority of the participants. For example

"Will city development take responsibility for keeping the strategic overview throughout the process, or is this also something city physique takes over when the project is transferred?" (Gretoft). In this instance It was agreed to bring the question up to the coordination group, with Trædmark committing to the task by filling out an "action card" to remember it by.

As the milestones was plotted on the timeline it enabled the participants to start filling in which and when the other strategic concerns fitted in (hydraulic, liveability, coordination with other project etc.) and could thereby relate it to the overall milestones. There seemed to linger a general indecisiveness around agreeing on the order of the parallel processes, setting up a rough sketch for an overall timeline thus showed to be an effective starting point for coordinating the various departments and their responsibilities in the project. This phase, however, manifested in a rather chaotic and unstructured way, as some of the participants were more concerned with describing previous experiences regarding potential roadblocks for the process flow. Even though this was valuable knowledge sharing, it can also be seen as counterproductive when trying to agree on an overall process flow. However we argue that a more structured approach could be facilitated by having each participant fill out their tasks and concerns in relation to the overall strategies in a more systematic way e.g. by going from top to bottom on the map.

"Looking at this time line, with the arrows going forwards and backwards in loops it shows pretty clearly that we need this kind of feedback loop in the process, that can only happen when we meet like today and talk about these things, for that, I find this format to be a good tool " (Werner)

Seeing that the sequential mapping exercise had instigated many lengthy discussions and went on overtime it consequently resulted in a little amputated last relational mapping exercise. In this last phase of the workshop, we were joined by the department managers from city development (Leonardsen) and city physique (Asmind), who were invited to listen in on this last roundup and partake in the feedback session from the participants. The final organisational map with roles and responsibilities in the organisation we seek to relate the previous sequential mapping exercise with the administrative procedure ("forretningsgangen") set up for cloudburst projects, and link this process to the overall organisational structure. We again sought to bridge the previous and new exercise by taking a hold in one of the on-going discussions, which now concerned the overall economic business cases impact on the process. The map was mounted to the wall and the participants were gathered around it (picture) in an effort to pinpoint where some of the more critical concerns that had surfaced could originate. Stefan Werner from city physique took the lead, utilising the map to illustrate the critical issue of the business case, orig-

inating and relating to the organisational structure (picture). This showed how the map could easily be used to relate specific concerns by the aid of visual elements to better communicate and explain a rather complex issue. Unfortunately we did not get to unfold this issue much more as we reached the end of the feedback session.

This feedback session was overall very positive, with both constructive critique and reflections on the potential usefulness of the format. As we in the beginning of the session was asked to share our perspectives on the workshop and its course, it provided an opportunity to both reflect on what we had learned and point out perspectives for further development. The following quotes from the participants can be said to encapsulate the general responses from the feedback session:

"If we come to these sessions more well prepared the contextual map will provide a good frame for the screening process that comes in the start of the sequence map, as such they complement each other good and will provide a good starting point for filling out the assignment note" **(***Trædmark)*

"Using two and a half hour on Vejlands Allè here in the start has been really good, but I don't know if it will be worthwhile for all the projects" (Nannestad)

In response to this Stefan Werner noted that:

" I don't think using a couple of hours on a project is much, compared to the current state where I can use 4-5 days just writing mails to get people up to date on the project... If they had partaken in this format the next time I would call, I imagine all this information would fall (click, click, click) into place " (Werner)

"After such a session It will make it much easier to go home and fill out the assignment note, as well as we identify the obstacles much faster" (Berggreen)

To clarify this statement Asmind asked:

"So on the level this has now been processed, it will come before the transfer note? So that everybody can get up to date on that?" (Asmind)

"It would make sense to further systematise this into some kind of template, which could be used to fill in the assignment note as the meeting evolves, that it becomes part of the process" (Leonardsen)

To which Werner replied:

"The templates in themselves are not the most important, what I like is that we stand up and move around which creates a more dynamic format" (Werner)

"In our department (city development) we talk about all kinds of coordinative issues all the time, from road maintenance to citizens, without really having anything to relate to, in reality this format makes this much easier" (Berggreen)

As these statements points towards different aspects of the workshop, they all describe how the format created a different and more beneficial setting then what is now practiced. Just bringing the relevant people together and supporting the discussions with visual tools creates a big change in how people interact, while the biggest challenge is getting support from management to actually allow for more experimentation of the current way to conduct meetings.

In the beginning the group seemed a bit reluctant towards interacting with the sequence map, nevertheless it triggered a rather fundamental discussion on the overall processual concerns on cloudburst projects in general. Leading to a valuable knowledge sharing session where many of the uncertainties towards what should be done, when, and concerns around who had responsibility for what part was unfolded. As also Sevaldson points out in relation to this kind of mappings;

"This sorting device allows the group to skip the agenda, as long as one has a theme to investigate. The conversation is allowed to jump back and forth. Jumping in the discussion is done easily because everybody is brought along in the jump by pointing to the timeline. The conversation stays focused on the topic but remains open ended and holistic." (Sevaldson 2013)

It would have been beneficial to have more time to explore the last relational mapping exercise, especially unfolding the nature of the relations and what they meant. However as with all new exercises, future iterations would include these and more adjustments, as Trædmark commented in the end of the workshop.

"It's hard to break people out of the habit of going into long monologue arguments, even when the exercise is to make these arguments more explicit by drawing it out, but like every habit it takes practice" (Trædmark)

Another interesting observation in this regard was how these more activity based meeting formats open up for negotiations on contesting views, which we argue can potentially help seed more aligned strategies in the long run. One good example from the workshop of such conflicting views can be encapsulated by the following quotes:

"The problem is that when all the technical and functional concerns are covered there are no money left for the nice things, like more green and other aesthetic features, this is a big problem for all the proj-

ects, that the economic framework is a roadblock for including these aspects in the projects" (Werner)

With Trædmark responding:

"It is possible to be creative within the economic frameworks in place, we just need to find new ways for how to utilise the co-financing act so that it can also benefit the liveability aspects of projects" (Trædmark)

These two rather conflicting statements show that the framework and the practicalities within the cloudburst issue can (in some aspects) come down to a question of interpretation and applied creativity. As the above quotes points out a rather fundamental challenge of opposing views in relation to economic frameworks, it would be naive to think that mapping out the problem can solve it. However, going into a dialogue/negotiation on how one interpret these frameworks and try to relate this to one's daily practical work tasks, as well as the overall organisational structure can be seen as a good starting point when seeking a common end goal. Grounding this vision in a more holistic approach by relating it to the surrounding organisational frameworks can furthermore show a more creative path to overcoming the many conflicting views and strategies in the process. The set- up and facilitation of these negotiation spaces (meeting rooms), and the formats included can play a crucial role for the further development of what we have coined the "flex room".

