Stakeholders, Roles, Workflows and Requirements

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D2.3 STAKEHOLDERS, ROLES, WORKFLOWS AND REQUIREMENTS REPORT

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1 INTRODUCTION

1.1 Scope

Decisions makers in cities and urban areas continuously have to make important decisions to react or proactively identify new challenges, problems and conflicts. But as cities and urban areas have become more complex, well-founded decisions have also become more difficult to make. Decisions cannot be purely based on intuitions but require a basis for assessments, which put great constraints on decision makers and decision making procedures in terms of expertise and knowledge. New technology and sources of information can, however, support decision makers and facilitate the decision making procedures, but at the moment these possibilities are not being leveraged to a greater extent in urban governance.

The UrbanData2Decide project aims to facilitate the above mentioned decision making procedures by designing an integrated and multi-dimensional model which combines vital information sources in two decision support tools: The *UrbanDataVisualiser* and the *UrbanDecisionMaker.* The UrbanDataVisualiser aims to collect, aggregate and structure social and open data in a functional design, permitting decision makers in urban governance to extract the information they need, while the UrbanDecisionMaker aims to integrate expert evaluations using multi-round consultation techniques.

Together the UrbanDataVisualiser and the UrbanDecisionMaker are thought to support decision makers in urban contexts in order to make well-founded decisions in urban governance. However, with a specific focus on urban governance it is of great importance that the decision support tools actually meet the needs and requirements of urban decision makers, and also specifies who the urban decision makers actually are, and which decision-making situations they face.

In this report stakeholders analyses have been undertaken by the UrbanData2Decide team in order to survey relevant stakeholders in the areas of urban governance for the development of the two decision support tools. As a part of the analysis, the main roles, workflows, experiences and requirements of relevant stakeholders have been mapped out in three distinctively different case studies in the cities of Malmö (Sweden), Copenhagen (Denmark) and Vienna (Austria).

Each case study has a specific focus on a pre-defined topic. The case study conducted in the city of Malmö focuses on urban safety and security, relating to how decisions are made on a proactive and operational level. The case study conducted in the city of Copenhagen focuses on municipal spatial planning, including information on how decisions are made for a longer period of time in collaboration with the citizens. The caste study conducted in the city of Vienna presents ten minor

examples on how the UrbanDataVisualiser and UrbanDecisionMaker could be leveraged in ongoing, and future, projects in Vienna.

1.2 Disposition

Deliverable 2.3 will outline stakeholders, roles, workflows and requirements within urban decision making processes. Initially stakeholders on a general level will be investigated, focusing on the transition from 'government' to 'governance', a shift which has had a great impact on decision making processes in urban areas.

Following the investigation of stakeholders on a general level the three different use cases will be presented individually. The case studies in the city of Malmö and the city of Copenhagen have different focuses but follow the same structure to outline common similarities and differences. The case study conducted in Vienna outlines important features and challenges in urban decision making processes.

In the final chapter each case study is summarized and some general conclusions are presented based on the results from the cases studies.

2 STAKEHOLDERS AND DECISION MAKING

2.1 Investigation of Stakeholders on a General Level

On a general level, a stakeholder is an individual, group or organizations that have an interest in or is affected by an organization's plans and decisions. From an urban decision making perspective there can be a wide range of possible stakeholders, such as citizens, property owners, corporations, NGOs, political parties, but also different administrations within a local authority as well as international policy makers such as EU. Different stakeholders have different influences and power to affect urban decision making. The transition from 'government' to 'governance' is one very important shift in urban policy and decision making procedures which may hamper transparency in decision-making for some stakeholders but not for others. Furthermore, the influence of international organizations such as EU affects the freedom of action for actors on both national and local levels. Different stakeholders have always had different influences and power to affect urban decision making. The shift to a 'governance model' does not change such power relations, but in many cases it has made them more invisible since decision-making becomes more informal, complex and difficult to follow. Consequently, different lobby groups emerge that represent various stakeholder groups without

being visible to the public. On the other hand, and which in many cases can be viewed as counter movements, social media has become more and more important for public opinions and social mobilization.

In urban decision making, and in many cases, stakeholders have opposite positions and advocate different solutions but have difficulties to clarify more in detail what the different positions are based on, and what the consequences can be. In other cases, stakeholders can have difficulties to grasp complex urban processes and therefore need to be supported by methods and tools that help them to get a better overview, as well as to distinguish important aspects of the current issue. In both cases, visualization of urban problems, stakeholders and decision processes is an important path to tread, but equally important is to develop platforms that can clarify different positions, and in relevant cases to enable collaboration across organizational borders.

2.2 Boundary Objects

As mentioned in the previous section, collaboration across organizational borders has become increasingly important. Complex projects demands different specializations and perspectives, but it also puts new requirements on the collaboration. Different organizations bring their own norms, values, time frames and interests into the process, which can make it difficult to create a common understanding (Phelps and Reddy, 2009). In order to overcome these different interests, a common basis is needed to support collaboration.

The concept *Boundary objects* was introduced by Susan Leigh Star and James R. Griesemer in a 1989 publication. Boundary objects can be described as artifacts that allow knowledge, viewpoints and values to be exchanged across organizational boundaries (Phelps and Reddy, 2009). In the 1989 publication Star and Griesemer present boundary objects as:

> "[..] objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. They may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds."
>
> (Lutters and Ackerman, 2007, p. 343)

In this sense, boundary objects should be seen as artifacts which allow organizational boundaries to be bridged without dismantling them. The boundary objects translate information from one organization to the other, giving the information meaning (Lutters and Ackerman, 2007). They contain sufficient information to be understandable by both parties, but neither party should understand the full context of use by the other (Phelps and Reddy, 2009). In this way, boundary

objects create a common understanding for all parties involved without compromising their interests or identity.

Boundary objects can be divided into two different classes: primary and secondary. The primary boundary objects are the coincident boundaries, or the material artifacts around which the project is organized. The secondary boundary objects are the other artifacts that translate the information between the different parties such as contracts, operating procedures or project methodologies (Alderman, Ivory, Mcloughlin and Vaughan, 2005).

In Star and Griesemer's original definition the boundary object can be both abstract and concrete. But due to the heavy use of boundary objects in computer-supported cooperative work, the emphasis on boundary objects as a physical artifact has been promoted. Lutters and Ackerman argue that this limits the concept's usefulness in understanding collaborative work (Lutters and Ackerman, 2007). By promoting the boundary object as a physical, static artifact, no account is taken to the fact that it is created within a larger information flow. When translated from one group to another, the process creates a negotiation about how to interpret and contextualize the boundary object that includes not only the current information about the object, but also the past and the potential future (Lutters and Ackerman, 2007). The recontextualisation of a boundary object therefore becomes critical in order to understand how to reuse the information. For instance, in a publication Marc Berg and Geoffrey Bowker discuss how patient records in hospitals serve as a boundary object in hospitals to 'produce' the patient. In Berg and Bowker's case the interpretation and contextualization of the patient record becomes crucial in how to coordinate interaction between care providers, but also how to plan future interventions based on the patient's medical history (Berg and Bowker, 1997). Depending on how the care provider decontextualize and interpret the patient record, the outcome for the patient can differ.

Given the importance of collaboration across organizational borders within governance the concept of boundary objects serves as an important example of how information is communicated and transmitted between different stakeholders involved in decisions making. In the cases described in the report different sorts of boundary objects such as maps, different forms of charts and written reports are used today.

3 CASE STUDY 1: URBAN SAFETY AND SECURITY IN THE CITY OF MALMÖ

3.1 Introduction

3.1.1 Urban Safety and Security in the City of Malmö

Malmö is the third largest city in Sweden with more than 310 000 inhabitants in 2014. Since the mid-1970s, Malmö has gone through a period of de-industrialization and economic decline, but also expansion through large immigration, and economic and cultural revitalization. The city has developed to be an example of what has been characterized as a dual city with new forms of social stratification and socio-spatial divide. In 2014, a large proportion of the workforce (14 %) still was unemployed, while other parts of the economy and to those related occupations thrived. Consequently, the city is socially, economically and geographically divided. Furthermore, this comprehensive urban transformation has not been going on without social tensions. Adverse events such as intentional fires, social and extremist political conflicts, violent disputes between criminal networks and acts of xenophobia have occurred. Even if these events occur irregularly, and Malmö generally is perceived as a safe and secure city, authorities have found it necessary to develop forms of collaboration between organizations such as police, municipality, emergency services, and real estate companies in order to manage severe incidents when they occur. These forms of cooperation include strategic and operational actions as well as efficient sharing of information among relevant stakeholders.

In this case study the ongoing work for urban safety and security in Malmö will be investigated. The case study will have a specific focus on the organization of Malmö Municipality who has a responsibility to coordinate and develop forms of collaboration in order to manage severe incidents when they occur. But Malmö Municipality also has a responsibility to manage minor incidents which might not be as adverse as the ones mentioned above, but still affects the general perception of safety and security in the city. This diverse role requires Malmö Municipality to have a well-developed emergency preparedness and crisis management in order to handle and coordinate the sharing of information among relevant stakeholders to make efficient decisions.

3.1.2 Structure of Case Study

The case study is presented in three different sections with related subsections. The section *Method* includes a discussion of the qualitative methodologies used for collecting data to the case study and how it was analyzed. The section Background will give a brief outline on the national guidelines for emergency preparedness in Sweden and how they are implemented in Malmö Municipality. In the

final section the *Results* will be presented in a structure set to be used by all the case studies in the UrbanData2Decide-project.

3.2 Method

3.2.1 Data Collection

The case study for urban safety and security in Malmö Municipality uses a qualitative method approach. The qualitative method comprises six interviews and two minor workshops with stakeholders involved in crisis management in Malmö Municipality. The interviews and the workshops are also complemented with relevant reports from the stakeholders.

Table 1: Methods used for collecting data

Method	Stakeholder	Participants	Event	Duration
Interview	Emergency Services South	Management Staff	Interview	3 hours
Interview	Police District West	Police Chief, Analysts	Interview	3 hours
Interview	Malmö Municipality	Unit for Safety and Security	Interview	2,5 hours
Interview	Police District West	Police Chief, Other	Research Circle	3 hours
Observation	Malmö Municipality	Unit for Safety and Security	Handover Meeting	45 minutes
Interview	Police District West	Police Chief, Other	Research Circle	3 hours
Minor Workshop	Emergency Services South	Management Staff	Minor Workshop	3 hours
Minor Workshop	Malmö Municipality	Unit for Safety and Security	Minor Workshop	3 hours
Interview	Police District West	Police Chief, Other	Research Circle	3 hours

3.2.1.1 Interviews

The initial interviews were conducted at three separate occasions with three different stakeholders at the end of October in 2014. The three different stakeholders were Malmö Municipality, Emergency Services South and Police District West. The representatives from each organization corresponded to the focus of the interview.

During the interview topics related to crisis management and decision making were addressed in an open discussion. The interviews lasted for about 2-3 hours. Some questions and topics were prepared beforehand, but the follow-up questions were improvised based on the information provided by the interviewed stakeholders. The basis for discussion was data usage: how data was collected, compiled, used, and improvements wanted for making better decisions. Detailed notes were taken by one of the interviewers during each interview, which were later summarized in a common structure.

Four follow-up interviews were done with Police District West during November and December 2014 and January 2015 as a part of a research circle (a recurring meeting including the Police District West and other stakeholders once a month). These interviews had a more practical approach where different technical solutions were tested and discussed with the participants. Detailed notes were taken during these interviews as well.

3.2.1.2 Minor Workshops

The minor workshops were conducted in December 2014 at two separate occasions; one occasion with Malmö Municipality and one with the Emergency Services South. During the minor workshop with Malmö Municipality two representatives working at The Unit for Safety and Security were present and at the minor workshop with the Emergency Services South three representatives from the management staff were present. Both of the minor workshops lasted for about 2, 5 – 3 hours.

The purpose of the minor workshops was to identify and problematize the current safety and security management workflow within the organizations in order to provide suggestions on how to improve it. To achieve this purpose the minor workshop was divided into four phases, an approach influenced by the Future Workshop technique.

The Future Workshop is divided into three different phases where the participants first lists points of critique to the current work process, then develop an exaggerated or utopian version of how the work process could be, to finally have a discussion about realizable parts from the utopian work process (Brand, E, Binder, T and Sanders, E B.-N, 2013). Based on the structure from the Future Workshop, the minor workshop included the following four phases:

1. Identify and explore the current workflow
2. Problematize the current workflow
3. Depict a visionary workflow
4. Realizable changes in the current workflow

The discussion was systematically summarized on a Whiteboard by one of the interviewers during the discussion. In this way the participants could easily make references to different parts of the

workflow. By the end of the minor workshops photos were taken of the whiteboard for documentation. The discussions were also recorded and transcribed.

3.2.1.3 Literature

The literature used for the case study mainly consists of public and internal reports from the interviewed stakeholders. The literature has mainly been used for background information, but also for filling out missing links from the interviews and the minor workshops. Examples of how collected data is structured and summarized by the organizations have also been studied.

3.2.2 Data analysis

During the analysis of the data collected from the interviews and the minor workshops the workflow of Malmö Municipality was identified as the most relevant case for the *UrbanData2Decide*-project. Both the Emergency Services South and the Police District West are important stakeholders in the crisis management, but Malmö Municipality has a more strategic role where they are required to both handle incidents and coordinate stakeholders. With this role Malmö Municipality would benefit more from a decision support tool than the other interviewed stakeholders would. The results will therefore mainly focus on Malmö Municipality, but data collected from the other interviews and minor workshops has been used to get a holistic picture of the emergency preparedness and crisis management in Malmö Municipality.

The data collected from the interviews and the minor workshop with Malmö Municipality has been analyzed and categorized to fit the common structure set for all the case studies in the research project:

1. Identify stakeholders
2. Outline roles and functions
3. Sketch out different experiences of how data is used today
4. Explore workflows
5. Explore stakeholder's requirement for visualized decisions support and expert input

The results are presented in section 3.4.

3.3 Background

3.3.1 National Guidelines for Emergency Preparedness

The handling of incidents or crises requires cooperation. An incident or a crisis usually affects several domains and therefore several stakeholders. But cooperation between stakeholders might not be something natural and during the events of an incident or a crisis the areas of responsibilities might become unclear.

To regulate these responsibilities the *Swedish Crisis Management System* is based on a set of rules which constitutes the *Swedish Emergency Preparedness.* These rules comprise provisions on how, where and by whom an incident or crisis should be handled and consists of three different parts: *The Basic Principles, Responsibilities* and *Laws* (Krisinformation, 2012).

3.3.1.1 The Basic Principles

The Swedish crisis management system has three basic principles on how to act during an incident or crisis: *The Responsibility Principle*, *The Proximity Principle* and *The Equality Principle* (Krisinformation, 2012).

- **The Responsibility Principle:** The Responsibility Principle regulates the responsibilities for activities when a crisis or incident occurs. According to the Responsibility Principle, a stakeholder responsible for an activity during normal circumstance will also be responsible for the activity during an incident or crisis.

- **The Equality Principle:** The Equality Principle regulates how activities function when a crisis or incident occurs. According to the Equality Principle, an activity should function as normal as far as possible. The activity should also, if possible, be managed in the same location as under normal circumstances.

- **The Proximity Principle:** The Proximity Principle regulates where an incident or crisis should be handled. According to the Proximity Principle an incident or crisis should mainly be handled where it occurred and by the primarily affected stakeholders. This means that an incident or crisis should primarily be handled by the affected municipality and associated county.

3.3.1.2 Responsibilities

To regulate the cooperation between stakeholders the Swedish crisis management has two responsibilities: *Sector Responsibility* and *Geographical Area Responsibility* (Krisinformation, 2012).

- **Sector Responsibility:** The Sector Responsibility regulates the responsibility for stakeholders in a sector affected by an incident or crisis. This means that authorities and organizations will have a responsibility to handle crises which occurs in their sector.

- **Geographical Area Responsibility:** The Geographical Area Responsibility regulates the geographical collaboration between stakeholders during an incident or crisis. The geographical area is defined by municipality- , county- and national borders. This means that municipalities, counties and the state have a responsibility to coordinate the crisis management between public and private stakeholders within their geographical area when an incident or crisis occurs. They will not, however, deprive any stakeholder from their responsibilities.

3.3.1.3 Laws

The Swedish Codes of Statues includes two specific laws concerning crisis management:

- The law on municipalities and county councils measures before and during extraordinary events in peacetime and high alert
- The regulation on emergency preparedness and increased preparedness.

Additional appendixes on crisis management can however be found in other laws too (Krisinformation, 2012).