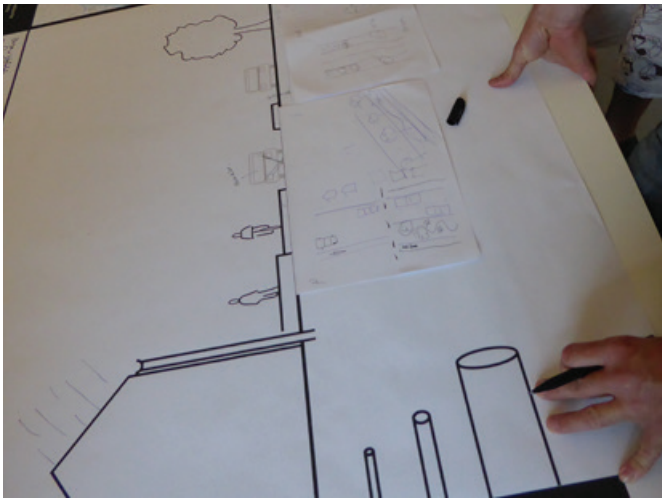
From experimental room to new meeting practices

To move on from these workshop formats experimental room to a more practice oriented everyday meeting room format, without loosing the action based designerly approach to the space, will prove a greater challenge. Changing practices within organisations takes time and effort, which entails continuous commitment and support from influential change agents. As such, this first workshop have been strategically well placed and targeted, a strategy that can be seen as a shared endeavour between us and our key supportive actor inside City Physique Jens Trædmark. The infrastructuring work going into this process has been a continuous effort over several months, the culmination of which have unfolded in the format of above described workshop. This process took a combination of relational work, a good change agent, interviews, observations and a considerable amount of synthesised insight. Nearing the end of our projects timeframe we made the choice of postponing the workshop in order to include the department managers (Leonardsen and Asmind) at the end of the workshop. This can be seen as a tactical move that sought to enable the setting to allow for the experimentations to travel further in the organisation. As such opening up a decision room

where our intervention could either be deemed a useful exploration or a viable approach to further develop. Fortunately both participants and department managers saw it as viable approach, consequently opening up for further development, allowing our intervention to be anchored more closely to the everyday practices of the planners involved in the CCAP.

Relating to the context, and mapping concerns

Drawing the time-line together



The contextual exercise

Writing down action cards to

Werner pointing out where he sees ruptures in the system.

CHAP. 8

ADJUSTING FOR COMPLEX ADMINISTRATIVE PROCEDURES - HOW NEW PLANNING PRACTICES EMERGE?

In our endeavours to aid the Technical administrations to navigate the increasing complexity of cloudburst management we found that planning practices and how collaborative planning is facilitated presented an interesting space for generating systemic design capacity, thus with the prominent questions about governance capacity raised by Patsy Healey in her article on creativity and urban governance we wish to discuss how these endeavours can facilitate new innovative planning approaches:

"What kinds of governance processes have the capacity to release imaginative and innovative activities in city regions? What interventions help to transform governance cultures to generate such capacity? What 'imaginative resources' and mobilising power help to enrich contexts to foster the 'mainstreaming' of successful experiments?" (Healey 2004, 96)

Adjusting for complex administrative procedures - How new planning practices emerge?

Moving past the experimental rooms created in the workshops into a scenario where the proposed methods and techniques are adopted as part of the formal procedures in the organisation, will not only entail substantial development work but also a continued infrastructuring and experimentation process, where both planners, managers and different administrative layers will need to be involved. Fitting the formats into the frameworks of the organisation means not only practice change for how the planners work with the issues of complexity, but also how the overarching administrative layers understands how these issues are most effectively addressed. Seeing that opening up for experimentation in clearly defined instances like course modules in Frederiksberg and selected phases of a process in Copenhagen are a long way from committing to any wider reaching change programs; We would argue a strategy along the lines of Head (2008) "the pathway most commonly adopted in this instance is mediated dialogue, seeking to explore common ground about longer term goals and directions, and interim (on-going) steps for moving forward together (Head 2008)

A recent Australian government discussion paper on wicked or intractable problems (APSC 2007) suggests that the general aim of governments when addressing intractable problems should be to "achieve sustained behavioural change through collaboration as a response to social complexity" (Head 2008, 108) We would argue that we have seen an experimental model for collaborative response to social complexity when following the Frederiksberg group, and which possible long-term benefits we have also argued for in our work with Copenhagen municipality. Emphasising that new processes and thinking are required, is however insufficient as these are often stumped by factors outside the scope of the problems themselves, these factors are aptly described by Head (2008) in the following:

"In some circumstances, not all leaders wish to adopt a problem-solving stance, with attendant risks of failure. Some prefer to steer towards calmer waters rather than tackle the wild rivers. In one sense, this is simply to recognise two ongoing truths of public policy – the inherently political nature of decision-making, and the impossibility of resolving all problems through government activity" (Head 2008).

In the case of the CCAP, this can be exemplified by the many popular strategies for liveability and sustainability promoted as solutions by the politicians, and the increasing amount of external consultants contracted in order to solve them. It is here important to acknowledge the fact that "It is too easy to blame the risk-averse organisational culture of public agencies for our lack of innovation"(Head, 2008).

We argue that in the case for public innovation the issue of risk-aversion is especially relevant to consider when it comes to suggesting systemic methods of a more problem seeking nature. As Kolko (2010) points out; "reflective and messy synthesis processes are considered a "waste of time," as they aren't positioned as actionable or immediately predictive (Kolko 2010) Further arguing that "these problems are roadblocks to innovation, and illustrate a deep disconnect between the core process of insight development and the billed process of product development (Kolko 2010). Along these lines we argue that creative problem seeking processes belong as much in the early planning stages as solution seeking processes in the later, and that the two should be seen to complement each other and be side-lined rather than separated in an on-going and dynamic planning process where uncertainty and complexity are constant factors.

From the onset of the project, we never had the goal of producing a finished generic tool applicable to all sorts of complex problem solving situations, rather we seek to infrastructure new learning perspectives, with focus on increasing the threshold for designing with complexity in the municipal network structures currently struggling to coordinate projects and accentuate a way for innovative solutions in CCAP. We therefore acknowledge that 'design is never done', because organisations now operate in an environment of constant change, where the challenge is not how to design a response to a current issue, rather, how can we design a means of continually responding, adapting and innovating practices? We seeks to infrastructure not only formats for effective processes, but the tools, skills and organisational capacity for on-going organisational change. We have sought to facilitate such by directing attention towards the systems design, as we intend to increase the planners awareness and means to reflection in action in the spaces set up for planning the urban landscapes. As Healey argue on the notion of building the capacity for imaginative governance "The processes and cultures of urban governance cannot be changed by 'formulae' " (Healey 2004, 98) rather than formulas for how to build capacity, as is often developed by consultants and equally the outcome of our previous project "Skyplan", in this project we seek to facilitate learning more along the lines of Schön's (1983) double loop learning perspective where not only the action strategy is approached, but further to influence the governing variables or the espoused theories and how they are approached (Picture). In these endeavours it becomes more important to infrastructure new methods for dealing with the current low resolution of the multiple plan elements required to implement CCAP within the municipal organisational structure. Therefore it makes sense to focus capacity building around complex system oriented planning issues, rather than presenting a finished planning tool. The focus on problem setting rather than problem solu-

tion, is thus core to approaching wicked problems in the municipal setting, as we would argue that; all of these settings demand a holistic approach, a level of systems thinking, a focus on individual behaviour, and the orchestration of a range of different design inputs (Burns et al. 2006). We see, that in the TEA the plan-hierarchical level is still in focus and of main concern in relation to the cloudburst adaptation plan, which follow a classical rational planning structure. However the networked governance structure is equally steering how the projects take form, which regulations needs to be addressed immediately and which priorities are given in the specific cases; Creating a mix of bureaucracy and network governance where ad-hoc planning groups form and develop pivotal responses to pressing needs. One of the noticeable observations during the meetings and workshops we attended/hosted, was how the planners would strive for more imaginative and innovative planning activities in the projects, to foster interesting and inspiring recreational solutions from CCAP as has been the promoted vision and focus of the political and architectural plans. However the budgetary framings and regulatory prominence of the solutions creates difficulties in releasing this energy and equally the processes become slow and heavy by the lack of overview in the narrow scope for redesign, consolidated with firm planning frames.

The politicians and directors has the ultimate responsibility for the planning as a whole, but the politicians did not consider the practical issues, only the creative potential of the projects. (Interview: Madsen 2016)

Therefore we argue, as new technologies and urban strategies emerge, the regulatory system often become deficient to handle transition periods, where new ways of designing roads and parks, must translate into both planning practices and regulatory systems over time. An interesting argument from the landscape architect Stensballe from CEA in this respect was:

"I think the whole narrative of the road needs to change, so we can start to address these infrastructures in another way" (interview. Stensballe 2016)

This came as a response to the difficulties they are facing in the Roads and Park department to actually redesign the road infrastructure to deal with cloudbursts, something that was also highlighted in the coordination group of TEA. Here the boundaries of legal frameworks needed to be tested to understand the physical framework for all the 300 projects. Therefore we see evidence that CCAP cannot be managed within the existing boundaries of the bureaucratic system. Rather, as Engberg (2016) suggest, we should focus on the mechanisms to structure the rules of the decision-making game in complex network structures.

"Networks, then, are in part a response to the insufficiencies of NPM in the face of complexity, mission expansion, government de-legitimization, and knowledge creation needs that are posed by wicked problems. Networks provide flexible structures that are inclusive, information rich, and outside the scope of direct bureaucratic control. These structures allow public agencies to manage public problems by leveraging expertise held outside its scope of authority" (Isett et al. 2011, p. i159)

The resiliency of our systems depends on these governance structures as a current challenge to actually make changes in the city. This discussion relates to how planning systems are subject to what Callon (1998) defines as planning frames. These frames are represented in the different infrastructural functions such as roads, parks, and sewerage where the governance system has been framed around stable translations of these functionalities. The infrastructural failure, caused by cloudburst floods, highlights how these frames and consequent boundaries, previously stable, are now challenged. These perspectives directs attention towards new forums for how path dependent infrastructural planning may be re-oriented, when established boundaries within the planning system are subject to overflow and need to collaborate in new ways.

"Complex problems cannot be addressed from a single point of view, and are rarely the sole responsibility of one department, set of expertise or knowledge silo, the design process creates a neutral space in which a range of people, whose expertise may have a bearing on the problem in hand, can work together." (Burns et al. 2006, 20)

As the administrations of Copenhagen and Frederiksberg municipalities has, and are undergoing significant organisational changes within their technical and environmental departments, this restructuring process coupled with the new and unchartered terrain of the CCAP has consequently resulted in what could be described as a substantial amount of uncertainty based indecisiveness, enclosing the planners in their work on cloudburst projects, but equally presents a window of opportunity for the planners to take action and reframe some of the out-dated constellations - here we hope the SOD framework can assist the necessary change and help the recreational and sustainable initiatives to work in synergy with liveability visions.

Stabilization of the SOD framework

As we have focused on urban planners and how they navigate the new and changing landscape of CCAP in correlation with their daily work tasks constituted in the municipal systems, a considerable part of our infrastructuring work has been concerned with suggesting alternative methods for how they can relate to, and work with complexity to approach uncertainty planning in more visual workshop formats, while ultimately strengthening the capability for collaborative intervention in the current organisational frames. However the translation processes to stabilize the network around the SOD framework and rich design space is still very fragile within the network of actors constituting CCAP. To gain support and momentum for the endeavours and mobilize new practices for collaboration approaches, more actors need to be enrolled in the network. On the other hand you could argue that we have sought to destabilize the network around current meeting practices and ways of engaging wicked problems with check lists and linear value chain procedures. Thus by thoroughly instigating different planners perception of how the system could work better and staging new arenas for problematizing systemic relations not currently running according to ambition we open up for the planners SOD capacity. (Show network figure)

Through exploration of different problem settings and perspectives on what constitutes the complexity of implementing CCAP we seek to translate the various problems and needs into new problem setting formats. These connect to the strategic level of the administration's efforts to interact on a more detailed and visual level, when assigning the cloudburst projects, from the Climate unit to the implementation departments. Furthermore we challenge how the interdepartmental meeting formats can benefit from formats inspired by SOD, which has been translated through multiple intervention/interaction settings as the project is not delimited to a design phase in the development of SOD formats for the organization, but should rather be seen as an on-going process of alignment between planning contexts and partly conflicting interests (Star & Ruhleder, 1996). These can be perceived as crucial moments of translation, where efforts are mobilized through bridging interests, gaining allies and enrolling key spokespersons in the network. The work formats will however not mobilize themselves further into the organisation without facilitating new problem settings and thereby invite the chance of enrolling actors, ultimately stabilizing around the existing procedures of cloudburst management. As such we have experienced several abrupt destabilizations of the collaboration around the experimental work formats, while the most effective response to this was seeking to transfer ownership and not make the intervention our attempt to sell a perfect model or a big design solution, but to incorporate several of the planners own

visions, consolidated by ethnographic observations and interview statements. Thus we follow the notion that

"participation in the process gives stakeholders ownership of a vision and helps champion the chosen direction. Leaving the participants with the tools and capacity to continue to adapt and innovate means not only that organisational change will continue to happen, but also that it can happen alongside that organisation's day-to-day work." (Burns et al. 2006, 22).

In so doing we argue that facilitating the existing elements day-to-day problems like the Checklist, hydraulic capacity/effects and environmental assessment must be the focal points in the design intervention to create stakeholder ownership. Therefore using SOD frameworks to facilitate more visual and comprehensible system maps is only half the story, as facilitating the contextual relevant discussions with flexibility yet guided intent to intervene better in the organisational structure became the real design challenge; The balance between a too rigid or too open format for planners to interact demands for a more participatory approach to the design challenge which was not achieved in the timeframe of this project. Yet by following the perspective of action learning, we seek to build capacity and encourage that the planners take ownership of the presented SOD framework, to manipulate the work formats and adjust to changing needs in the administration of projects. We therefore advocate for further experimentation and imaginative exploration of how more visual mappings of organisational concerns can contribute to working with complex problem settings, and translate these to comprehensible intervention models both internally in the organisation and externally in the urban planning processes.

Discussion on the SOD frameworks applicability

As our use of the SOD framework along with our general approach was both an explorative and interventionist approach, evaluating if we have succeeded in employing the framework in a meaningful way within the context of the CCAP is essential for the discussion. Separating the approach into exploration and intervention will however prove difficult, seeing that it has been an entangled process of infrastructuring methods and searching for fits in the organisations. For clarification purposes we have instead posed the following questions to be accounted for; Do we accomplish the effects we promote the SOD framework capable of, and what does it actually entail to do this within the scope of this project, and the context of the municipal planning system? To answer this, it becomes necessary to address how the concept itself has been communicated, and consequently practiced by the planners in the explorative moments of the workshops.