According to the two specific laws, municipalities and counties are responsible to prepare a plan on how to handle extraordinary events. In order to prepare for extraordinary events each municipality and county is also responsible to have a special *Crisis Management Committee* who has the authority to make decisions without consulting regular municipal committees during a crisis (Krisinformation, 2012).

3.3.2 Central Crisis Management Organization of Malmö Municipality

As a municipality the City of Malmö has a geographical area responsibility to coordinate the crisis management between different stakeholders. This responsibility requires Malmö Municipality to have a well-developed crisis organization to respond appropriately when an incident or a crisis occurs in order to minimize the impact.

In figure 1 the *Central Crisis Management Organization* in Malmö Municipality is described. The Central Crisis Management Organization is defined by the *Emergency Preparedness for Central Crisis Management* and the *Central Crisis Management*. Together they form a foundation for how incidents and crises should be handled on an operative-, strategic- and political level. Depending on the

severity of the incident or crisis, different functions of the Central Crisis Management Organization will be activated as illustrated in figure 1.

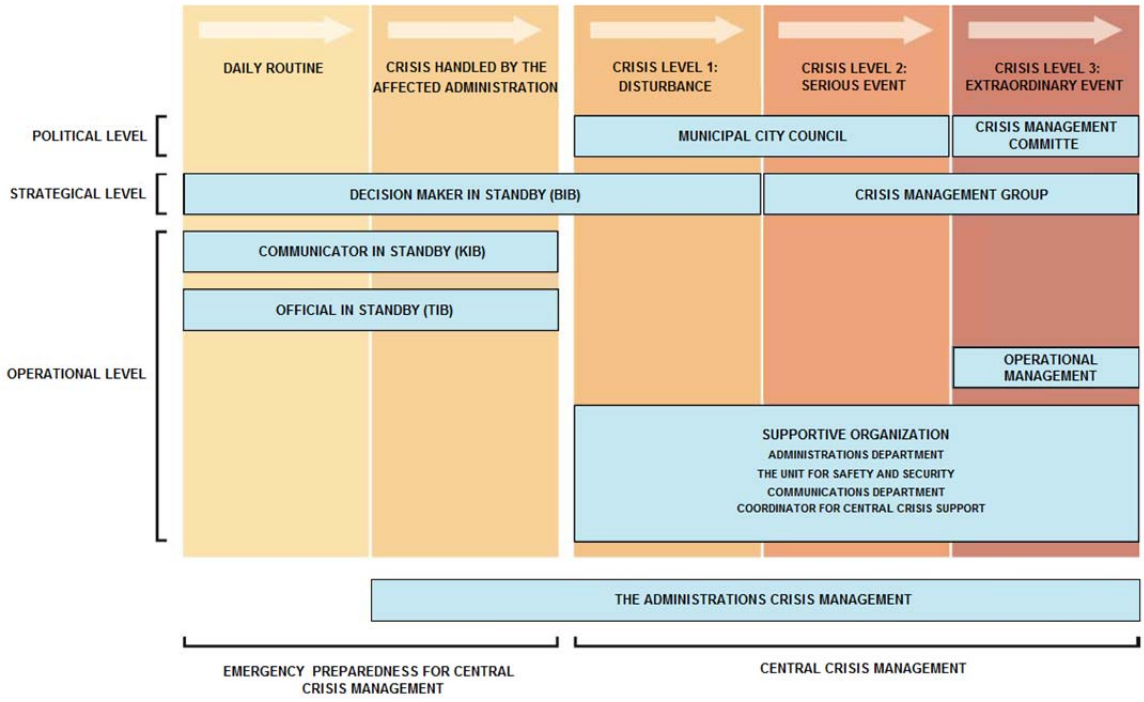

Figure 1: The Central Crisis Management Organization in Malmö Municipality. Source: Malmö Municipality (2011)

3.3.2.1 Emergency Preparedness for Central Crisis Management

The Emergency Preparedness for Central Crisis Management illustrated in illustration 3.1 consists of three standby functions:

- Decision Maker in Standby (BIB),
- Official in Standby (TIB)
- Communicator in Standby (KIB[1]).

The three standby functions are municipality-wide and active around the clock. When an incident or a crisis occurs, the standby functions can support the affected stakeholders immediately and activate the Central Crisis Management if needed (Malmö Stad, 2011). A more detailed description for each of the three standby functions is found in section 3.4.2.

[1] Swedish abbreviations will be used throughout the report

3.3.2.2 Central Crisis Management

The Central Crisis Management, also illustrated in figure 1, can be activated when an incident or crisis is so severe that it cannot be handled by the affected administrations alone. The main purpose of the Central Crisis Management is to coordinate and support the affected stakeholders on a central level by leading the crisis management, make decisions and disseminate information about the crisis (Malmö Stad, 2011). Depending on the level of severity different functions of the central crisis management will be activated as figure 1 shows.

- **Crisis level 1: Disturbance:** A *Disturbance* is considered to be a crisis that mainly can be handled by the affected administration's crisis management, but might require some support on a central level.
- **Crisis level 2: Serious Event:** A *Serious Event* is a crisis that cannot be handled by the affected administrations alone, and will require support and coordination on a central level.
- **Crisis level 3: Extraordinary Event:** An *Extraordinary Event* is a serious crisis which will have a huge impact on the society as a whole. During an extraordinary event all support and coordination will be handled on a central level and a special *Crisis Management Committee* headed by politicians is instituted, who has the authority to make decisions for other committees without consulting them.

When the crisis has been handled the central crisis management will be decommissioned gradually (Malmö Stad, 2011). The operation will also be logged and evaluated properly.

3.4 Results

3.4.1 Stakeholders of Crisis Management in Malmö

3.4.1.1 City Office Administration of Malmö Municipality

The *City Office Administration* (COA) is the municipal government of Malmö's administration. As the municipal government of Malmö's administration, the COA has the responsibility to assist, coordinate and monitor the other administrations in the municipal organization. The administration therefore consists of seven different departments with different focuses and responsibilities corresponding to the needs of the other administrations (Malmö Stad, 2015).

As a part of the *Administrations Department*, *The Unit for Safety and Security* works with issues related to drugs, accidents, crimes and crisis management. The unit has a responsibility to coordinate safety and security work already done by the other administrations, but also initiate new processes to proactively prevent new incidents and crises from happening (Ibid). Being responsible for the safety and security work, the unit also has to prepare the central crisis management plan according to the laws described earlier in section 3.3.1.3.

3.4.1.2 Other Administrations in Malmö Municipality

In total Malmö Municipality have 18 different administrations. 13 of them are technical administrations with responsibilities for specific activities, and five of them are referred to as district administrations, with responsibilities for a specific geographical area (Ibid).

- **Technical Administrations:** The technical administrations are based on 13 fields of activities. The administrations range from *The City Planning Administration* to *The Primary School Administration*. The COA described earlier is also a part of the technical administrations. Each administration belongs to a political committee, meaning that one committee can be in charge of several administrations. *The Technical Committee* is, for instance, in charge of both *The Real Estate Administration* and *The Streets and Parks Administration.* During an incident or crisis the different administrations will be responsible for handling events that affects their field of activity according to the principles, responsibilities and laws described earlier.

- **District Administrations:** The district administrations are divided into five geographical areas: *District Inner City*, *District North*, *District East*, *District South* and *District West*. Each district administration has their own political committee with the authority to make decisions about the area. The district administrations are mainly responsible for the development of the area, local health and social care and individual and family care, but they are also responsible for safety and security. As a part of this responsibility, the local district administrations have to

establish a crisis management plan, compatible with the central crisis management plan established by the Unit for Safety and Security at the COA.

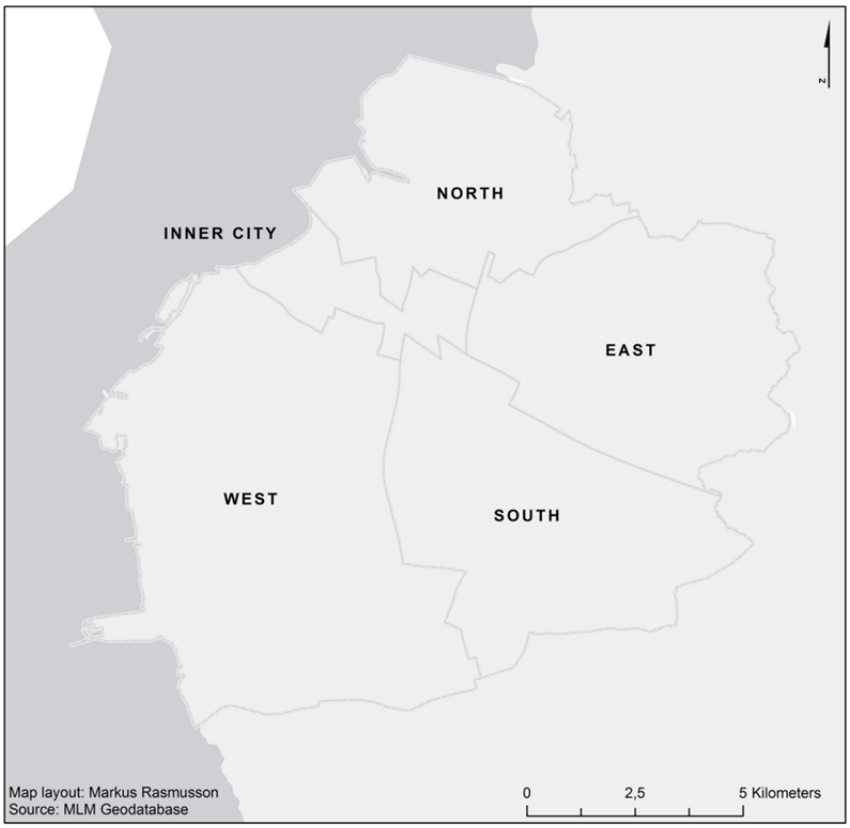

Figure 2: District Administrations in Malmö. Source: MLM Geodatabase

3.4.1.3 External Stakeholders of Relevance

When handling an incident or crisis Malmö Municipality will usually collaborate with external stakeholders. These stakeholders will vary depending on the domains affected by an incident or crisis, but besides Malmö Municipality there are some stakeholders who also work with safety and security on a regular basis:

- **The Swedish Civil Contingencies Agency:** *The Swedish Civil Contingencies Agency* (MSB) is an authority with the responsibility to develop the society's ability to handle and prevent incidents and crises. The agency is directly subordinated the ministry of Justice. MSB support the municipalities with information, guidelines and tools (MSB, 2015).

- **The County Administrative Board of Skåne:** *The County Administrative Board of Skåne* (LST) is the state's representative in the county. The LST is responsible for coordinating crisis

management on a county level when an incident or crisis occurs that affects several municipalities (Länsstyrelsen Skåne, 2015).

- **Region Skåne:** *Region Skåne* is the county council in Skåne. As a county council Region Skåne is responsible for healthcare and public transport in the region. During the events of an incident or crisis Region Skåne is obliged to make sure that these activities work properly (Region Skåne, 2015).

- **The Police Authority:** *The Police Authority* is responsible for investigating crimes and work proactively to prevent new crimes from happening. As an authority they are also responsible to have a crisis management plan and usually have an important role when an incident or crisis occurs (Polismyndigheten, 2015).

- **The Emergency Services South:** *The Emergency Services South* is responsible for handling accidents and work proactively to prevent new accidents from happening. The emergency services are prepared to handle both occurring incidents and crises, and usually have an important role in crisis management (Räddningstjänten Syd, 2015)

3.4.2 Roles and functions

3.4.2.1 Decision Maker in Standby

The *Decision Maker in Standby* (BIB) is a function at COA with the authority to make operative and strategic decisions when an incident or crisis occurs. The persons working as BIB's are all senior officials and have diverse professional backgrounds, corresponding to the needs of crisis management. As BIB's they also have knowledge about the municipal organization and possess the competence to lead the central crisis management when needed (Malmö Stad, 2012).

The person working as a BIB will be on standby around the clock for seven days a week. While on standby the BIB is responsible for making assessments and decisions on how to handle incidents that might have a large impact on Malmö Municipality. Some possible measures could be to establish support for the affected stakeholders or notifying the municipal government. The BIB is also authorized to activate the Central Crisis Management when needed (Malmö Stad, 2012).

When a minor event occurs, the BIB will generally not handle it. These events are usually handled by the Official in Standby. The BIB will however be notified and updated about these events and will also act as a contact person if the TIB needs consultation.

3.4.2.2 Official in Standby

The *Official in Standby* (TIB) is a function at COA acting as an operational support to the BIB. The persons working as TIBs are officials working with urban safety and security on a daily basis and will therefore have substantial knowledge about crisis management. As TIBs they are also required to have knowledge about the municipal organization and be able to support affected stakeholders during the events of an incident or a crisis (Malmö Stad, 2012).

The person working as a TIB will be on standby around the clock for seven days a week at the same time as the BIB. While on standby the TIB is responsible to continuously monitor occurring events and make assessment on if they might turn into incidents or not. If the TIB makes the assessments that an event might turn into a severe incident that will require central crisis management, he or she has to contact the BIB to provide a basis for decision. If the TIB makes the assessment that an event will turn into a minor incident, he or she will have the authority to adopt measures based on the three basic principles described earlier in section 3.3.1.1 (Ibid). The first assessment by the TIB is therefore very important, since a faulty assessment might result in the incident escalating further.

Although the TIB has the power to adopt measures when a minor incident occurs, he or she will usually not be mainly responsible for solving it. According to the three basic principles, the incident or crisis should mainly be handled by the administration that is responsible for the operations normally. This means that when a TIB receives information about an event and makes the assessment that it might turn into a minor incident, he or she will mainly be responsible to forward the information to the administration that has the responsibility to solve it. For instance, if the TIB receives information about an intentional fire in a school, the TIB will not try to handle the consequences of the fire. Instead, he or she would be responsible for contacting the administrations who has the responsibility to handle it. In this case it would perhaps be the Local Municipal Administration and the Educational Administration.

Even though the example above might imply that the TIB mostly acts as a mediator of information during the course of an incident, he or she still has the responsibility to make sure that the incident gets solved properly. If the TIB realizes that the responsible administration will not be able to handle the incident on their own, he or she has to contact the BIB to discuss if it's necessary to activate the central crisis management. If the BIB decides that it is necessary, the TIB will be responsible to coordinate the support functions in the initial phase. The TIB could therefore be described as a versatile function during the events of an incident, acting as a coordinator both internally and externally, with the responsibility to make sure that the incident gets solved.

3.4.2.3 Communicator in Standby

The *Communicator in Standby* (KIB) is a function at the COA acting as an operational support to TIB and BIB. The persons working as KIBs are officials working with communication on a daily basis and will therefore be able to handle both internal and external communication properly.

The person working as a KIB will be on standby around the clock for seven days a week. While on standby the KIB will be responsible for handling issues associated to crisis communication. This means that the KIB will be responsible for managing media relations and publishing information on Malmö Municipality's media channels when an incident occurs. The KIB will also assist the TIB by monitoring the media channels and report any information regarding events that might have an effect on Malmö. The media channels include various news sources online, but it also includes social media such as Twitter and Facebook.

3.4.3 Technical tools and applications

3.4.3.1 Technical Tools

When the standby functions commence their service they will get access to some technical tools for assistance. The technical tools include:

- **An iPhone (or similar):** The iPhone allows the standby functions to be reachable at all time. When an event occurs, the standby functions usually receive information about it by phone. The iPhone also assists the TIB and the KIB to continuously monitor events in the municipality with different news applications, set to send a push notification to the user if an event occurs

- **An iPad (or similar):** The iPad acts as a complement to the iPhone. When an event occurs the standby function can use the iPad to access the technical applications described in section 3.4.3.2.

- **Rakel:** *Rakel* is a professional mobile radio system which allows the standby functions to communicate with other important public stakeholders during a severe crisis. Rakel is maintained by the Swedish Civil Contingencies Agency (MSB) and has a nationwide coverage. The system is used by many important public stakeholders such as the Police, the Emergency Services and the Ambulance Service on a daily basis, but only during severe crises by the standby personnel from municipalities such as Malmö Municipality.

3.4.3.2 Technical Applications

As assistance throughout the week the standby functions also have access to some technical applications. Some of the applications are public, available to everyone, but some of them are specifically developed for Malmö Municipality. The technical applications include:

- **Sydkris:** *Sydkris* is a web portal developed by Malmö Municipality where the standby functions can access *Generalen*, digital alarm lists and *Krisapp*. Sydkris is accessed through a web browser both internally and externally
- **Generalen:** Generalen is an application used by the standby functions to log incidents. The application is developed specifically for Malmö Municipality and can be described as a diary where it is possible to save information as text. Generalen is accessed from Sydkris with user credentials and can be accessed by anyone within Malmö Municipality involved in crisis management. This means that logs made by the TIB at the COA can be read by a person working at a district administration.