To first address the point of promised effect, which comes down to a question of how the SOD framework promote holistic practice through its methods and techniques one need to focus down on how these has been applied by the planners involved. The method of Giga mapping is here central where the activity of 'drawing together' (Pollastri, 2013) is seen as a simple yet powerful technique. It can be discussed if drawing together cannot also be performed without the framework of the Giga-map? As this certainly is possible it would not readily include the ordering and interlinking of information that the facilitation of Giga-maps instructs. This type of "visual dialog" furthermore fosters a more spatial understanding of the projects, why combining differentiated maps, like we did in the workshops, are helpful in bringing out tacit knowledge, as they aid patterns to emerge and subsequently be understood, it is the co-creation of the Giga-map we argue makes up a holistic practice.

The rich design space and very rapid learning process of Sevaldson (2012) are frameworks that have been developed specifically for the purpose of making sense of complexity, albeit they are conceivably more inspirations than recipes. Understanding that co-design and mapping exercises ultimately comes down to mindset and setting, the dynamic of the format relies as much on the subtle orchestrating of the rooms and guiding of the participants as the content of the pre-prepared maps. Setting up these spaces, preparing the templates and facilitating the processes are as such ultimately linked to the practice we argue planners adopt to better address complex urban projects. It is important to note "that it takes a considerable amount of time in these spaces to achieve the needed comfort to utilize this value" (Paulsen 2013)

We have argued that the current approach and practices of how planners address the complexity of the CCAP are suffering under a rigid and compartmentalized framework, to account for how the systemic approach differ, we find the process of 'sensemaking' in relation to design thinking useful (Kolko 2010; Sevaldson 2011). Kolko refers to sensemaking as "a motivated, continuous effort to understand connections (which can be among people, places, and events) in order to anticipate their trajectories and act effectively." (Kolko 2010, 4). The systematic process facilitated through the pre-prepared templates (contextual, sequential, exploratory and relational) are examples of such a sensemaking framework, that is both flexible and iterative. The process of synthesis "have been continually referenced as critical in sensemaking organization" (ibid), in which "the most basic principles of making meaning out of data is to externalize the entire meaning-creation process" (ibid), exemplified by the Giga-mapping activity. Guiding such sessions takes a certain skill set and in-depth understanding of the underlying principles, not only for the methodological framework but also of the organisational frames in which the session is carried out, why we argue internal capacity building and new planner roles are needed.

When presenting our approach to our collaborators we chose to speak in terms of direct applicability rather than future probability in regards to capacity building and organisational changes, why we also chose to design our workshops after their current needs rather than how we saw the potential 'future fit' (Hutchins, 2016) of the SOD framework. We further strived to communicate not only a method but a whole framework (SOD), getting access to and interesting relevant stakeholders has nevertheless implied proposing it in its methodological form. e.g as the rich design space and Giga-mapping. We argue that in proposing methods for managing complex planning issues there is also an inherent danger of both simplifying the challenge, as well as presenting a whole approach as a plain tool rather than a way of working and relating to complexity as a practice. Circumventing this potential pitfall will however entail a prolonged exploration and infrastructuring phase were not only time and resources are allocated but also planner roles are taken up to consideration and reconfiguration.

Will a systems oriented approach contribute to create better cities?

As we have focused attention on opening up the planning frames to the pressing needs for resilient urban infrastructure, we should not neglect the important efforts and necessity of the current planning constellations, which ensures that urban development is considering the accessibility, operational, environmental and health related concerns of managing urban life, traffic and water on the same surface in the city. Furthermore, creating good and resilient urban spaces depends on the social and physical interactions that it facilitates. Creating synergy with hydraulic and social planning poses opportunities of new approaches to urban planning, but it also opens up a debate of what should be prioritized if technical/social barriers emerge, or departmental timelines and project scopes clash; What future states are then at risk? Even when projects are in place, particular groups might disrupt established project frames and "call to combat" with technical, environmental or social concerns not opened up for earlier in the process. Thus the capacity for creating good cities depends on the interactions of multiple professions and perspectives in setting up good systemic relations for creating urban life. Following the lines of 'A metropolis for people':

"The municipality can not create Urban life. But together with citizens, site owners, business life and experts we can create a city which invites people to an urban life." (Copenhagen municipality 2009)

It is thus a shared responsibility between the technical engineers, political representatives and urban planners to facilitate such frames in collaboration with citizens. However, engaging multiple actors in strategic discussions about the future urban life and technical requirements simultaneously requires the development of a common language and systemic framework. Following Latour; visual language is able to make information mobile, immutable, presentable, readable and combinable (Latour, 1988). This is not to say that technical problems are solved or consensus about urban space will arrive from drawing and mapping the urban elements in combined efforts. Rather, we would argue that current work formats create a tenuous frame for drawing different future states and present a fragmentation of relations between the physical context, the systemic constellations and the urban life. In this regard Polanstry argue that "*we ought to think of cities in terms of dynamic networks that connect different layers of the system, and acknowledge that small decisions that are made in the present might have a significant impact in the future on different parts of the system.*" (Pollastri 2013 , 2) In making visible and expressing future concerns, pace layers in the city and processual approaches in collaborative

settings, we might move away from misaligned infrastructural plans, and be able to communicate why critical consequences might arise from certain administrative procedures or specific interpretations of the space, as complex future states are ill represented in verbal problem settings. Thus unfolding the systemic relations and contextual Giga maps visually can facilitate a more rich setting and language for creating frameworks that support dynamic and creative development of cities, rather than seeking to tame the complex problems of creating good urban life. We realize that cloudburst adaptation, in its hydraulic overflow sense, is 'tamable' where solutions are merely complicated to solve, while as we follow the argument of Rittel and Webber (1973) the social context that these solutions/designs are situated in make them wicked, as they can never be seen as end solutions, rather, the social criteria for liveability are never solved. At best they are only re-solved over and over again. What is important in relation to this iterative process where social concerns integrate in the hydraulic budgets and planning processes, is how we develop not only the solutions and actions plans to improve them, but equally the systems that reproduce these same responses to problems.

Creating better capacity to manage the systemic barriers for innovation, might thus be a lever to restructure organisational practices for better alignment between planning domains and ultimately also the domain for citizen inclusions, which is equally compromised by a lack of overview and communication about project processes (Hoffmann et al. 2015) as a local resident explained after a citizen inclusion process on a cloudburst project in the outskirts of Copenhagen:

"How could the process have been better? They (the water utility and planners) should explain what the process is about and how the different phases are connected. Make the difference between citizen inclusion and the level of concretization clear. They are conflicting. Initially everything is open, but the further we get in the process, the more it closes down, and the concretization takes over. It's about focusing in on measuring the compromises against each other. Citizens need to understand that it's about compromises. There are some limitations and this could have been more clear" (Hoffmann et al. 2015, 103)

This statement frames how these processes perform when they meet the outside world and the actual end users who should ultimately interact with and benefit from the projects. More interestingly it points precisely at the insecure planning process that evolves out of a misaligned planning process.