- **Digital Alarm Lists:** The digital alarm lists contain information about responsible functions in other administrations and routines on who to call during a minor and severe incident. These lists are mainly used by the TIB.

- **Krisapp:** Krisapp is an application which allows the standby functions to share information with corresponding functions in other municipalities in real time. The application is developed by the City of Malmö and eight surrounding municipalities. The application can be installed on a smartphone and allows the users to communicate with push notifications, text chats and video conferences. The idea is to use the application to share information during the first hour after a severe incident.

Figure 3: The web portal Sydkris. To access one of the applications the user has to click on one of the doors and enters his or hers user credentials.

- **Outlook Calendar:** The *Outlook Calendar* is used to keep track of upcoming events. The calendar is linked to the iPhone/smartphone and maintained by the person currently on standby. If the standby function receives any information regarding upcoming events that might be of interest, he or she marks it in the calendar. This could for example be an upcoming power outage or a demonstration. When an event marked in the calendar approaches, a notification will be sent to the standby functions currently on service, either on their iPhone or on their personal computer/iPad (depending on their settings) to notify them.
- **Supportive documents:** The *supportive documents* are used as guidance when a standby function has to make an assessment. The documents can be accessed through a folder online via Dropbox and includes information about how to handle specific incidents. An example of these documents could be a checklist on how to handle a heat wave or an epidemic disease.
- **Malmö City Atlas:** *Malmö City Atlas* is a public web map service hosted by the City Planning Administration. The web map includes a number of different layers with information concerning public services such as schools, hospitals and district administrations. The user is allowed to turn on and off the different layers and search for specific addresses in the map to see if any public services will be affected by an event, but the standby functions cannot add any information to the map. The web map service is therefore only used to get an overview of where an event or incident has occurred.

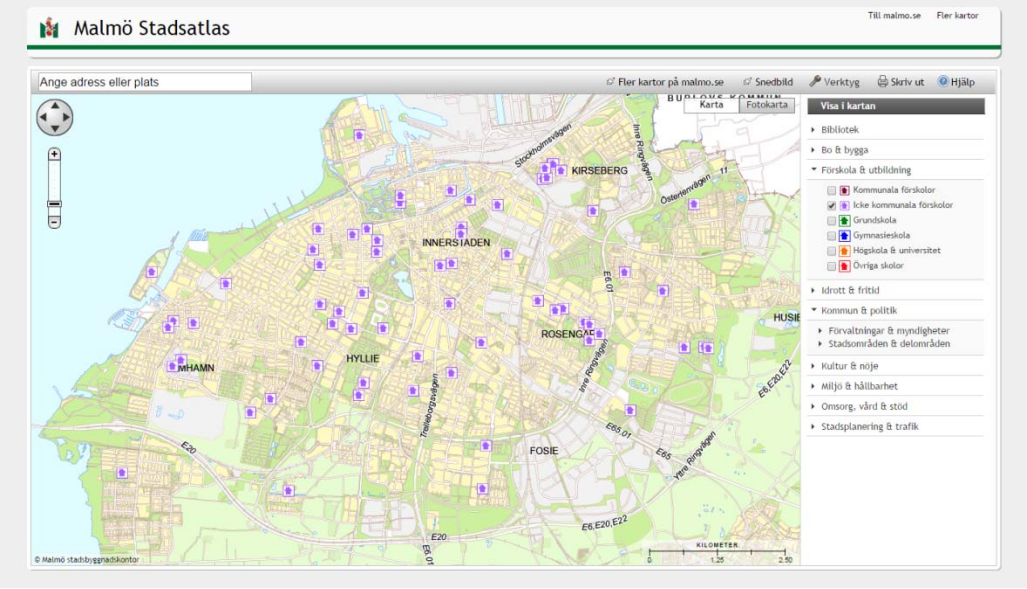

Figure 4: Public Web Map Service hosted by the City Planning Administration. In the panel to the right the user can turn on and off different layers containing information about public services.

- **Web Based Information System:** *The Web Based Information System* (WIS) is developed and hosted by MSB. WIS is accessed through a web browser and allows authorities, county councils and municipalities to share information based on incidents. WIS is mainly used during incidents that affects several municipalities or counties, and might therefore not be used on a weekly basis by the standby functions in Malmö Municipality.

3.4.4 Workflow

3.4.4.1 A week of Emergency Preparedness for Central Crisis Management

The Emergency Preparedness for Central Crisis Management in Malmö Municipality fulfills an important part of the crisis management in Malmö. The emergency preparedness makes sure that the impact of incidents and crises are reduced to a minimum, and damage to people, environment and property limited. The weekly workflow of the Emergency Preparedness for Central Crisis Management could therefore be considered to be one of the most important workflows of the Central Crisis Management Organization in Malmö Municipality.

In the upcoming subsections the weekly workflow of the Emergency Preparedness for Central Crisis Management will be described thoroughly. The workflow has been categorized into eight different parts where the current process is described and problematized. In the final subsection the workflow is summarized in a generic model.

3.4.4.2 Handover Meeting

The three standby functions have service around the clock for seven days at a time, from Monday to Monday. On Mondays, at 11.30 AM, a handover meeting is held. The TIB currently on standby acts as host for the meeting and except for the BIB and the KIB also currently on standby, all the other persons working as a standby functions are thought to attend. Since the persons working as standby functions have other duties within the Municipal Administration of Malmö there might be an absence sometimes. This applies to the persons working as BIBs especially, since they are all senior officials and may therefore have other commitments.

The handover meeting consists of two parts; a summarization of the past week and a discussion about upcoming events. The TIB currently on standby leads both parts. The summarization of the past week generally contains an overview of the past week's incidents, incidents that have deviated from the normal state and a brief discussion of how specific incidents have been solved. During this part of the meeting the content of the logs in Generalen might be projected on a screen and used as a recap. If the BIB or the KIB currently on standby have some additional information to add they are allowed to do so.

The discussion about the upcoming week includes information about events that might be of interest for the standby functions commencing their service. This information can come from any source, but usually it is information that the standby functions currently on service has received during the past week from other stakeholders (this will be described more thorough later in subsection 3.4.4.7). If anyone else participating in the meeting has some additional information concerning upcoming events they are also allowed to share it.

During the conducted interview both of the informants agreed that the handover meeting generally works well. Both the summarization of the past week's incidents and the discussion about the upcoming events are important for the persons commencing their standby service. One of the informants is however critical of how the TIB currently on standby usually reduces the severity of the incidents he or she has been involved in during the past week. The TIB might inform the attendees verbally that nothing severe has occurred, but the written logs in Generalen might contain information about incidents that could have required a more coordinated crisis management on a central level.

The informant also believes that this creates a problem since it makes it difficult to have a more thorough discussion about how to handle specific incidents. If the TIB currently on standby does not acknowledge it as a severe incident, and report it at the handover meeting, the other attendees will not be notified about it and therefore not be able to give input on how it was handled. This complicates the skill development for the persons working as TIB's since no discussion about the function takes place.

3.4.4.3 Daily Routine

When the handover meeting is concluded the standby functions currently on service hand over the service to the commencing persons. If no severe incidents or crises are reported during the meeting the commencing standby functions will have no specific commitments besides being on standby. This means that they can dedicate themselves to their regular work duties.

While on standby the TIB and the KIB will continuously receive information about events from other administrations and various external stakeholders. The external stakeholders generally include other organizations from the public sector such as the police or the emergency services, but it can also include stakeholders from the private sector such as electric power companies or water and sewerage companies. Most of these updates are done by phone, meaning that if a power company has information about a power outage they will call the TIB to notify him or her about it verbally.

Even though the informants believe the number of sources to be sufficient, they still believe that there might be a lack of information sometimes. Both of the informants especially points out the lack of communication within the organization between the different administrations. Sometimes the TIB

might not be aware of the existence information which the administrations have, even though it could be information useful for him or her. But this can also depend on what type of information the administration collects. For instance, information collected by the Social Resources might be too sensitive to share with anyone not working for the administration. The TIB might therefore not know about its existence, even though it might have been useful for him or her. This problem also exists when communicating with external stakeholders. Not being able to fully share information between each other creates issues both on an operational level and a strategic level according to the informants.

3.4.4.4 When an Event Occurs

The first assessment made by the TIB on how to handle an event is a vital part of the crisis management in Malmö Municipality. A faulty assessment by the TIB might result in the event escalating further, damaging people, environment and property. Making these assessments can be fairly easy, but also difficult. As a support the TIB will generally use some of the technical tools and applications described in section 3.4.3.1 and 3.4.3.2. If the TIB is uncertain about how to handle the event he or she can also consult the BIB or another TIB currently not on standby for advices.

Although the informants think that the assessments made by the TIB generally are correct, they still think that the assessments will differ depending on the persons currently on service. This means that the assessment will not only differ depending on the TIB currently on standby, but also depending on which BIB who is on standby. In some cases the TIB currently on standby might make the assessment to contact the BIB for a residential fire and consult him or her on how to handle it, while the TIB on standby next week, who receives information about a similar incident, might decide that he or she can solve it without involving the BIB. This indicates that there is a lack of clarity concerning how the TIB as a function should act when receiving information, which can be problematic according to the informants.

3.4.4.5 Handling an Incident

As described in subsection 3.4.2.2, the TIB will not be mainly responsible to handle occurring incidents. The TIB will mainly be responsible to mediate information between stakeholders to make sure that the incident gets solved. As a function who mediates information between different stakeholders the TIB will be in regular contact with corresponding functions in other administrations and organizations. This could for example be the head of a district administration or the principal of a school. Most of these functions can be seen as a network of formal functions that should be contacted if an incident occurs. If someone breaks into a school during a weekend, the principal of the school should be contacted, for instance.

But since the TIB regularly is involved in incidents occurring in Malmö, he or she usually develops her own, informal, network. This informal network is based on personal contacts and knowledge, and not on a formal structure. This means that if the TIB receives information about a break-in at a school, he or she might not call the principal who has the key and therefore can solve the incident. Instead the TIB might call the caretaker who he or she knows better than the principal who also has the key, to solve the incident faster. Since these informal networks are based on personal contacts, they will look different depending on the TIB currently on standby. Incidents might therefore be solved in different ways, even though forms of formal networks exist.

Although both of the informants believes it to be somewhat problematic that informal networks are developed and used for handling events, they can also see advantages. One of the informants argues that the development of informal networks might actually result in events getting solved faster. The other informant does however think that the informal networks could have an effect on how incidents are handled. The informant means that when the TIB uses informal contacts instead of formal ones, he or she makes and assessment based on who he or she thinks could handle the incident best, and not an assessment based on who actually could handle the incident best. This might result in the wrong persons getting involved and an exclusion of certain groups. There is, for instance, a risk of women being excluded due to gender inequality.

Given the fact that informal networks actually are used to handle events has also resulted in a situation where it is difficult for new persons to start working as a TIB. Both informants claim that the information the TIB will receive about an incident will vary depending on his or hers contacts and therefore also how it is handled. The informal networks have also resulted in a situation where the TIB needs to be trusted as a person, according to one of the informants. If the person working as a TIB is not trusted by stakeholders, they might not trust the information he or she mediates, something that might have consequences on how the event is handled. The informant does not necessarily see this as a problem since it will be based on a mutual trust, where the TIB also can trust the stakeholders to handle the event when he or she informs them. But the fact that there needs to be a mutual trust between the persons that are holding functions is problematic according to the other informant. If the person needs to be trusted as a person the function does not fulfill its purpose since it basically will be based on personal relationships rather than formal relationships.

3.4.4.6 Logging Incidents

When the TIB is involved in an incident, he or she has the responsibility to log it in Generalen. The log entries are mostly used for keeping track of currently active incidents and how to handle them, but also for evaluation afterwards. The log entries usually contain information about how different incidents have been handled and which decisions that has been made. Using the examples with the intentional fire at a school described earlier, the log entry would probably contain a short summary

about the incident, stakeholders who received information about it and how it was handled. But depending on the persons currently on standby, the number of logs, and the length and detail of them, will vary. Each log entry will, however, contain the current date and time. This means that the log is saved on the specific date and time when it was written, and not when the event occurred. The user of the application cannot change this setting.

For each incident a new log entry is started, which means that several log entries can be started during the course of a week. Some incidents might be ongoing for longer period of time; in these cases several entries can be made in the same log. Besides the TIB, the BIB, the KIB and other crisis management functions within the Malmö Municipality are also responsible for logging incidents they have been involved in. This does not, however, work very well according to the informants. The BIB and the KIB makes few log entries and there is almost a total absences of log entries from the other administrations.

One of the informants also remarks on the content of the logs as inadequate. At the moment the logs are mainly used as a way of documenting how incidents have been handled and which decisions that has been made; that is information which they have received and acted upon. But throughout the week the TIB and the KIB will also receive information that they do not act upon. This information is however not logged properly at the moment, and it is therefore not possible to make proper evaluations to see if it could have been used to prevent an incident.

3.4.4.7 Meetings

Besides the information the TIB receives irregularly on a daily routine, he or she also receives information on a regular basis through a number of different meetings hosted on a weekly basis. The meetings have different hosts, attendees and geographical focus, but all deals with issues related to urban safety and security. The TIB might not always be an attendee of these meetings, but since the TIB plays a central role in organizing the crisis management in the City of Malmö, he or she will receive information which concerns the City of Malmö.

3.4.4.7.1 Interaction Meeting

The first meeting of the week is hosted by the TIB on Thursdays at 15.00 PM. The meeting is called *Interaction Meeting* and involves 10 different stakeholders (both internal administrations and external stakeholders) besides the standby functions currently on service. The Interaction Meeting has an overall perspective and focuses on the City of Malmö as a whole. The meeting is held by phone and includes no other technical tools, although the TIB might sometimes email a document with the agenda and some other information to the attendees beforehand. During the meeting each stakeholder sequentially gives a report about incidents they are, or have been, involved in during the past week and upcoming events that they know about. This could for example include information

from the Police about an upcoming demonstration or information from E.ON (power company) about an ongoing power outage.

Given that the meeting is held by phone, the information is shared verbally. Official meeting notes will however be taken and saved in Generalen. This makes it possible for other stakeholders within Malmö Municipality to access them. The TIB will also save upcoming events which concerns him or her in the shared Outlook Calendar described in section 3.4.3.2.

3.4.4.7.2 Local Interaction Meeting

The second meeting of the week is hosted by District Administration East on Fridays at 08.00 AM. The meeting is a local interaction meeting with a specific focus on District East and includes District Administration East, the Local Police, the Local Rescue Services and the Social services as default. Schools, security companies and caretakers for public services might participate as well depending on what is going to be discussed. The meeting is held in District East and the information is only shared orally. No meeting notes are taken since the information shared can be sensitive. The information can however be forwarded to other stakeholders, such as the TIB, who don't participate in the meeting.

The main intent of the local interaction meeting is to summarize information about the previous week's event. Many of the stakeholders participating in this meeting does this internally every week, but when sharing it with other stakeholders in this meeting it will be possible for them to get an overall picture of the situation in the district and complement their own information. For instance, if the Local Emergency Services shares information regarding a smaller intentional fire at a school it might not be something out of the ordinary. But if the Police, Social Services and the Security company also shares information about incidents at the same school, it might indicate a major problem that needs to be handled before escalating further.

3.4.4.7.3 Operational Coordination Meeting

The third meeting of the week is hosted by the County Administrative Board of Scania on Friday mornings. The meeting is called *Operational Coordination Meeting* and the purpose is to share information about bigger events in the region and identify possible risks of disruptions that might affect several stakeholders in several municipalities. The meeting involves standby personnel from Scania Regional Council, Scania County Police, Municipal Emergency Services and the TIB currently on service at the County Administrative Board of Scania (LST) as default, but depending on ongoing and upcoming events, additional stakeholders might attend. For instance, if it is known that a big storm is approaching, a meteorologist from The Swedish Meteorological and Hydrological Institute (SMHI) might be asked to attend it to inform the other stakeholders about the forecast.

During the meeting each stakeholder shares information regarding their operations from the previous week and expected operations the upcoming week. As a support some of them might use internal compilations with statistics on what they have done, but the information from these compilations is usually only shared verbally. When each stakeholder has shared their information they decide if any of the information should be forwarded to other stakeholders in the region. If, for example, the Municipal Emergency Services in Malmö have shared information concerning an increase of intentional fires in the city, they will probably decide to forward this information to the TIB currently on service in Malmö Municipality.