"It would definitely be of great aid if internal coordination was better facilitated in relation to communication with citizens. Just to map out some of the branches of the different departments critical considerations, would be very important for the Climate

unit to manage this extra layer of complexity with citizens inclusion." (Trædmark 2016)

Following these criteria, we should not only focus attention on planners capable of navigating in the departmental requirements and new implications of CCAP, we must equally utilize our capacity to communicate visually and map out critical concerns with end users, to open for a space where the urban life and the planning system is thoroughly related to another and better connected. This requires more creative and reflective approaches to the problems at hand; what we argue is an open invitation for more holistic design practice.

CONCLUSION

This thesis has sought an answer to the initial problem formulation by investigating what challenges urban planners are experiencing in relation to the implementation of CCAP in the municipal governance system. Furthermore, how following an infrastructuring approach the explorative research is combined with efforts to intervene and experiment with SOD frameworks to aid the technical administrations of Frederiksberg and Copenhagen in generating systemic design capacity, and tools to navigate increasing complexity of collaborative planning.

Through an extensive field study with interviews, meetings, observations and workshops we found that urban planners in both technical administrations experience, that cloudburst adaptation require more extensive methods of coordination and knowledge sharing to address new complex problem settings. The challenges relates to multiple administrative layers, as previously more autonomous and divided urban development professions, like sewerage, road renovation and local area renewal, are now obliged to co-create or at least coordinate their interventions in the city, with the arrival of the hydraulic masterplan and a new co-financing act to utilize hydraulic interventions for recreational purposes.

These interventions must therefore both relate to political commitments like parking spaces, waste reduction, bike infrastructure and more citizen inclusion while simultaneously figure out the technical hydraulic specifications and regulatory considerations of nature preservations and environmental assessments. Challenges leading to frustrations, as it become increasingly complex to manage and gain an overview of the different critical considerations and coordinating roles and responsibilities in the development of projects. As we have explored how these problems are approached in planning meetings and administrative procedures, we see that addressing the complex problems in relation to aligning expectations, visions and practice in and between the involved departments require new planning practices.

We found that these new problem setting require a more visual land systemic approach, where the complexity of the problems are not reduced to long text documents or one hour meeting discussions between planners with very different knowledge backgrounds. Therefore we have sought to introduce a methodological framework (SOD) that is beneficial in bringing together many elements on different levels and help reveal relations and ruptures between these, so planners can better understand and navigate complex urban development processes.

Based on our workshops and concurrent feedback we have proven the approach useful for facilitating a more systematic and effective process that complement current procedures, and have as a result gained

support for further development with our collaborators in Copenhagen municipality›s technical administration. In short, we believe that the SOD approach to mapping can generate capacity for unfolding the potential of planners to navigate in current complex planning constellations and urban realities, to create better cities in collaboration with stakeholders rather than to frustration of both planners and local residents.

PERSPECTIVES

This project has investigated how the complexities surrounding many of the projects of Copenhagens Cloudburst Adaptation Plan is experienced from the vantage point of the two municipal planning systems in Copenhagen and the planners involved in the various projects. As the research has both concerned the organisational frameworks surrounding the projects, and the practices making up how these projects are carried out, the focus has come down to how practice change influences systems change and how long term capacity building might lead to such larger changes. We argue that even though such changes can not be directly linked to the interventions carried out within this projects, these have been valuable explorations of the embedded potential of systemic thinking and design practice as ways of navigating complex issues that at the same time can have a systems changing potential.

Through our fieldwork and in the workshops we have encountered various planning perspectives, where we have observed that the municipal systems require that the planners employ different professional roles to navigate in the municipal system and execute CCAP. In relation to how we observe new planning roles take form, where the planner as facilitator of public innovation is highly promoted, we follow the perception of Sehested (2009) who offers a "General Framework for the Hybrid Planner" (ibid.) describing four role variants; professional strategist, manager, market planner and process planner, where she investigates the ideal of the collaborative and communicative planner as a binding characteristic for the "new hybrid-planner role" (ibid.). For the complex planning issues investigated in this study we find the role of the process planner most urgent to capacitate, as it requires not only knowledge about urban development but also about processes involving a large number of participants, which the planners we have engaged with find difficult under current conditions. This correlates with Sehested`s study (2009) revealing that planners found the process planner role difficult to perform "because they lack the competences to fulfil it" (ibid). We thus argue for the relevance and need of opening up to new more holistic approaches, exemplified through the SOD framework, and as a perspective for further work within this direction we propose a new role for the hybrid-planner; the role of 'systems architect'. This is inspired by Mayer and Rechtin (1999, 2000) who

have coined the term 'Systems Architecting' (Maier and Rechtin, 2000, Rechtin, 1999) in describing a management style today typically associated with complex IT development processes and software systems. "Such role is working along with the traditional project managers not to replace them but to supplement the hard logistics with more artistic, intuitive and holistic perspectives" (Sevaldson, 2011). We suggest the role to be seen as a bridge between the professional strategist and process planner, which can be linked to the gap between general vision and implementation in the fragmented and sequential planning system of CCAP. Why we argue establishing new meeting spaces and formats as important arenas of development for planners to practice systems oriented design methods and techniques that in the long run can enable better organisational alignment and communication channels with the external stakeholders.

To facilitate Giga-mapping sessions in a more practical communicative format and address the lack of dedicated project rooms for rich design spaces, we have throughout the project reflected on how information from the proposed workshop formats can be easily manipulated, harvested and shared digitally. In this regard we have noticed the Smart Boards, placed in most of the meeting rooms in TEA as a great potential to digitalize Giga-map formats and make it more practical to approach in a busy everyday setting. Thus to infrastructure the role of the systems architect in a highly digitalized world, it would be wise to develop more smart-technology around this approach, even though paper usually allows for a more informal setting. This was therefore brought up after the workshop with TEA where it was agreed that future development of the format was in the interest of the planners. This leads us to our final perspective of digital and visual citizens inclusion, as we in the beginning of this project investigated the potential of bridging more visual municipal planning approaches with the growing ambitions of creating digital citizen inclusion platforms. In this regard Realdania have sponsored a grand scale citizen inclusion and municipal coordination platform called 'Samvejr' currently being developed by anthropologists of Gemeinschaft and the digital designers of B14. As we approached both of these organisations to look for potential partnerships, and gained positive feedback on future collaboration opportunities, it could make way for a new approach in urban planning where digital drawing from citizens and planners could merge in a new setting for drawing cities together and possibly in the end, make future cities better.