Meeting notes are also taken and published in Web Based Information System (WIS). Upon publish the meeting notes in WIS the publisher can decided which users that should be allowed to read them, meaning that only stakeholders that might need to take part of the information will be able to do so. The TIB of Malmö can, for instance, take part of the meeting notes if he or she wants to.

3.4.4.8 Preparation for handover meeting

At the end of the week the TIB currently on standby will be responsible to prepare the handover meeting. Only if something extraordinary has happened a written summarization will be done, otherwise the past week will only be summarized verbally as described in subsection 3.4.4.2. Although this is the current routine, both of the informants find it to be inadequate. Especially one of the informants argues that the lack of evaluation and analyses in the routine contributes to an organization culture which does not allow the function of the TIB to develop. The informant therefore thinks that a more thorough summarization should be made, focused on how an incident has been handled and how it could have been handled. If evaluations like these were made it would be possible for the TIB to make better decisions the next time a similar incident occurs. At the moment the informant believes that it would make no different if the information saved in Generalen was deleted after one week, since nobody utilizes the information for these type of analyses anyway.

But the fact that nobody utilizes the information saved in Generalen for analyses can also be a result of the application itself. Generalen has very limited capabilities when it comes to extracting information, according to the informants. If, for instance, a TIB wants to extract information concerning intentional fires at public schools during the last three months, he or she would have to review all the log entries manually. It is not possible to use any type of search queries. Furthermore, as soon as a user opens up a log entry in Generalen and then close it, he or she will be sent back to the first page by the application. This means that if a user reviews a log entry found at page 43 in the application, he or she will automatically be sent back to page 1 upon closing it. Extracting information from Generalen is therefore a time consuming task.

Both of the informants are also critical to the fact that it is only possible to save log entries on the specific date and time it was written, and not when the event occurred. This makes it difficult to create a more thorough summary of the events since the date and time will not be correct. The possibility to make several entries in one log is also considered to be problematic since the user has to click on each log to see the content. This setting also makes it difficult to understand if the log contains information about one incident or several incidents and also complicates the compilation of information afterwards.

3.4.4.9 Overview of the emergency preparedness

From the process described in the previous subsections a generic model on the standby functions weekly workflow is outlined in illustration 3.5. The workflow has been divided into three different levels of emergency preparedness and crisis management based on the information provided by the informants:

- **Weekly workflow of information exchange and evaluation:** As a part of the *Daily* Routine the *Weekly workflow of information exchange and evaluation* level visualizes the exchange and evaluation of information between different stakeholders. The exchange of information is done on an irregular basis when an event occurs and on a more regular basis through the *Meetings* hosted by different stakeholders. *When an Event Occurs* and the TIB receives information about it, he or she has to make and assessment if it might turn into an incident or not. In some cases the TIB will make an assessment that the event might turn into an incident later. As guidance the TIB will have a number of different tools and technical applications, some of them visualized in the level named *Technical Tools and Applications*.
- **Preparedness for Central Crisis Management**: The *Preparedness for Central Crisis Management* level visualizes the *Handling of an Incident*. Upon handling an incident the TIB will have to make an assessment on the severity of the incident. If the TIB makes the assessment that it is a minor incident he or she will have the powers to adopt measures, but if the incident is considered to be a severe incident the TIB will have to consult the BIB on how to handle it.
- **Central Crisis Management:** When the incident is considered to be so severe that it cannot be handled by the affected administrations and stakeholders alone the BIB will have to activate the *Central Crisis Management.* Upon activating the Central Crisis Management the BIB will have to make an assessment on the severity to decide which functions to activate.

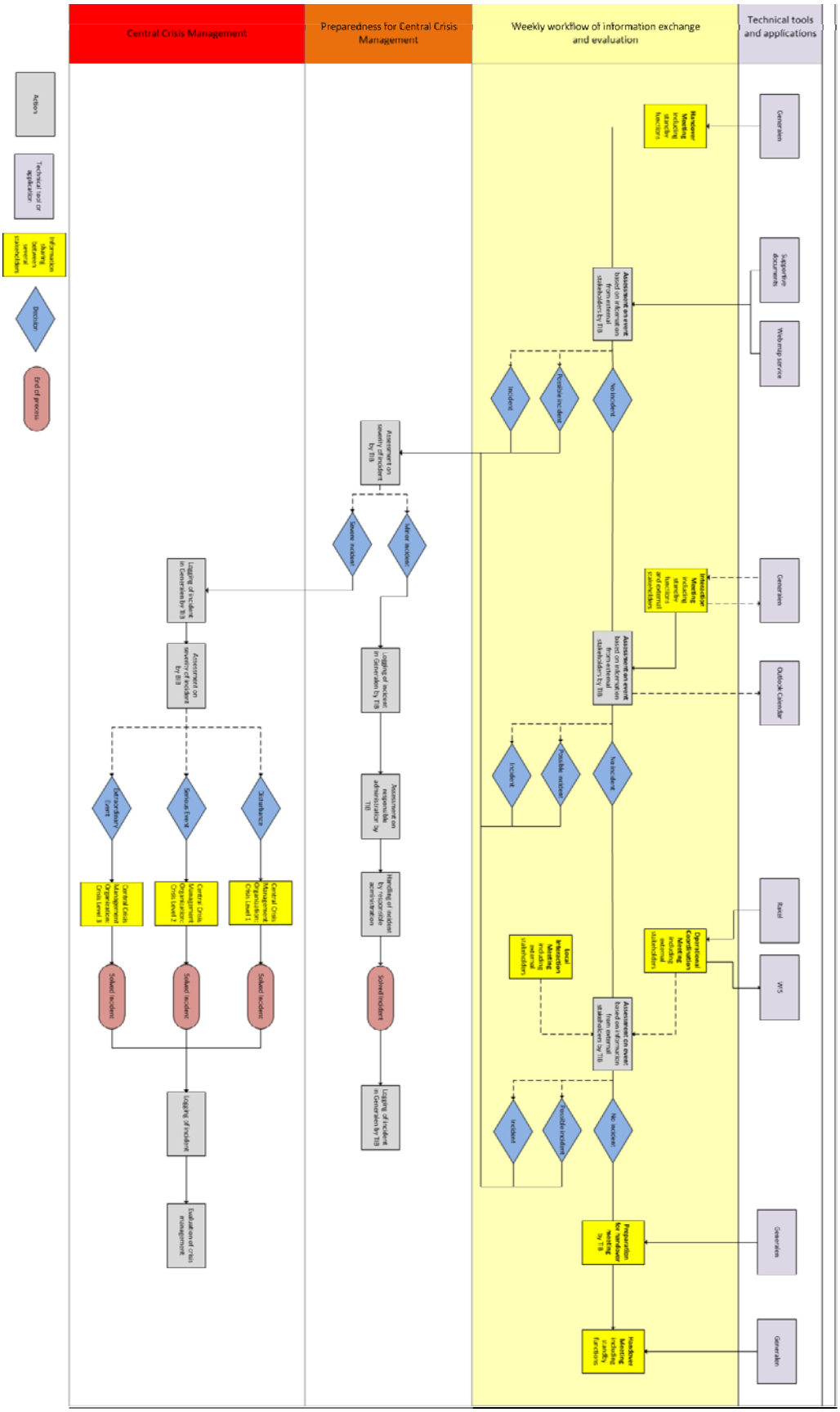

Figure 5: Model of the standby functions weekly workflow

3.4.5 Data Usage in Crisis Management

In the process described in section 3.4.4 information is exchanged between different stakeholders continuously. The information exchanged on a daily, irregular, basis usually derives from an occurring events. This information is hard to categorize since it is unstructured and will vary depending on the event it derives from. Information deriving from a major traffic accident on a highway will, for instance, not be structured in the same way as information deriving from an incident in a socially deprived area. The measures taken based on this information will also vary.

But information is also exchanged on regular basis through the weekly meetings. The information in these meetings also derives from incidents and crises, but it derives from incidents and crises that have occurred, meaning that the information have been collected and usually compiled in a more structured way. This information will allow the stakeholders to work more proactive to prevent new incidents and crises from occurring. All the information received throughout the week is however important for the standby functions. In the following subsections currently used data sources and potential ones are outlined.

3.4.5.1 Data usage for operational decision making

The data used for making assessments is mainly qualitative data. As mentioned above, this data is usually unconstructed and derives from occurring events. This data is mainly received from primary sources such as the police or the emergency service, and it is generally considered to be trustworthy, according to the informants. The data received from external stakeholders is usually the only data used by the TIB when making the first assessments since it is usually the only data available about the event. The data could be combined with geographical data found in the Malmö City Atlas, but since it is not possible to add any data to the web map service, it will not be possible to visualize it properly.

Besides the data received from stakeholders, data is also received from media channels and social media. Although the data from these sources is considered to be important, one of the stakeholders admits that this data will not be trusted in the same way as data from a reliable stakeholder will. Before acting upon data from a newspaper such as Aftonbladet (a national tabloid) or social media, the informant says it probably would have to be confirmed with other sources before taking any actions. Based on the informant's opinion, the data retrieved from sources like tabloids and social media could therefore be seen as an indication on a possible incident and not actual data to make assessments on. The other informant does however think that data received from tabloids and social media should be trusted to a greater extent. Tabloids and social media are usually among the first platforms to report about occurring events, if the TIB were to trust the information and act immediately, it could mean a great advantage in terms of time when taking action.

Table 2: Type of data sources used and potential data sources for operational decision making.

Source of information:	Type of data:	Used for decisions:	Potential use for decisions:
Internal stakeholders	Closed	Yes	-
Other stakeholders	Closed	Yes	-
News Media	Open	To some extent	Yes
Social Media Data	Open	To some extent	Yes

3.4.5.2 Data usage for proactive decision making

The data used for proactive decision making is both quantitative and qualitative. Usually the data used for the proactive work will be based on more structured data, meaning that it has been compiled and summarized. This data can derive from both external and internal stakeholders, but contrary to the data used for making assessments, this data acts more as an indication that an incident might happen and not as an incident that actually has happened. It will however usually be based on incidents that has happened. For instance, each week the Emergency Services compile a report based on data collected from all the emergency calls from the previous week. When compiling this data it is possible to see if the number of incidents in a specific area deviates from the normal. If something deviates from the normal, the Emergency Services can share this information with the TIB and the other stakeholders during the interaction meeting. This type of quantitative summaries allows the TIB and other functions involved in crisis management to work more proactive to prevent incidents from happening.

At the same time the qualitative data might also indicate that an incident is about to happen. One incident at specific address might not be of interest when compiling a quantitative summary, but if qualitative data regarding the incident is shared orally during a meeting and other stakeholders also recognizes it, it might be an indication on a bigger problem. Qualitative data derived from social media can also be used for this purpose. By monitoring social media it might be possible to receive information regarding upcoming events that might turn into incidents, and take necessary actions before they do. This could for example be information regarding an illegal counter-protest, which is about to take place within the proximity of legal protest, that might become a problem. If the TIB and the other stakeholders involved in crisis management receives information regarding this in advance they can prepare properly.

Table 3: Type of data sources used and potential data sources for proactive decision making.

Source of information:	Type of data:	Used for decisions:	Potential use for decisions:
Internal organization	Closed	Yes	-
Other stakeholders	Closed	Yes	-
Social Media Data	Open	To some extent	Could be utilized more

3.4.5.3 Data Generation

A single incident generates a lot of data. Most of the data generated by the standby functions will be qualitative. An incident will, for instance, be logged in Generalen as text and information regarding it will also be communicated in different media channels. Affected administrations will also generate a lot of qualitative data when handling the possible consequences of it. At the same time quantitative data will also be generated. An incident involving a break-in at a school will for instance not only generate qualitative data in Generalen and by affected administrations, it will also generate quantitative data such as crime statistics registered in other systems such as police databases. This data can later be used for analyses since most of it will be available to the municipal organization.

During an incident data will also be generated on various media channels and social media. Some of the data will be generated by the KIB on various social media platforms when communicating information regarding the incident, and some of it will be generated by news agencies and newspapers, but also by private individuals. This data is however not used by the municipal organization in the same way since it is not as easy to obtain.

3.4.5.4 Potential Ways of Handling Data

Based on the sections above, data within crisis management in Malmö Municipality is something that the standby functions have to react on, but also something that they have to generate. The documentation of how an incident was handled is as important as the data used to take action. The handling of data is therefore a vital part of the crisis management, but when it comes to handling of data several deficiencies can be found.

When a stakeholders exchange data with the standby functions, it is mainly done by phone. Even though it is an efficient way of sharing data fast it can also lead to misunderstandings since the data is shared orally. It might also be hard to get an overview of the incident if the data is only shared orally, since it will not be visualized in any way.

The lack of visualization of data is a recurring problem according to the informants. Considering that almost all of the data exchanged between the standby functions and the other stakeholders contain some sort of geographical information it would be beneficial if it was visualized in a map. The visualization of data in a map will not only give a better overview when making operational decisions, it could also be used for proactive decision making since the information would actually be saved. The oral information exchanged between the standby functions and the other stakeholders is not always saved or logged properly and can therefore not be leveraged in the same way at the moment

Logging the incidents properly would also allow the standby functions to evaluate the consequences of an operational decision. The operational decisions are made to handle the immediate

consequences of an incident, but sometimes the decisions made to handle the consequences of an incident might result in other incidents. If, for instance, the TIB makes a decision to send a security company to a school which has been subject to intentional fires, the number of intentional fires might decrease in that school. But at the same time a school in the proximity might experience an increase in intentional fires instead, due to the first school being monitored by a security company. This kind of strategic follow-up is however difficult to make if the logging of data is not done properly.

Given the focus on how data is saved, the informants also find it problematic to make comprehensive summaries of the incidents due to how incidents are logged. If anyone within the organization wants to make a summary of the incident and the consequences, he or she will usually has to search for external sources in newspapers and social media where the incident has been documented by reporters and citizens with photos, videos and text. Better routines on how to log an incident for all the standby functions and tools would facilitate this practice. At the moment, for instance, there are no routine or tool available for documenting the data generated by the KIB on various media platforms during an incident. This data would however be valuable when making an evaluation on how an incident was handled according to the informants.

3.4.6 Stakeholder's Requirement for Visualized Decision Support and Expert Input in Crisis Management

Even though all incidents differ from each other in terms of how to handle them, some common requirements for a decision support and expert input dashboard can be outlined.

3.4.6.1 Map

The incidents handled in crisis management in Malmö Municipality are always location based, and both the operative and the proactive decisions will take the social and physical geography into account. The possibility to visualize data in an interactive map in the dashboard is therefore vital. As a part of the map, the following features are of interest for the standby functions according to the informants:

- **Table of Content:** A table of content with a list of the layers displayed in the map. The table of content should also be interactive, allowing the user to turn on and off the layer he or she wants to display.
- **Draw Tool:** A draw tool to mark out specific points or areas of interest when an incident occurs. The draw tool should allow the user to draw freely or by pre-defined geometrical shapes.

- **Spatial Analyses:** A tool for executing minor spatial analyses. The spatial analyses could for example be a buffer analysis, where the user can set the buffer distance themselves to see which activities that will get affected by a specific incident. Two other examples could be an interpolation analysis, based on elevation data, predicting areas which will get affected by heavy rainfall and a Hot Spot Analysis to identify clusters of crime. Since it is impossible to determinate where an incident will occur it is important that the tool allows the user to perform the analysis on any location.
- **Add data:** A tool for adding data from occurring incidents. This function could either be an upload function, where the user can upload data from formats such as CSV, XLXS, TXT, SHP or KML, but it could also be a function where the user can add data manually anywhere in the map and later save it in any of the specified formats.

3.4.6.2 Logging

To be able to keep track of the course of events when an event or incident occurs it is vital that the standby functions can log activities and decisions made. It is therefore important that the application includes a function which allows the user to log information about an event or incident. The function should include important fields such as date and time, location, keywords and name of person writing the log, required to be filled in by everyone. Besides these fields the function should also include a free text field, where the event or incident is described in more detailed, and also a fields which allows the user to attach pictures or documents.

3.4.6.3 Visualization of Time

It is essential that the dashboard can visualize data over time. Studying changes over time would allow the standby functions to make better proactive decisions. The function for visualizing data over time should allow the user to set the span of time which he or she wants to study, and visualize this data in a map, graph or a timeline. The user should also be allowed to categorize the data based on certain attributes. This could for example be population data for a district, where the user can visualize how it has changed over time and categorize it based on age groups.

Furthermore, the functions for visualizing data over time should also include data or make predictions about how the variable might change it the future. This could for example be the expected population growth. This function should also allow the user to categorize the data based on certain attributes, when studying expected population growth it should, for instance, be possible to see the expected amount of person in a specific age group based on a certain sex in a district.