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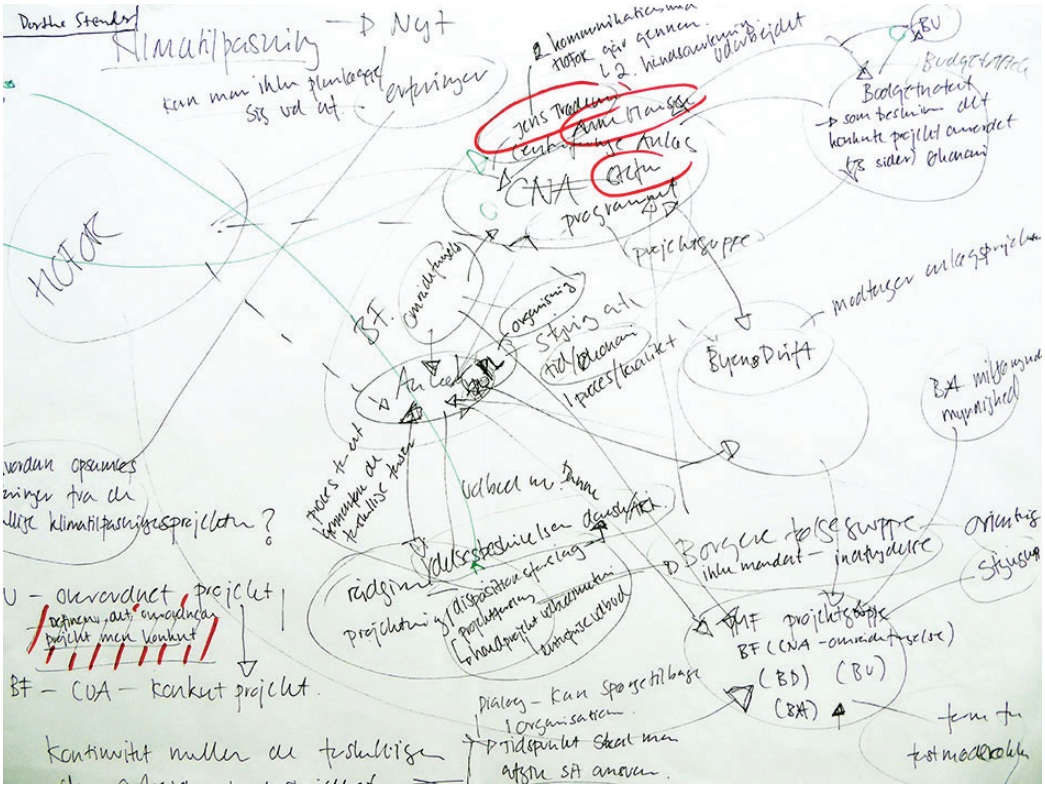
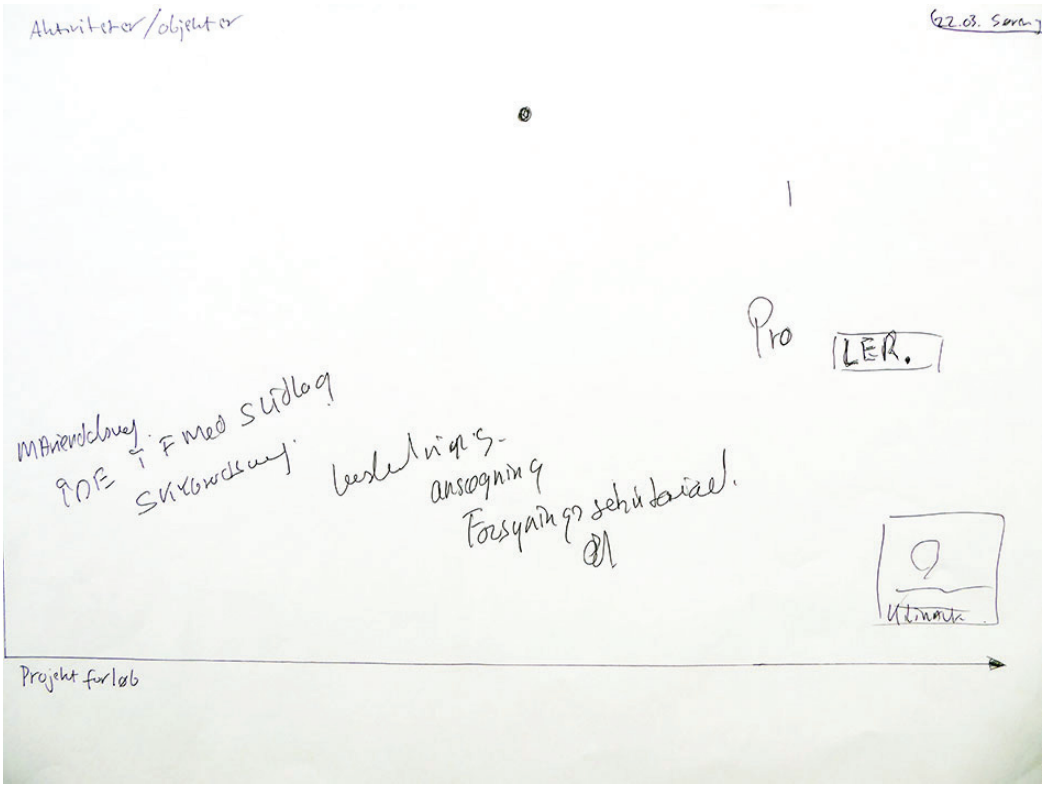
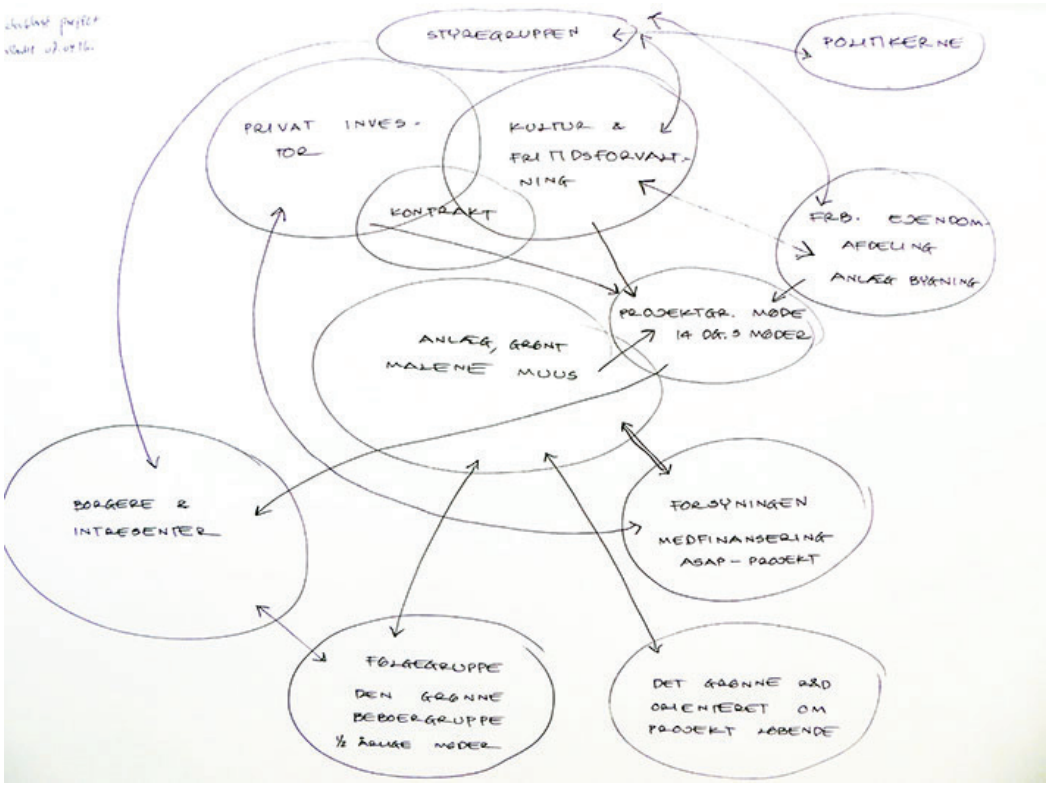