3.4.6.4 Timeline

To be able to keep track of current incidents or crises the dashboards needs a timeline where the user can add events and decisions made related to the incident or crisis. The timeline would have to be fully interactive, allowing the user to add and change any event or information related to the incident or crisis anywhere on the timeline. This would allow the user to visualize the course of events and use it as a basis for further decisions. The timeline could also be used for evaluating the handling of an incident or crisis afterwards.

3.4.6.5 Social Media Data

The dashboard needs a function which makes it possible to collect and visualize data from social media. When an incident or crisis occur the municipal organization of Malmö, external stakeholders, media agencies and citizens generates a huge amount of data on social media. The function should allow the user to collect and visualize this data in a map, a timeline or some sort of feed based on the user's criteria, meaning that the user can categorize the data to see information relevant to him or her. The function should therefore allow the user to categorize the data based on time, location, words or hashtags.

This function could for instance be leveraged when a heavy downpour has occurred, where several stakeholders and citizens has been affected. The functions involved in crisis management would then be able to recreate the sequences of events based on social media to evaluate the decisions made.

3.4.6.6 Expert input

The need for expert input in the dashboard is important. Many of the persons working as functions in crisis management are experts in their domain, but will still need some assistance when making more comprehensive analyses. Expert input would also be needed when visualizing data, since the visualization can be treacherous if not verified properly. When visualizing data on a map it could, for instance, be easy to find a strong spatial correlation between two variables just by looking at them, but this does not mean that there is causality. Expert input will therefore be important before making any major decisions based upon data from the dashboard.

Expert input could also be used for providing data to the dashboard. This could, as an example, be specific data on expected developments in a district, based on surveys from a research project. If this data is added to the dashboard it would already be controlled and verified by experts, and therefore safe to use for the functions involved in crisis management.

3.4.6.7 Scalability

Considering that the standby functions uses a smartphone, a tablet and a computer in their daily work, the dashboard needs to have either a responsive web design or a specific version designed for the screen resolution on the device currently used. This function is vital since the standby functions needs to be flexible when handling an incident, and might not always have the time to use a desktop computer or enough battery time on the smartphone or the tablet.

3.4.6.8 Offline mode

Given that it is possible to use the application on a smartphone or a tablet the standby functions requires that some functions of the application is usable in an offline mode. During an event or crisis the standby functions might sometimes lack mobile network coverage, something which will affect the access to internet. The offline mode would allow the standby functions to leverage some functions despite the lack of internet connection. Upon receiving internet access again the application is also required to synchronize any changes or queries made.

3.4.6.9 Shareable

The data visualized needs to be shareable. The crisis management in Malmö Municipality involves several stakeholders with different responsibilities, but they all need to share some information with each other in order to solve an incident. The data aggregated from a dashboard therefore needs to be shareable, either in the dashboard or outside the dashboard. If the data is to be shared in the dashboard, it would require the possibility to create a private session where one stakeholder could invite other stakeholders to share information in real time. But if the data is to be shared outside the dashboard, a tool for converting the visualized data into a PDF or PNG would be required.

3.4.6.10 Security

Some events and incident will involve sensitive data which cannot be shared outside Malmö Municipality's organization. It is therefore important that it is possible to enable user login and password on some functions in the application as a security measure.

4 CASE STUDY 2: SPATIAL PLANNING IN THE CITY OF COPENHAGEN, DENMARK

4.1 Introduction

4.1.1 Spatial Planning in the City of Copenhagen

The second case study of the UrbanData2Decide project focuses on discussing processes in integrated urban renewal projects in Copenhagen. In a renewal process citizen participation is crucial to the decision process. Citizens have in depth knowledge about their neighbourhood and their co-ownership of the projects is necessary to assure sustainability of the actions taken. Furthermore, citizen participation in urban development is a mandatory endeavour embedded in policies and laws guiding urban projects. The Ministry of city, housing, urban and rural affaires, has prioritized to work towards urban development (Ministry of Urban,housing and rural affairs, 2014).

Urban renewal and urban development are some of the priorities, mentioned in the ministry's policy documents. The city of Copenhagen municipality abides by a policy for disadvantaged areas in Copenhagen. The policy details the focus, objectives, goals, development plans and strategies to be adopted by integrated urban renewal projects. It describes urban renewal in context to the uniqueness of Copenhagen and as part of the city's development plan. It presents renewal projects under the term, "Områdefornyelse" meaning area renewal. In addition, the policy emphasizes the use of inter-departmental efforts, in which municipal planners collaborate with local players to improve disadvantaged areas. These disadvantaged areas are characterized as areas, which have stagnated in relation to the overall development of the city (Copenhagen Municipality, 2010). Democratizing urban renewal processes in such areas requires that the socially marginalized are represented well in the participatory processes and decision-making.

With a policy in place, focusing on creating green growth and improving quality of life, comprehensive analysis of existing statistical data and informal knowledge about the area is conducted, to identify physical and social challenges. The role of this exhaustive analysis of data, alongside the participatory processes with citizens, guides the urban project towards collective incremental decision-making that leads to a concrete neighborhood plan. However, some of the obstacles affecting these efforts might be the degree to which people show up to participation activities, the diversity of identified problems and the heterogeneity of the data and its sources.

In most projects, collaboration is based mostly on workshops. The ideas and suggestions generated by citizens during participatory events are normally supported by analyzed statistics and qualitative data from community members, and social networks within the community. Citizen contributions during workshop are often inspired by their personal experiences from the neighborhood and data

analysis presented to them by the planners. In most urban renewal projects, decision-making and planning in participatory processes is invariably shaped by human factors, such as *(i)* the planner's interpretation of the analyzed data, *(ii)* the citizen's interpretation of the presented data analysis, their personal experiences from life in the area, and *(iii)* the local knowledge about the area from dialogues with community members and the examination of the findings from the pre-studies. Both planners and citizen interpret and discuss analysed data, though both interpret the data based on different experiences and knowledge about the area.

The challenges in urban renewals projects, concerning the collection and analysis of data and its use in decision-making, planning and collaborative work are based on the heterogeneous nature of data and problems in the communities and the reflexivity of the process: Each disadvantaged area has its specific problems and dimension. This in turn influences the participation process and what data is relevant to be analyzed. In each project context, there are unique challenges and opportunities to be addressed and there is no way of anticipating how citizen would respond. This requires an investigation into three elements, *(i)* what are the specific problems of marginalization that influence the neighbourhood under investigation, *(ii)* what data can be used to support collaborative decision-making processes and *(iii)* how can non-participating citizens be included in the renewal projects. Each of these dimensions in turn influences the other dimensions. The statistical analysis is used by municipal planners to confirm the existing challenges and opportunities in a community, which are often addressed in the social settings e.g., workshops, meetings, campaigns and street interviews.

The case study underpinning this section takes place in cooperation with the technical and environmental administration of the City of Copenhagen that is responsible of the urban renewal projects as well. We have conducted a field study through a participatory observation of processes and activities on an urban renewal project in Sydhavnen. Sydhavnen is a part of Copenhagen harbor that was moved from being part of the industrial harbor to house modern apartment buildings and service industries and is adjusted to a working class neighborhood. Fieldwork was conducted by observing the municipal teams as they performed their duties on and off site between their offices and Sydhavnen. Other forms of data and information were acquired through interviews and analysis of project materials. In this description of fieldwork we will show how one case of Copenhagen's urban renewal projects at Sydhavnen is initiated and integrated in the communities.

In presenting this case we will first discuss the methodologies used for conducting the qualitative research in the fieldwork. We will discuss the approaches taken and key information they intended to provide. Then we introduce the *Områdefornyelse Sydhavnen* case, and discuss the project setting, followed by an overview of the process flow and an evaluation of project phases and the data used. The section concludes with a list of overall requirements for data based on decision support.

4.2 Method

4.2.1 Methodological Approaches

The investigation of urban renewal in Copenhagen applied a case study approach with interviews, participatory observations and analysis of documents. The study was conducted by Joshua Ddamba and Yvonne Dittrich from the IT University of Copenhagen in cooperation with the Technology and Environment Administration of the City of Copenhagen. The fieldwork and data collection is related to two urban renewal projects: Sydhavnen and Rentemestervej. Observatory work was conducted without any interference of the project activities or team members as they carried out their tasks. In the continuation of the project we plan a Participatory Design part resulting in ideas and if possible proof of concept prototypes exploring the visualization of data to support the planning and decision processes.

At the beginning of the investigation, the study involved the observation of public events attended by the municipal teams as well as events organized by the team in Sydhavnen. In these events, observations of the interaction between team members and citizens were made in order to develop an understanding of how data was shared. Further observation of the project campaign stand in Sydhavnen looked at the various ways of how data was generated, collected and used. Workshops with citizens organized by the project team at Sydhavnen were observed as well. Workshops were based on three themes. For each theme a series of three workshops was held. All together there were nine workshops in total. These observations involved performing audio recording and collecting sample materials distributed at the workshops. There was an observation of the final feedback meeting.

Interviews were conducted with team members at their workplaces. All interviews were audio recorded and transcribed. The first interviewees were planners of the Sydhavnen team. After preparation of a series of open-ended questions, we began interviewing the urban planner team. Interview involved short tours around the work area while describing the work process. Video recordings and photographs of the materials involved in the process were taken.

Open-ended questions were prepared based on initial observation, the document analysis and on the outcome from earlier interviews. Interviews were focused on how the team investigated different challenges in the area, such as social and cultural challenges, infrastructure and common gardens. The selected challenges being investigates are based on the criteria defined by the municipality's policy for disadvantages areas. The open-ended questions were often supported by follow-up questions to further clarify a topic.

Interviews were held with theme leaders responsible for leading the investigation for the individual themes mentioned above. These interviews were conducted formally with open-ended

questionnaires. Unstructured interviews were regularly conducted while they were at their workplace and after workshops and meetings.

A second research investigator conducted a group interview with the planner who prepared the Sydhavnen project proposal and the leader for a new application at another neighborhood, Rentemestervej, plus two team members. This interview was based on open-ended questions, which were discussed with the group as a whole.

A further interview is still to be held with the project leader from the Sydhavnen project to complete the series.

Table 4: **Data collection methods**

Data collection Methods	City of Copenhagen (Municipality)			Location
	Project theme	**Persons involved**	**Event**	
Interview	Spatial Planning and city life (Theme 1)	Architect planner1	1 interview (1-2hr)	Municipality head quarters
Interview	Theme1, Theme 2, Theme 3	Architect 1	1 interview (2hr)	Municipality head quarters
Interview	Social, cultural leisure (Theme 2)	Social Scientist (TL)	1 interview (2hr)	Municipality head quarters
Interview	Energy climate sustainability (Theme 3)	Spatial planner 2 (TL)	1 interview (1 hr)	Municipality head quarters
Interview	New Project Rentemestervej (TL), Områdefornyelse project committee	Social Scientist,		Municipality head quarters
Participatory Observations	Theme1, Theme 2, Theme 3	Citizens & Planners	Kick off meeting	Sydhavnen
Participatory Observations	Theme1, Theme 2, Theme 3	Citizens & Planners	Campaign	Sydhavnen
Participatory Observations	Life between and around housing (Theme 1)	Citizens & Planners	Workshop 1	Sydhavnen
Participatory Observations	Social, cultural leisure (Theme 2)	Citizens & Planners	Workshop 2	Sydhavnen
Participatory Observations	Theme1, Theme 2, Theme 3	Citizens & Planners	Committee election	Sydhavnen
Analysis of Materials	Theme1, Theme 2, Theme 3	Citizens & Planners	Campaign	Municipality head quarters
Analysis of Materials	Life between and around housing (Theme 1)	Citizens & Planners	Workshop1	Municipality head quarters / ITU
Analysis of Materials	Social, cultural leisure (Theme 2)	Citizens & Planners	Workshop2	Municipality head quarters / ITU

4.2.1 Data analysis

Data collected from the fieldwork through participatory observations and discussions was typically recoded verbatim as well as filed notes. Transcription of the audio recording from interviews and meeting were produced, for review. Visual data was collected through photos and video recording of

meetings, interviews, demonstrations and materials. Filed notes describing the activities and events were used in collaboration with the other methods of data collection.

In debriefings data sources used were identified, a first timeline was constructed and the below described characteristics of the process were discussed. These dimensions were then used to analyse the field material systematically. The result has been complemented through member feedback as part of a participatory design workshop implemented Wednesday February 11th.

4.2.2 Trustworthiness

The following measures were applied for assuring trustworthiness of the findings. (Robson 2002)

4.2.2.1 Regular Debriefing

Two researchers were involved in investigating the cases. The first was the main field researcher holding close contact with the project process and conducted fieldwork through observations, field notes, collecting data and capturing recordings, which were documented by transcription. The first researcher performed regular debriefings of the findings to a second researcher. The debriefing recounted the events and the materials used in the project process as it unfolded, leading to a clear mapping of the entire process. The debriefings also served for identification of questions and emerging themes.

4.2.2.2 Data triangulation

The consistency of collected data was a key for verifying individual findings. Data was collected from transcribed interview recordings of team members. Another set of data was collected via field notes, sample documents and materials, which completes and confirms the transcripts. The analysis was based on the context in which the data was used, along the project process. The findings were then verified with the municipality's project team.

4.2.2.3 Interview Triangulation.

Interviews were conducted with team members and the project leaders. Transcriptions of the details from interviews were used in the reconstruction of the tasks and the events in project process. While the field researcher would get close to the case study and the fieldwork, the danger was that he became subjective in process. To avoid this, the second researcher conducted a second level interview with the team members and project leaders partly previously interviewed focusing on reconstructing the Sydhavnen timeline prior to the observations and understanding the variations in the process by comparing it to the work with the application for the Rentemestervej project.

4.2.2.4 Member Checking

The members of the team of planners from the municipality, often reconvened to collectively discuss the findings, and exchanged for information while exploring and probing the collected data. The team members crosschecked their findings with each other. The discussion was often based on a categorized collage of feedback across one of the walls in the offices. This collective analysis allowed members to ensure that they have a common understanding of the process.

4.3 Results

4.3.1 Integrated Urban Renewal Project Sydhavnen

A field study conducted on Sydhavnen, observed how data was used and moved between experts and citizens. The study helped to map out the decision-making process including the participatory processes between the municipality and the Sydhavnen residents participating in the urban renewal exercise. Sydhavnen, a former industrial harbour and adjacent traditional working class neighbourhood, is currently undergoing an urban renewal process. The purpose of the project is to promote new, positive development in the area by looking at the existing infrastructural, social and economic challenges and opportunities. The work with the Sydhavnen project started with preparations of the proposals and applications both within Copenhagen municipality and to the Ministry of Housing, Urban and Rural Affaires (MHURA). With the positive decision to go ahead, the project started in mid-2014, with a participatory process determining the specific actions to take in the area.

The following presentation first focuses on the stakeholders in Urban renewal projects. It then discusses roles and functions of key actors before it discusses the decision processes that are part of the proposal preparation and the preparation and implementation of an urban renewal project.

4.3.2 Stakeholders in Integrated Urban Renewal in Copenhagen

4.3.2.1 Copenhagen Municipality

The neighbourhood and urban renewal department is situated at the Technical and Environmental administration. The urban renewal project implements the 'Policy for Disadvantaged Areas of Copenhagen' that details concrete goals for urban renewal and development. It also identifies a list of disadvantaged areas. Urban renewal projects normally are co-funded by the MHURA, where the municipalities can apply for 10 million DKK (1.32 Million EU) (Buch, 2014). Copenhagen municipality normally provides twice this amount for the projects. Copenhagen Municipality is represented in the urban renewal projects by (teams of) planners, who play a lead role in planning, driving the project and fostering and facilitating participation in the process. The planners involved in the project come

with different professional backgrounds ranging from architects, sociologists, and spatial planners to experts on low-energy housing and other relevant expertise.

Besides the central administration, local citizen representations have an interest in the prioritization of their areas for the renewal projects. Since 2006, the central citizen representation is complemented by 'lokaludvalg', local councils representing their neighbourhood in the central administration. These local councils are involved from the very beginning when the proposal to the central municipality and later to the ministry is initiated.