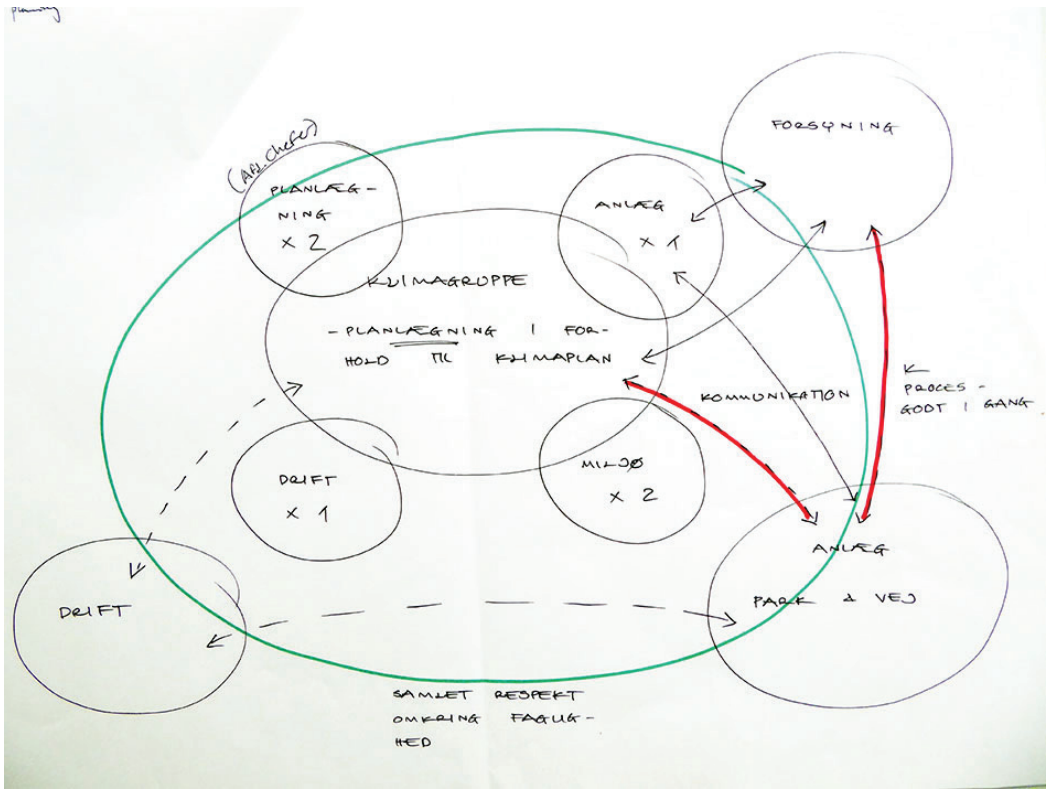
Dorthe Stender, Project manager, Copenhagen Municipality , 16.03.2106



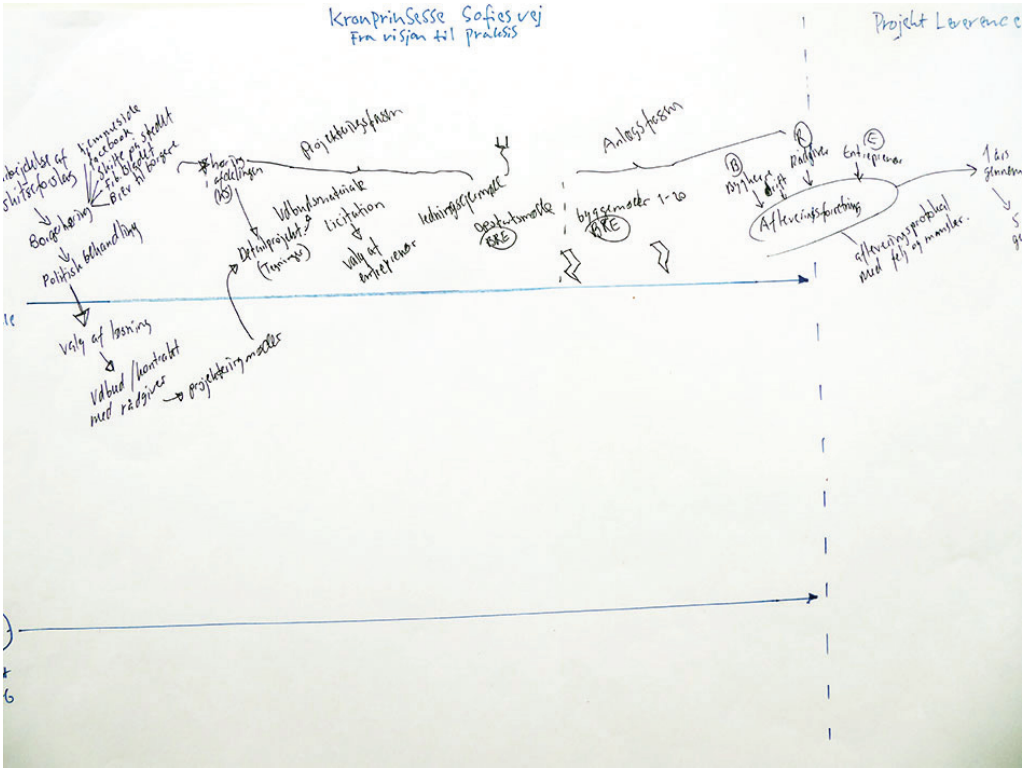
Søren Kim Jensen, operational manager ,Frederiksberg Municipality 22.03.2016



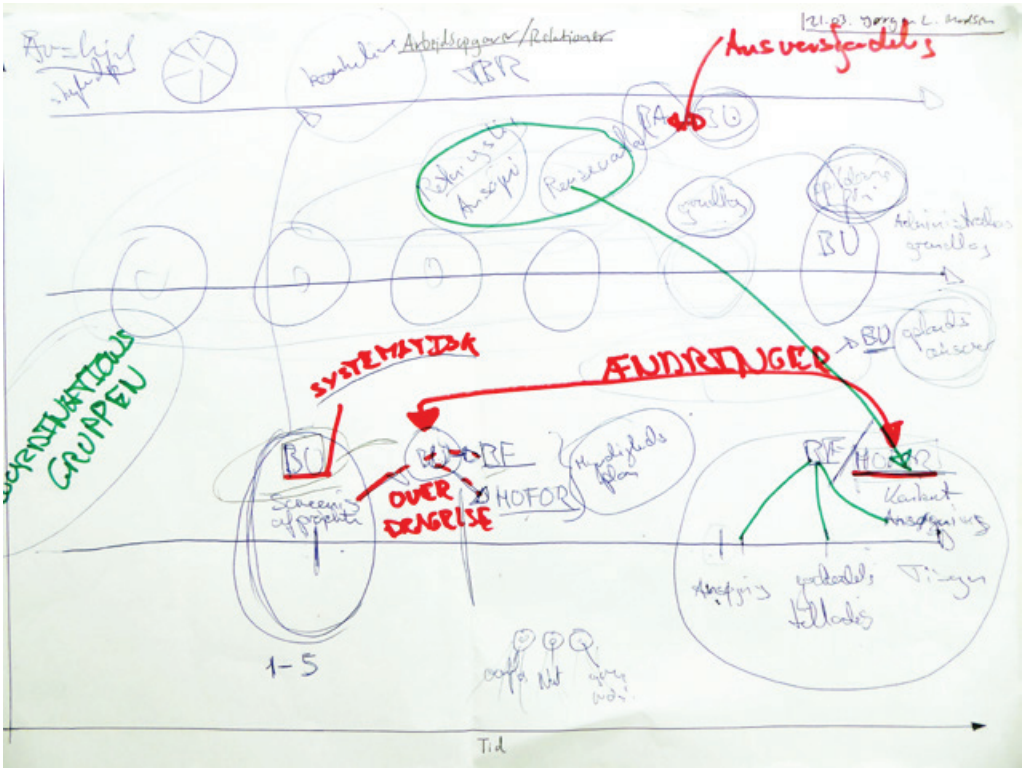
Malene Stensballe, Project manager, Landscaping, Frederiksberg Municipality, 07.04.2016