Other stakeholders are identified and included as the proposal and later preparation process progresses. These community stakeholders though might be different ones from project to project. One common group of actors though is the public housing sector. Other actors can be schools, religious organisations, the local public library, business associations and the like. Within the projects these are called 'key stakeholders'

4.3.2.2 Identification of community stakeholder

The type of community stakeholder who will be involved in the proposal and the project depends on the area being investigated and its specific problems and characteristics. The identification of what an urban renewal project should focus on and who to involve takes place in an iterative process: Issues are identified based on socio-economic data and other systems such as the business registry. Information from open street interviews with local residents, meetings members of the local councils, politicians and e.g. the head of the local school complements this information. One of the challenges is to include relevant stakeholders that are not easily identifiable through statistic data or snowballing the social networks of the official representatives. Such stakeholders, like e.g. the local library may only be noticeable by their absence in the official report of community. The fusion of expertise in the project team provides more opportunities to involve such stakeholders and improve transparency in the citizen involvement.

Below the roles and functions of the municipal planners as the central actors and the involved citizens are discussed.

4.3.3 Roles and functions

4.3.3.1 Municipal planners roles and functions

Municipal officials take on the role of facilitator, where their expertise guides participants in complex topics. The teams of officials were made up of individuals from diverse professional backgrounds. Often members of these teams would complement each other in the renewal projects. These responsibilities mainly involved the use of miscellaneous data analysis technics and development of methods for citizen involvement. The municipal team responsibilities and competencies overlap

throughout the project processes. Team leaders coordinate processes and the activities between team members, to ensure consistency.

1. **Data Collection:** Team members are expected to collect data from citizens through project participatory activities with citizens.

2. **Data analysis:** Team members were expected to perform analysis on structured data from various data sources as well as analyze the data from the participatory activities whenever the need arises.
3. **Dissemination of Data**: The members should provide information to interested citizens in form of leaflets, posters, and as input for the formal participatory processes.

4. **Citizen Mentorship:** The municipal team had to perform different function in their roles as facilitators such as *instructing*, *nurturing*, *listening*, *encouraging*, and *empathizing* with participating citizens.

5. **Mediating between Policy and Citizen Participation:** Aligning projects to confirm to the policy in a participatory process required careful coordination. Officials had to act as mediators between municipality and the participating citizens. To ensure the goals specified by the policies, close attention had to be given to the discussions and ideas to ensure that suggestions were in line with the focus areas and possibilities of the budget.

4.3.3.2 Citizens' roles and functions

During our observation, it became visible that the citizens' role in the participatory process is not as uniform and straight-forward as expected. The following outlines a number of roles and functions citizens and community stakeholders are assigned to:

1. **Providing Expertise about local relations*:*** During the participatory process citizens act as experts, showing knowledge of their neighborhood.

2. **Providing data:** The municipal officials, view citizens as data providers. This approach allows officials to gain understanding by learning and collecting data from citizens through participatory processes such as meetings and workshops. Ultimately citizens provide the data required to inform the participatory process and to guide the municipal officials.

3. **Taking decisions:** Citizens are encouraged to voice their views and ideas and act as decision makers of what should be implemented. Subsequent decisions made in participatory processes are used to build towards a final concrete neighborhood plan.

4. **Driving the project:** The citizens are invited to become project owners, and are encouraged to communicate their ideas as freely as possible, in favor or against ideas any other suggestions. The project is theirs and they are the decision makers.

Some of these functions are in conflict with each other, which mirrors the situation of the renewal projects being policy implementation on one side and depending on participatory innovation on the other side.

The next section will detail the processes from a workflow perspective.

4.3.4 Workflow

4.3.4.1 From proposal to implementation of urban renewal projects

As mentioned already above, urban renewal projects implement a municipal policy. They therefore are a reoccurring phenomenon. The overall process is described first. We then present how the process in the Sydhavnen project unfolded. Thereafter we discuss the causes for variations in the process from project to project.

4.3.4.2 Common elements in the project process

All renewal projects start with a decision, which of the remaining disadvantaged areas to pick from a list compiled based on socio-economic data and the criteria the municipal policy is based on. These criteria are the presence of marginalization, number of small flats, lacking installations, percentage of inhabitants with non-western background, unemployment level, low or no education and low average income.

This data is revisited to compile a short **preliminary application to the municipality**. Parts of the application are also photos taken on a first visit to the neighbourhood. Upon a positive decision the **application of funding from the MHURA** is compiled. Here statistical data is analysed in greater depth, local council members and community stakeholders are consulted. Their input is consolidated using additional statistic data where available. Parallel to the application possible team members are identified.

When the decision by the ministry is taken and with it the core budget is decided, the **preparation phase** starts. All urban renewal projects involve citizen participation, starting from the project preparation to the maintenance phase. The preparation phase starts with the identification of community stakeholders and the recruitment of citizen participants. During this phase the concrete actions are designed and decided. The preparation phase finishes with a project plan detailing actions and budget for the renewal project. In the end of the preparation phase, citizen representatives for a steering committee for the project implementation are selected.

During the **implementation phase**, the plan is implemented. The steering committee monitors the progress of the implementation ideas and plans.

All urban projects must have a **sustainability phase** where there is a handover of the maintenance of the project and recognition of future development from other actors including parts of the municipality itself. This process ensures that development in the area continues to grow and new development opportunities to build on top of the projects are realized by the citizens themselves.

4.3.4.3 The Sydhavnen Process

In this section, we describe the process of the project preparation phase and identify the different actions and events that took place. There after we will discuss the variations between different urban renewal projects.

The Sydhavnen was selected among the areas shortlisted for development by the municipality. The investigation on the Sydhavnen project has been focused on the preparatory phase of the project and not the implementation, as this is where the central decisions take place. The application phase was reconstructed through an interview with the leading planner in the urban renewal department. Although the pre-study involved the area selection process, exploring the area for data and information was done based on a fixed set of selection criteria as mentioned above. Exploring these criteria is a requirement for drafting the project application.

Figure 6 gives an overview over the process, the central decision points and the data used.

The application phase enabled the identification of physical, socio-cultural and economic challenges in Sydhavnen. Members of the project team were selected during the formulation of the proposals based on skills required to investigate the identified problem domains. Following these stages was another series of set of activities on the project in which the citizens were involved for the first time. These activities involving citizen collaboration form the start-up-phase in which citizen are contacted via mail posts, community events such as the red-square opening, cultural festival and campaign where flyers describing the project were handed out to Sydhavnen residents. From this brief introduction we can map out the process and its elements through figure indicated below.

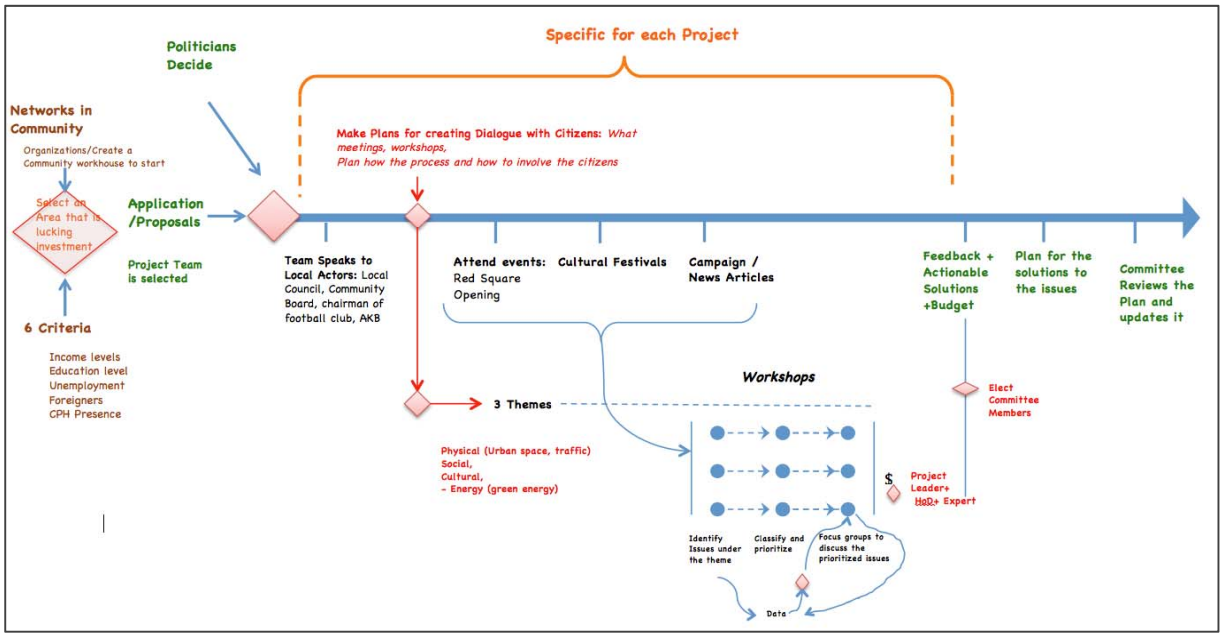

Figure 6: Overview over the process, the central decision points and the data used.

To prepare the internal proposal and the application for additional funding to the MHURA, a pre-study was conducted on Sydhavnen: data was collected from different sources including the socio-economic map and analysed based on six criteria defined in the municipal policy for disadvantaged areas. The socio economic maps visualize data in form of statistics, physical elements, down to the level of administrative squares allowing to identify the most problematic areas in the neighbourhood.

An analysis was done on structured data, such as socio-demographic data and data from various sources, and unstructured data from interviews with municipal administration representatives, members of the local council and citizens of Sydhavnen. The data for analysis was extracted from flat files and maps found in the municipality's open data portal and other internal sources. Some data was extracted into excel for analysis, it was indirectly provided by the online portals through visualizations provided in the form shape files, csv, geojason and Jason data files. At the same time they were used to identify specific problems existing in the area. Further analysis and comparison is done on data from interviews of community networks and organization in the community. The identified networks and organization have some influential role in the community, e.g. community workhouses, businesses and local politicians. These entities have good knowledge about the marginalized areas.

4.3.4.4 Trip Through Area

In order to develop an understanding of the area, a trip through Sydhavnen was one of the first activities. The exploration of the area involved walking and cycling through Sydhavnen and to talk to resident, stakeholders, like local shopkeepers or the coffee owners about their perception of the area. With this first encounter a network analysis of the local community started in order to establish who the most well connected people are in the area. This analysis is used to identify the local networks in the community and the people involved in these networks.

4.3.4.5 Internal Proposal

The results from the analysis of quantitative and qualitative data were used to compile a project proposal to the municipality. The analysis and compilation of data for the application uses more criteria than the project selection. The submission of the proposal to the central municipality was for consultation or recommendation, to continue with the project application and preparation process. While waiting for response from the municipality, the data analysis continued on additional criteria.

4.3.4.6 Application to the Ministry

Once the Internal application is given a 'go ahead', more data is analysed and used to compile the application for funding from the ministry (MHURA). The application to the ministry uses even more criteria than the municipality. About 30 – 40 different criteria of data on Sydhavnen were analysed once the concrete boarders of the area to include in the project were identified. The urban renewal expert selected eight themes to focus on in the renewal project. Here core members of the future team were already assigned. The member of the technology and environmental administration compiling two separate applications (due to regulation regarding application to the ministry) and share the analysis files and the proposal with the new team.

4.3.4.7 Feedback to Stakeholders

Though the ministry only approved one of the applications and with it half of the amount applied for, the municipality decided to continue with the project based on a reduced budget. The team was deployed into the community to discuss the project with community stakeholders in Sydhavnen. The community stakeholders have important roles and their support assures participation and support in the community. Also their knowledge about Sydhavnen is important. Some of the key actors interviewed included local councils, community board, chairman of the sports club and social housing organizations.

4.3.4.8 Formulating an Engagement Plan

The team analyses the data collected from the interviews and results from the data analysis and defines a plan of how to engage with the community. During this process the team combines and reduces the eight themes from the application to the ministry to three themes for which materials are prepared for engaging with the community. The project leader conducts meetings with each theme leader who designed, planned, and organized the participation process including the engagement tools, dissemination of information and data collection methods.

4.3.4.9 Establishing a Presence in the Community

The first step of the engagement process involved disseminating information as well as taking advantage of public events. This was done through mail, attending a public political discussion event, and a cultural festival. The team then marked their presence with a campaign stand in Sydhavnen, for which they prepared maps, surveys, flyers, posters games, food and music to engage with community. The survey was based on two questions where community members had to describe three the best things they liked about their area and three of the worst things that needed improvement. The maps were used to map out walking patterns where community members put sticker on where they lived, places they like and places they did not like. Other maps were used to map out the emotional attitude to places in the neighbourhood. At this event residents volunteered themselves to take part in the workshops series focusing on one of the themes. The discussion at the public events also provided the team with the opportunity to learn about the normal residents' perspective.

4.3.4.10 Data Analysis and Workshop Preparation

After the campaign and interviews with the community, the team transcribes the data from the surveys, and field notes into excel and categorized the results. Then the team creates a categorized collage from cut out paper strips of the survey answers, across one of the wall in the office. Likewise the data collected from the maps is captured and digitalized using map tools into geospatial maps and shape files that display the patterns similar to the physical maps used to capture the data. These data collections form the background information that is required to describe aspects of the community that need improvement. For example a number of answers pointed towards the improvement of shops and the shopping streets to be made more vibrant so that more people would enjoy doing shopping from Sydhavnen. This process is also used to establish connections between the issues being raised by community members and to identify areas that have huge potential in the community. The data and analysis from the process is used to prepare the materials used in the workshops. A consultant is hired by the municipality to structure the workshops and their content.

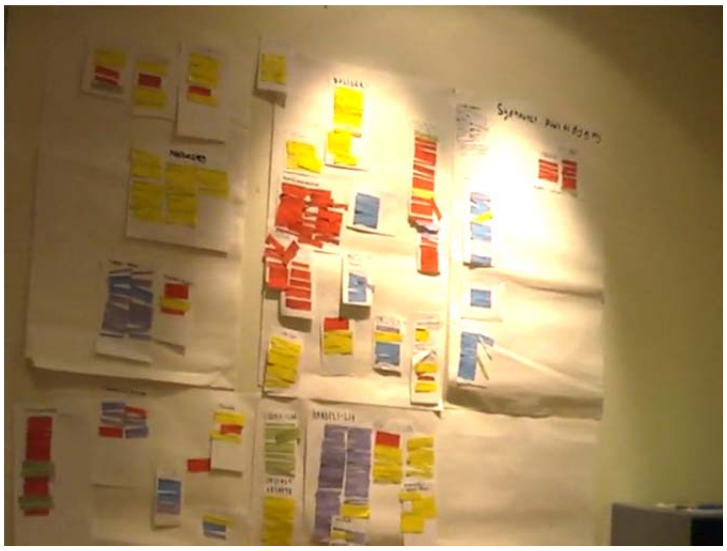

Figure 7: Collage of categorized community responses from survey questions

4.3.4.11. Meeting With Politicians, Actors and Local Organizations

The project manager maintains constant communication with local and internal stakeholders. The project manager holds regular meetings with political and individual representatives of the area throughout the duration of the project preparation phase. Parallel to this, further meetings are held between the project manager and the local administrative networks and social housing organizations, and even more meetings are held at regular intervals with different actors from the community.

4.3.4.12. Participatory Process With Workshops

Based on the results of the initial engagement, a sequence of workshops between the municipal team and the residents were conducted to further explore the challenges related to the three themes and come up with concrete actions addressing the challenges. The three themes were categorized in the following order;

1. Physical infrastructure focused on life experiences between buildings
2. Social cultural infrastructure focused on social, cultural leisure
3. Green energy focused on energy and climate sustainability.

For these themes, nine workshops were scheduled involving citizens in a dialogue. The workshops were based on three cycles, such that the results or/and decision from the first cycle would feed into the design of the following workshop. The first stream of workshops were used to identify issues under the themes, the second stream was used to clarify and prioritize issues and the third stream was used to form focus groups to discuss the prioritized issues and design project ideas to address the issues. The workshops were an environment where municipal experts and citizens held

discussions, and made numerous decisions on how to improve the neighbourhood. The end result of this phase was a series of concrete neighbourhood actions compiled into the project plan.

4.3.4.13 Allocation of budget

The team compiles the results from the workshop and prepares feedback on the ideas and motivates their prioritization for the neighbourhood plan. The project manager allocates a budget to the actions of each of the three themes.

4.3.4.14 Municipal feedback & Committee election

The feedback of the ideas for the neighbourhood plan, complemented with their budgets, was presented to the citizens in a joint feedback meeting. In the same event a steering committee was elected by the residents present to monitor the implementation processes of the agreed plans.

4.3.4.14 Feedback to key stakeholders

A kick off meeting is arranged with key stakeholders of the community such as building owners (e.g. social housing organisation), sports clubs presidents, and local politicians, along with the steering committee residents for team to present the outcome of the preparatory phase.