Malene Stensballe, Project manager, Landscaping, Frederiksberg Municipality, 07.04.2016



Lars Jørgensen, Project manager, traffic planner, Frederiksberg Municiplaity, 22.03.2016



Jørgen Lund Madsen, Head of Unit, environmental impact study, Copenhagen Municipality, 21.03.2016

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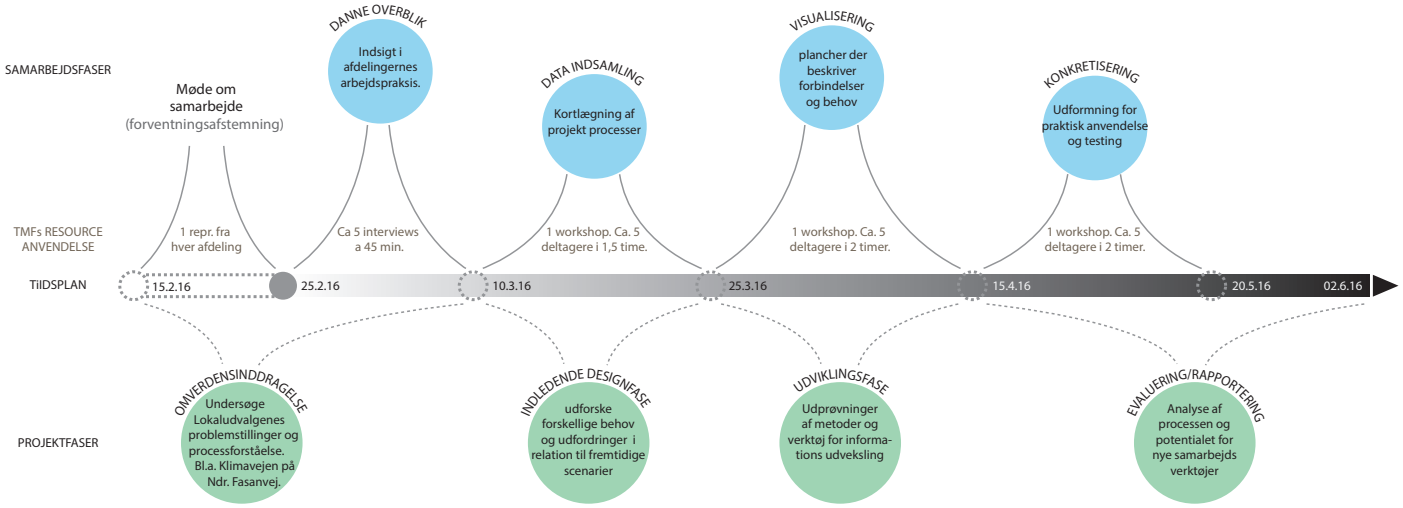

Initial collaboration proposal for Copenhagen municipality, early research phase, February 2016

Reflections on the process:

Our master thesis project has been a rich learning process in combining design and systemic thinking in complex and intriguing problem settings where it has been very necessary to adapt to different deviations in the original project plan.

The initial aim of the thesis was to collaborate with the municipality on tackling and seeking to solve some of the pressing needs related to cloudburst adaptation, where we strategically placed our project focus as our previous project had given access to contacts within the municipality and interesting insight that we could use to focus our efforts and gain a starting advantage for digging deeper in the problems of alignment between departments in the municipal planning system.

The project planning consisted of a broad literature and interview study, where we sought to gain access to interesting developments within citizen inclusion, urban development competitions Copenhagen Municipality and Frederiksberg municipality to see where we could hook our project interest of more visual and inclusive planning approaches to the field and the real work related problem settings that we could encounter after our studies.

We succeeded to translate our interests and proposed methods of systems oriented design through several mails, interviews, phone calls and meetings taking up a great deal of time as we would focus on getting the right collaboration opportunities from the beginning. Here we could have been more direct and contact with phone in stead of mail, however with a very new methodical approach to the problem field, and an awareness that we would have to interest the right actors, we played it more safe but got to work in the end with both Municipalities of Copenhagen. This also presented a dilemma on where we should put our academic focus in the report. We chose to leave it open, so we could see where the most interesting opportunities would arrive.
Our theoretical approach of infrastructuring and ANT gave us a good understanding of how one should build ideas through enrolling multiple actors and the art of interesting good spokespersons for our project, which proved crucial in the final steps of the research.

The challenge of applying the SOD framework was mainly on actually getting time from the planners to experiment with such practices, as they are booked normally months ahead with meeting schedules. The best approach in this regard was to align our project scope with work tasks already on the table. So In Frederiksberg we applied our workshop in a phase where the group had already set time of the figure out how they would approach the project, and could therefore se the benefit of opening up for new methods and a more structured work format. In Copenhagen we equally had to strategically place our workshop to fit the assignment of projects between the Climate unit and the Cloudburst Implementation Unit.
A crucial learning in regards to co-designing these working formats, as was the intention from the beginning, was primarily to get clear time resources allocated in the agreements with the management level to avoid misalignment of expectations, as we several times experienced that time was not set of to actually engage in our project proposals.
The biggest difficulty for our research have therefore been the role of the outsider in consultancy work, where we would never really know exactly what was going on in the internal work, that we wished to aid. Therefore it could have been better to actually do some long-term observations and co-working

inside the organisation. A constellation that was proposed by one of the key coordinators of the cloudburst projects, but a week after cancelled as he got a new job. Thus we understand that it is dangerous to have a project to dependant too much on individual persons. However in the end it was one individual planner who really stepped up and wanted us to carry out our proposed ideas, which lead to a successful workshop in the end of the project. This took away a lot of focus from the written report, consequently making the quality of the final paper lower. However we would argue that the learning outcome of doing action work was much greater than what we could have learned in the books and in the writing process. And more importantly it actually lead to a future implementation of the work formats we have worked on in thes project, allowing for actual organisational change in relation to Systems Oriented Design practices

Arild M. Kalseth & Sebastian Bovbjerg, 2016