The second phase is the implementation phase where the municipality sets up an office in Sydhavnen and the ideas from the three different themes are planned in detail and implemented. The third phase is where the continuity of development through future development plans is established. The rational of this phase, the sustainability phase, is to anchor the implemented actions to ensure that they continue to contribute to a positive development of the community.

4.3.4.15 Process Variations Specific to Each Project

Where the cornerstones of urban renewal process are common and are structuring the overall schedule, each project has specific challenges resulting in unique processes. The central variation here is how the citizen participation is organized. This very much depends on the specific challenges and problems of the community. The start-up of the preparation phase in our case piggybacked on a political and cultural event. Our interviewees recalled another urban renewal project, which started out with a light dinner for the community where 500 citizens joined. The dinner continued in discussion groups at the same evening kick-starting the process. Such an event was not considered fruitful in the Sydhavnen case.

Whether to work with parallel themes and workshop series for each theme similarly depends on the context, as does the decision to focus on these three themes.

The preparation of materials and planning of the participation events is not a pre-structured process; which means that participatory methods are not fixed. Qualitative data from traveling through and experiencing the area, and information gathered through social networks of the community stakeholders, combined with the social demographic data are the main set of data used for preparing the collaboration. However the analysis of such data is subject to interpretation by the project team when designing activities and events for collaborating with citizens.

Most of the citizen collaboration is based on self-selection. In order to counter the implicit bias, outreach activities to the whole community through mail is used. Likewise, the team might design a telephone survey implemented by professional companies in order to gain a more representative picture of the preferences regarding specific prioritizations.

The engagement process with citizen and collaboration approach must be transparent enough to spur creativity and yet demarcate clear decision points during the series of workshop discussions and negotiations. This requires that there are identifiable decision points based on the specific participation approach.

4.3.4.16 Variation in the Data to be Correlated to Statistical Data

As the participatory process depends on the specific characteristics of the neighbourhood, so does the data that is used to inform the process. This data often needs to be collected from actors or organisations in the neighbourhood. For example data about flooding basement would need to be collected from building owners and civil organisations. The participatory process itself generates data and information that is used by the team to design the next steps and to in the end finalise the neighbourhood plan. Further, the results of the participatory process might trigger the team to search additional data to triangulate the participatory process. For example, in the Sydhavnen project, traffic noise data was analysed as a reality check for subjective impressions of participating citizens. A professionally implemented survey might be used to complement the results of the participatory process that might be biased as it is based on self-selection.

4.3.4.17 Variations in the Data Analysis Methods

As the data differs, so does the data analysis. The data analysis needs to combine qualitative analysis and statistical analysis. The results of the citizen participation is often qualitative data with is analysed using categorization exercises. The issues raised by the citizens are illustrated with pictures. In most cases the engagement and the participatory processes reveal, elaborate or identify new problems all together, which may require further statistical analysis.

4.3.4.18 The Data analysis generates new data

As data is analysed more data seems to be generated to be shared in an excel table on a shared folder for the project team to access. These analyses are stored and can be assessed and used as references in the future work.

4.3.5 Data Usage in Urban Renewal Processes

The section above gave an overview over the process. This section now identifies data sources and the kind of data used in the process.

There is a large amount of quantitative and qualitative data that is subjected to analysis in the project preparation. During the process of selecting the area, budget applications and project start-up, the data selected for analysis is based on a fixed set of statistical data matching the criteria used to identify underprivileged areas in Copenhagen. Among other data the main statistical data used is based on the socioeconomic map compiled by the Technology and Environmental administration. This data helps to make clear what sort of data is needed throughout the process. It comprised the relevant socio-demographic characteristics needed to identify how people in a disadvantaged area faired in comparison to the rest of Copenhagen.

4.3.5.1 Data is used for Selecting Areas for Development

Sydhavnen and other Områdefornyelse project areas are selected, based on a fixed set of criteria. This data is part of the socio-economic map of Copenhagen compiled and provided by the technical and environmental administration department. Sydhavnen was identified as one of the shortlisted areas. The analysis of this data though is used to further analyse the internal structures of the neighbourhood. For example a specific challenge in Sydhavnen was the contrast between the old Sydhavnen, a traditional working class neighbourhood with small apartments and social housing, and the new Sydhavnen, with new rather expensive houses at the harbor front. This contrast was one of the reasons for selecting the area.

4.3.5.2 Analyzed data is used to inform the project application documents

The data selected for analysis was downloaded in the form of files, extracted, analysed and aggregated in excel sheets and map tools such as QGis. These analyses were done in parallel to the initial interview with community stakeholders and used to compile the project proposal for submitting to the municipality and the application to the ministry. For this application to be successful a range of between 30 to 40 different data sets was analysed. This was done through iterations where every new finding from the analysis was updated to the document.

4.3.5.3 Data is used to identify problems in an area and to specify themes and goals for the project

The analysis of statistics in combination with information from interviews with local administrative networks, politicians, community stakeholders and organizations is used to identify the specific challenges of an area. One of the spatial planner stated that “from the sea of statistics there are mountains sticking out describing the problem”. The analysis of data presents variances in the statistics that are used to spot issues in a community. These extremes in the statistics are then input to interaction with the community in order to confirm and further explore the issue through qualitative data derived e.g. from interviews. Vice versa, the results of interaction with community stakeholders can lead to further investigations using statistics and structured data.

The identified problems and statistics related to the criteria specified in the municipal policy are used to identify themes to work with and goal to achieve with the urban renewal project. This in turn informs the design of the participatory planning process.

4.3.5.4 Analyzed data informed the plan for involving citizens

The analysis of the data in the application phase influences how the residents of the neighbourhood are approached. The variance in the statistics, combined with other interview were key aspect in identifying physical, social, and cultural issues, which in the Sydhavnen case were the basis for identifying three themes, which were used to structure the citizen involvement. Other forms of data such as historical information about the Sydhavnen was used to give an impression of points important for the identity of the area. How the community responses to the events is one of the major uncertainties for the team. The results of the initial stages of the engagement process therefore will be used to inform later events.

4.3.5.5 Analyzed data is used to design materials for participation.

The result of quantitative data analyses and information about the area were used in the project materials such posters, handouts and portfolios, as well as in the participatory process itself. For example, maps showing physical infrastructures are used as tools for triggering discussions with citizens as well as to collect additional data. For instance maps were used to identify movement patterns of residents. Maps were also used for participatory activities where residents used iconic stickers to indicate their attitude towards different areas of the neighbourhood.

4.3.5.6 Data is often in the form of maps.

Most of the data used and produced during the process has a spatial component. Maps of various kinds are therefore central to the process. Much of the qualitative data from the citizen involvement can be related to places in the neighbourhood. Socio economic map data is used to explore specific

challenges of the neighbourhood. The aggregation of data is based on the borders of the area under consideration. The values regarding different criteria are then compared to the averages for the whole of Copenhagen. However such comparisons can prove to be difficult as the borders decided for the urban renewal project might not coincide with administrative borders. The data analysis and aggregation was therefore done in excel. Planners download socioeconomic data, extract statistical values and created reports in excel. This is an iterative process, as the result of this analysis is also used to argue for which blocks and streets to include in the renewal project. The result of the analysis is then again visualized in form of maps.

4.3.6 Stakeholder's Requirement for Visualized Decision Support and Expert Input

The analysis of the above in detail described processes and the role of data and decisions in these processes resulted in a number of design implications that are discussed below.

The main points here are the need to accommodate a high level of procedural flexibility and the need to combine heterogeneous data sources.

4.3.6.1 Flexibility of process

Though the timeline for application for additional funding by the ministry and the deadline for finalization of the neighbourhood plan provides a frame for the urban renewal projects, the process is by no means fixed or even decided when a preparation process starts. This flexibility needs to be accommodated in the tool support.

4.3.6.2 Aggregating of Heterogeneous data sources

Data was usually acquired from multiple sources. Experts performed analysis on this data at different stages of the process combining qualitative and quantitative data. The central quantitative data used is provided in form of a socio-economic map. A range of additional statistical data is provided through a CKAN based platform. Qualitative data from discussions and interviews is analysed using methods like categorization and coding. Providing the possibility for housing collections of data from various sources in a flexible way and for aggregating this data, can reduce repetition of data pruning and analysis tasks.

4.3.6.3 Project area specific data

Each unique project area requires different strategies that are specific to their context.

The engagement processes with citizens differ depending on the nature of the problems in the community. The analysis of feedback from communities is also different and depends on the community's response to the information and data analysis provided to them. The participation

process might indicate problem areas that then need to be explored using again statistical data. If additional quantitative data is required, the IT department of the technical and environmental administration is open to help locate and extract the data in a suitable format. Materials for participation are designed specific to the problems in the specific area. No two areas with contrasting problems would have identical designs materials. All things part of the process depend on the specific area

4.3.6.4 Participation “generating Data”

The participation processes itself is organized to generate data in different ways. For instance, citizens generate data when interviewed. Also the participatory process can be seen as resulting in data that then informs the design of the following workshops and provides input for the political decision process. From the campaign stand to meetings and workshops data is continuously generated that is not currently centrally collected for analysis. Some of the participatory processes are specifically designed to gather information from the citizen e.g. movement patterns of citizens.

4.3.6.5 Reflexivity between data and the process

Data analysis and the participatory decision process are mutually dependent. The analysis of data is used to design and plan the participatory process and is used to inform the collaboration with the citizens in the concrete event. The participatory process on the other side creates data and triggers the exploration of additional quantitative data.

4.3.6.6 Exploring new data sources

To broaden participation beyond the self-selection of the residents participating in the events and workshops, the project team today uses surveys and mail. One of the opportunities could be to use social media to reach out to segments of the citizenry that would not participate in such events.

In other cases, new technical possibilities might be exploited to reduce the effort needed to generate this data. For example, data about how residents move through the neighbourhood can be collected automatically with the help of location information collected in mobile phones.

5 CASE STUDY 3: A DISCUSSION OF THE CITY OF VIENNA, AUSTRIA

5.1 Introduction

Vienna has changed significantly in the 25 years since the fall of the Iron Curtain amidst a climate of deep regional and international transformation. Despite these radical changes, the city has done quite well for itself: Today, it is one of the fastest growing metropolises in Europe, and if this growth continues as projected, Vienna will have two million residents by around 2030. This means that over three million people will be living in the greater metropolitan area. Growth is changing the face of Vienna. The city is more diverse: Different lifestyles, value systems and attitudes, shifting gender roles and a multitude of economic, language, religious and cultural backgrounds are shaping people's living situations, work conditions and leisure activities. At the same time, Vienna's role as a business location is changing: Today, the service sector and technology-oriented industries are dominant. There are now more knowledge-intensive services such as telecommunication, insurance, legal and tax consulting, and creative occupations than before. The population growth and the dynamic change in the economic structure are proof that Vienna is attractive and draws both people and capital.

Therefore, the efforts in the coming years will not be limited to preserving past successes and maintaining the existing high standards. Innovations are being developed that will ensure high-quality urban growth despite the diminishing availability of resources. With this in mind, the urban development plan STEP 2025 refines strategies and instruments in a way that corresponds to the needs of a rapidly growing city. This starts with instruments for the mobilisation of land and extends to the organisation of the framework conditions related to business location policy and infrastructure as well as the linking of existing and new infrastructure such as green areas and open space. In line with the principle of sustainable growth, valuable elements need to be preserved, used elements need to be modernised and outdated elements need to be transformed. At the same time, measures will be taken to strengthen equal opportunity and the social balance. And finally, STEP 2025 puts the spotlight on urban development as a collective task for policymakers, businesses and the public. Dynamic growth and social equity, location development and climate protection – the range of tasks to be tackled by the metropolitan region of Vienna is broad, and the objectives often seem to contradict one another. (Vienna City Administration, 2014)

For Vienna's urban development planners and decision makers, the participation of the public is a central aspect. When used at an early stage and in a targeted manner, public participation can lead to better results that are more sustainable over the long term. Successful dialogues require everyone involved to show respect, a willingness to communicate and learn, and a sense of openness. For urban processes, this often means a new understanding and new methods: It is no longer just about

communicating projects and decisions in a transparent manner, but about including stakeholders in the processes in which development goals are defined. Stakeholders are the experts and professionals from research, public and private organisations, policy makers on European, national, regional and local level, real estate market, service providers, investors, NGOs, interest groups, the public, and the media. A broad stakeholder and citizen involvement process was conducted in 2013 and 2014 named "Vienna 2015 – My Future" with the aim to inform about and discuss the future development of the city in workshops, exhibitions, round tables, online dialogue, bigger events and campaigns (Magistrat der Stadt Wien, 2013; Vienna City Administration, 2014). In 2014 the city started to develop the "Master Plan Participation – Dialogue and Discussion" a set of rules and guidelines for various forms of participation in different phases of urban development and decision making processes and suitable forms of communication between stakeholders. To involve citizens in the development of the master plan a series of discussion rounds were organised in 2014 (Magistrat der Stadt Wien, 2014). A draft of the Master Plan for Participation was presented in February 2015 to around 300 interested stakeholders. The master plan will be finalised in summer 2015 and will also include a "Check list for good participation processes" (Magistrat der Stadt Wien, 2015).

5.2 Methods

The investigation in Austria/Vienna used a case study approach with literature review, media analysis as well as events and workshops participation.

5.2.1 Literature

A major part was the study of relevant documents on key topics for decision making processes in Vienna. To mention are the Urban Development Plan of Vienna (Vienna City Administration, 2014) that is an instrument for providing forward-looking answers and that was developed as part of a broad, intensive dialogue process among policymakers and administrators, the scientific and business communities, residents and special interest groups.

Current European research projects include pilot studies in Vienna on mobility and transport such as the PASTA project supporting physical activity through sustainable transport approaches (PASTA project, n.d), the PUMAS project that aims at planning sustainable regional-urban mobility in the Alpine Space (PUMAS project, 2012), or the CITYKEYS project that is about the evaluation of smart projects across Europe (CITYKEYS project, 2015).

5.2.2 Media

With the regular screening of media, news and articles we could identify current issues and key topics that are on the city's agenda. Relevant sources include derStandard.at (e.g. Putschögl, 2013), Wiener Zeitung (e.g. Vasari, 2014), etc. and by following initiatives and organisations on Social Media

such as the Smart City Vienna Initiative (Vienna City Administration, n.d), Tina Vienna (2015) – the Smart City Agency in Vienna, Wiener Planungswerkstatt (n.d), etc.

5.2.3 Workshops, Events, Exhibitions

Participation at events, conferences and stakeholder involvement processes such as the "Vienna 2025 - my future"-process (as described above) brought deep insights on current key issues and developments. The Smart Cities Week (2015), the biggest Austrian conference on Smart Cities, focused on the current situation of smart cities in Austria as well on European level. The conference provided not only a theoretical background but also good practice examples for the integration of information and communication technology in an urban context. Highlighted topics were energy transition, big data and privacy, citizen involvement processes, and public procurement. The Wiener Planungswerkstatt 2015 has just started with an exhibition called Stadt.smart.entwickeln (engl.: City.smart.develop) that emphasises on intelligent solutions for current local and global challenges of cities and metropolitan areas.

5.2.4 Identifying cases

Based on these insights, collected data and information a list of current topics for decision making and urban development in the City of Vienna was created taking into account stakeholders and potential forms of decision support.

5.3 Results

Key topics that are of main interest for development and decision support in the rapidly growing City of Vienna have been identified. They cover different thematic fields: **Energy** supply that is affordable, environmental friendly and resource saving at the same time is a key challenge. The Urban Energy Efficiency Programme (SEP) highlights energy efficiency and provides guidelines for energy supply. **Transport and mobility** in Vienna is done to 66% by using public transportation. The goal is to increase this number up to 75% until 2020 that requires investments in the subway, cycle lanes, and new concepts for pedestrians. Despite in an increase in build-up land and land consumption, still 50% of Vienna's land cover is green spaces (green belt). Safeguarding quality of life and the **environment** has been on the city agenda for a long time, but continuous efforts need to be done to tackle climate change and climate protection. This is also related to modern water and waste management and creation awareness of citizens for environmental topics. Following the idea of sustainability also refers to the **economy** sector. The city aims at a globally networked economy with competition between locations and synergies between metropolitan regions in the central European region. Also to mention are a growing differentiated **society** as well as high migration to and from Vienna. Change in **administration** and institutions, new forms of cooperation and process design as well as regional governance are key elements to steer such spatial processes. Vienna also tries to make use of

modern and intelligent solutions. Smart technologies, systems and concepts can support good governance as well as responsible and sustainable use of resources that is needed for environmental, economic and social efficiency of a "**Smart City**" and its citizens. (Madreiter, 2014; TINA Vienna, 2015, Vienna City Administration, 2014)

The following shows existing cases for decision making and urban development in the City of Vienna. For each subject the background is described, the involved stakeholders are listed, and possible forms of decision support are outlined.

Case 1 Opening the new central train station

Background	In autumn 2014 the Vienna Main Train Station opened and became fully operational. It is a new central hub linking all four major railway lines converging on Vienna from the North, East, West and South with destinations to Czech Republic, Poland, Slovakia, Hungary, Slovenia, Croatia, Serbia, Italy, Switzerland, and Germany. The modern station offers significantly improved, principally international connectivity. The city council agreed to build the station in 2006. Construction began in 2007, starting with preliminary works. Today the rebuilt station has around 100 shops and restaurants. Moreover, brownfield development, mixed use office and residential developments including an education campus, green spaces for communication and leisure activities are currently being built until 2019 that all together will form an entirely new district in the city for around 15.000 residents. (Hauptbahnhof Wien, n.d; Sonnwendviertel, n.d.)
Stakeholders	Railway company, municipality, real estate sector, private investors, transport and urban planners, citizens, media
Decision-support	The project is in its implementation phase. Social Media Data (e.g. from Facebook and/or Twitter) could be used to monitor and analyse citizen's (resident's, tourist's) opinion on the new Vienna Main Train Station and the renewed neighbourhood, to identify strengths and weaknesses and to be able to take the right measures.

Case 2 Planning a new subway line (U5)

Background	Short description: Since the late 1960s there have been numerous suggestions of routings for a line U5 but all these projects have been shelved, until the construction of a new U5 metro line in Vienna has been announced in early 2014. Several districts of Vienna will be affected by operations over the coming 10 years. Detailed planning, engineering works and budget negotiations are currently going on. In addition, Vienna's residents have just been voting on their preferred colour scheme for the new line. (ORF News, 2014; the Local, 2014)
Stakeholders	Municipality, public transportation provider, real estate market, construction and engineers, citizen, media
Decision-support	Open Data, expert knowledge and Social Media data visualisation could be used to support the planning phase of the project and citizen involvement.

Case 3 **Big events – Eurovision Song Contest 2015**

Background	In May 2015 Vienna is going to host the Eurovision Song Contest, a big European four-day music event going on in a Viennese event hall with a capacity for 16.000 people. In addition several public viewing locations will offer thousands of interested to follow the show and tourists from all over Europe are expected. Planning and organisation of such a big event requires ideal conditions in transport, safety and logistics. The city is planning and working on capacities adjustments of the public transportation system, security and safety measures, the construction of the Eurovision-Village, marketing strategies, city branding and tourism campaigns. (Wien.at, 2014)
Stakeholders	Municipality, city marketing, tourism, emergency services, citizens, media
Decision-support	Social Media Data (e.g. from Facebook and/or Twitter) could be used to monitor and analyse citizen's (resident's, tourist's) location based posts during big events for safety reasons.

Case 4 **Population growth and immigration**

Background	Vienna is growing and in 20 years will be home to around two million inhabitants, 200.000 more than today. An important factor for population growths in Vienna is immigration from other regions in Austria as well as other countries (especially from Germany and South-East Europe). This requires development and investments in infrastructure, including transport and housing, education, etc. (Lutz, 2013; Fellner, 2007). Immigration also leads to needs for additional housing, resulting for example in the construction of a new city in the city – Vienna's Urban Lakeside Aspern – a new mixed-use neighbourhood for 20.000 inhabitants (Aspern Development, n.d).
Stakeholders	Municipality, other public organisations, private sector, investors, research sector, citizens
Decision-support	Open data can be used to visualise demographic statistics such as birth, migration, age, gender, etc. of Vienna's population in the form of charts, figures, and impactful infographics.

Case 5 Shared Space Concept at Mariahilfer Straße

Background	Vienna's major shopping street Mariahilferstraße has been undergoing the whole scale revitalization. The street is now turning from car-busy street into pedestrians friendly. Advantages are broader sidewalks, new concepts for outdoor terraces and street cafes, more space for pedestrians, new seating areas, new lightning, Wifi installation, noise reduction, traffic calming, inclusive street design, etc. Still the reconstruction of the street faced at its beginning a lot of criticism and political controversies such as the fear of an increase in traffic and noise in the surrounding streets and loss in sales during the reconstruction phase. (Dialog Mariahilferstraße, 2011)
Stakeholders	Municipality, public transport providers, retail, real estate market, residents, media
Decision-support	The reconstruction has been finished in most parts. Social Media Data can be used to monitor analyse citizen's (resident's, tourist's) opinion on new street and its effects on the surrounding streets, to identify strengths and weaknesses to be able to set the right measures for the future.

Case 6	**Where does the money go? – Showing budget data**
Background	A used case could be developed for Vienna based on the UK application "Where Does My Money Go?" by the Open Knowledge Foundation with the aim to promote transparency and citizen engagement through the analysis and visualisation of information about public spending.
Stakeholders	Municipality, the public
Decision-support	Open budget data can be visualised to show how much is spent on the various functions of government in total — and where (e.g. services, housing, education, transport, health, general administration, etc.). This has been demonstrated by Open3 (2009 and 2011) in Vienna. A use case could deal with the update, visualisation and monitoring of this budget data over time.

Case 7	**From 5 to 10% - The challenge to double cycling**
Background	Compared to cities like Amsterdam, Copenhagen Bremen, or Münster where around 30% of the population use their bike as major means of transport, the numbers in Vienna (3% in 2006) have been rather low. In the 1960s and 1970s, the rise in prosperity and the rapid growth of car ownership led to a strong focus on car-friendly urban planning in Vienna; bicycles were exiled from the streetscape. Since 2010 a changing bicycle culture can be observed, also due to a strong image campaign over the years and with its summit in the "Year of Bicycle" in Vienna – a one year motivation campaign including the Velo City Conference. By 2013 the bike use was 6% (Wiener Stadtwerke, 2013). The goal has been to achieve a modal split of 10% bike use by 2015. (Mobilitätsagentur Wien, 2013; Weninger, 2012)
Stakeholders	Municipality, interest groups, the public, media
Decision-support	Open data and Social Media Data can be used to visualise and monitor bike use in Vienna. In addition, expert knowledge can be used for the right interpretation of the data and to set the right measures to achieve the goal.

Case 8	**The Year of Walking 2015**
Background	Similar to the "Year of Bikes" in 2013 in Vienna the "Year of Walking" aims to promote walking in the City of Vienna. To raise safety, comfort, attractiveness and quality for pedestrians the year 2015 will bring a number of events, activities and campaigns, a Vienna Pedestrian City Map and related mobile applications, a Street Festival, the Walk21 Conference and the development of "pedestrian highways" – the Mariahilferstraße being the first example. (Mobilitätsagentur Wien, 2015; ORF News, 2015)
Stakeholders	Municipality, interest groups, citizens, media
Decision-support	The initiative is at its start. Open data, Social Media data and expert knowledge can be used to aggregate pedestrian-related information in the city, visualise it and interpret the data with experts to formulate sound concepts and measures.

Case 9	**Road Accidents**
Background	Despite several measures the overall road accident numbers in Austria are as high as in the 1990s. Efforts are done to shape opinions and raise awareness of safety with all of its many facets. In addition, the aims are to support the research of sources of risk, and define further measures to reduce the risk of injuries and provide forward-looking approaches to leading a safe life. (KFV, n.d.)
Stakeholders	Municipality, ministry, emergency service, Austrian Road Safety Board, the public
Decision-support	The visualisation of road statistics – the data has been made available on the internet – could support not only the formulation of measures but can also support awareness raising in the general public. Factual data needs to be presented in a user-friendly manner so that it reaches the audience.

Case 10	**Green Schools**
Background	Schools leave large footprints. Ultimately, the goals of a green school are to measure and reduce its ecological footprint, while making the school environment

	healthier for students and staff, and getting the community thinking about solutions to the environmental problems. The aim is to improve the environmental health and ecological sustainability of schools, to catalyse and support "green" actions by kids, teachers, parents, and policymakers. Green schools are toxic free, energy efficient, sustainable, reduce and recycle waste, and teach environmental education. Also connected to green schools are clean and safe routes to schools. (Green Schools Initiative, n.d.).
Stakeholders	Municipality, education sector, schools, energy sector
Decision-support	Survey data to identify priorities for action (including for example assessing the level of waste from school lunch to checking the building for inefficiencies such as leaky taps, or electrical equipment left on overnight), expert knowledge as well as smart metering data of schools (e.g. energy consumption) are important input to support schools in issue identification, strategy planning, decision making, monitoring and evaluation.

Case 11 High-rise buildings

Background	Vienna is one of the fastest growing cities in Europe with several urban development projects either already ongoing or planned. The redevelopment project 'Areal Heumarkt' is located in the center of the city and supposed be finished in 2018 by private investors. It comprises a high rise building and a casino next to an already existing hotel and ice skating ring. The project is facing a lot of critique by citizens and local businesses; especially in regards to affordability of new luxury apartments and blocked historical view (UNESCO world heritage has eyes on the project). Similar current projects are: Bauprojekt Wien Meidling 'Komet Building' (new shopping mall) and Danube Flats (500 new apartments in a skyscraper) next to the Danube river. (Initiative Stadtbildschutz Wien, 2014 and 2015; Magistrat der Stadt Wien 21, 2014, ViennaGIS, n.d).
Stakeholders	Real estate sector, private investors, municipality, interest groups, citizens, UNESCO
Decision-support	Already used data (including zoning plans, specific guidelines for high-rise buildings in Vienna, influx new inhabitants/year) can be complemented with data not yet considered to make informed decisions: does the renewal project need to be altered in order to decrease dissatisfaction by locals & cultural heritage UNESCO?

	Which elements of the project can be changed (design & architecture, allocation of business vs. residential zones etc.)? 'New Data' input: e.g. Social Media Data from the Facebook group „Initiative Stadtbild"(440 likes plus comments in group discussions) as well as data gathered by citizens, including questionnaires, public petitions form 2014.

Case 12	**Vacancy of buildings**
Background	In context of an increasing need for housing, vacant space and buildings move to the center of attention for city officials. The mayor of Vienna just announced a new study on vacant buildings in Vienna (Putschögl, 2014; Wiener Stadtentwicklung, 2013). Some speculative numbers are available, but no up-to-date data is available (last survey 1996). Often apartments / space are not officially vacant, e.g. investors or real estate developers speculate with a building etc. The city of Vienna is currently developing a 'Leerstandstrategie' (strategy how to deal with vacant buildings).
Stakeholders	Technical University/ Department of Urban Planning, Municipality Department 18/ the city office for urban planning & renewal, real estate developers, investors, economic sector
Decision-support	Little Data is available, in the past years some local initiatives have been collecting geographical data on location of vacant businesses / apartments. A project initiated by IG Kultur (n.d) (local cultural organization) to crowdsource information on vacant buildings called "Leerstandsmelder" (post vacant buildings) could contribute to information about the current situation and to decide for further actions. Another project by the Austrian Chamber of Commerce (2014) called "Leere Lokale" (engl. Empty business offices) offers online information on vacant business premises. Data on new business (in formerly vacant business premises) can be found on the site of the Wiener Wirtschaftagentur (n.d). Data from different sources could be aggregated and visualized all together to achieve a more complete picture of the current status of vacant buildings.

Case 13	**Open data ecosystem analyses**

Background	Open Data in Austria are collected on two major platforms: www.data.gv.at and www.opendataportal.at. Also the City of Vienna has its own Open Data Portal (open.wien.gv.at/site/open-data/) where users can access all available open data sets.
Stakeholders	Municipalities, research, the public, private sector and app developers
Decision-support	An overview on all available open (government) data resources and data catalogues can be provided in a visual way, using graphics, charts, diagrams, and other visualisation methods. The aim is to show the open data landscape/ecosystem in Vienna or Austria and to compare it with other Open Data Ecosystems from other regions and countries in terms of number of available open datasets in total and according to different thematic areas, etc.

The collection of different cases shows the dynamics of a city. New issues and challenges are constantly coming up, influencing each other, the city and its people. Therefore, urban decision makers rely on regular input of sound data and information. Data and expert driven tools and processes can support planning, decision making and monitoring processes in cities.

6 CONCLUSIONS

In the report several stakeholder analyses has been performed in order to survey relevant stakeholders in the areas of urban governance for the development of two decision support tools: the *UrbanDataVisualiser* and the *UrbanDecisionMaker.* The stakeholder's main roles, workflows, functions, experiences and requirements of decision support and expert input have been mapped out in the three distinctively different case studies in three cities: Copenhagen (Denmark), Malmö (Sweden) and Vienna (Austria).

6.1 Stakeholders in Decision Making Processes

Given that stakeholders in urban decision making processes can include a wide range of possible actors with different influences and powers the characteristics of the stakeholders will also differ. To make general conclusions on the characteristics of stakeholders involved in urban decision making is therefore a difficult task. The conducted case studies undertaken in this report is a demonstration of this. Although it is possible to find some similarities between the stakeholders involved in the studied decision making processes, few of them can actually be described as general characteristics that can be applied to any organization.

Instead stakeholders involved in urban decision making processes seem to be defined by responsibilities, or more exactly by their sector responsibility and geographical area responsibility. Depending on which sector and geographical area responsibility a stakeholder has, the laws, principles and values will differ, affecting the outcome of decisions. This will therefore also affect the characteristics of the stakeholder since they will have different prerequisites and policies to relate to upon making decisions. Local policy makers will, for instance, not have the same basis for decision and prerequisites as international policy makers. Upon discussing stakeholder's characteristics it is therefore always important to be aware of the stakeholder's sector and geographical area responsibilities.

6.2 Roles and Functions in Decision Making Processes

Roles and functions generally outline the level of responsibility within an organization and clarify who has the power to make a decision. But decision can be made on different levels within an organization, and although a specific role or function might not have the authority to take the final decision, he or she might have the authority to take minor decisions that ultimately leads to the final decision. Depending on the decisions made in the decision making process, external roles and functions with more power might also get involved, with the authority to make decisions based on

their organizations interest. A role or functions level of responsibility within an organization might therefore not always be equal to actual power.

The roles and functions in urban decision making processes also need to be versatile and flexible. In the case studies undertaken in this report the roles and functions involved in the decision making process needs to be able to collect and process information to make decisions, but they also needs to be able to disseminate the information to make sure that the right stakeholders are informed during the whole decision making process. A decision making process therefore relies on the communication of information between different roles and functions in order to make the best decision.

6.3 Data Usage in Decision Making Processes

To leverage the full potential of data in urban decision making is a hard task. The numbers of potential data sources are numerous, and most of them are not even known to the decision makers. But as data becomes more available, more decisions can actually be based on it to avoid faulty decisions based on intuition.

The case studies conducted in this report indicates that data sources are used today in urban decisions making processes, but that the type of data used is often limited to a few specific data sources. The data sources can be both qualitative and quantitative, and the data is both structured and unstructured. The type of data used is often driven by the process itself, rather than the type of data driving the process. This means that the process decides what type of data that is required at specific stages in the process to precede and not the other way around. This approach creates decision making processes where it is possible to identify and implement new data sources for specific situations that are not currently being leveraged. Data is also often used to generate new data. This creates an interesting approach to data where the purpose of existing data is both to be used as a basis for decision, but also to generate new data.

As a common denominator the case studies also show that most of the data used in the decision making processes contain spatial attributes. The spatial attributes are an important part of the data since a lot of the decisions made throughout the decision making processes have to take the geographical area into consideration. The geographical dimension therefore plays a prominent role in the decisions made, which is also reflected in the data used.

6.4 Needs for Visualized Decision Support and Expert Input

The case studies that have been undertaken in this report describe different approaches to how decisions are made in an urban environment. Although the decision making processes described

throughout the report differs from each other in several ways they all serve as examples of what was stated in the beginning of this report; the need for collaboration across organizational borders.

As described in the beginning of this report, collaboration across organizational borders is not always an easy task. Stakeholders have opposite positions, advocate different solutions and bring in their own norms, values, time frames and interests into the process. These differences make the urban decision making processes complex and sometimes difficult to grasp. Within this context the two decision support tools that are to be developed by the UrbanData2Decide team could fulfil an important function. The tools would not only allow the stakeholders get a better understanding of complex situations by visualization and expert input, it could also allow them to exchange and communicate this information across organizational borders in an easier way, functioning as boundary objects.

6.5 Summary

The conducted case studies have shown that there is a need for visualized decision support and expert input in urban decision making processes. The UrbanDataVisualiser and UrbanDecisionMaker could therefore make the decision making processes easier to follow and allow stakeholders to exploit the vast potential of untapped data sources.

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