AALTO UNIVERSITY
School of Arts, Design and Architecture
Department of Architecture

SITUATION AWARENESS IN URBAN PLANNING

– Case: Mobility Planning Decision-making in Otaniemi campus and T3 area

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Master's Thesis
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PREFACE

First of all, I am deeply grateful to Senior Research Fellow Aija Staffans (Architect, D.Sc. Tech.) for your boundless encouragement during our long-term collaboration. Your multidisciplinary expertise and understanding have been an important support in my adventures between Urban Planning and Management & Organization Sciences. I want to thank also my supervisor Professor Kimmo Lapintie.

This thesis was made as a part of the national RYM-SHOK Energizing Urban Ecosystems (EUE) research program's work package 3 Regional Innovation Ecosystems (RIE). The EUE project has ambitious objectives of developing the expertise and multidisciplinary understanding in urban development.

The research idea of this thesis was founded already during the first steps of the EUE project in autumn 2012. The collaboration with Prof. Kirsi Virrantaus (D.Sc. Tech.), M.Sc. Andreas Hall, and M.Sc. Pekka Luokkala introduced me in their research of situation awareness in emergency management, and inspired me to apply the concept of situation awareness into the complex and dynamic urban planning ecosystem.

The dive into the world of mobility planning decision-making in the case area would not have been possible without the key person interviews. I am deeply grateful for all of the interviewees of devoting your time to my research, and describing your experiences of the decision-making process.

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Abstract

The process of developing urban areas is divided into a number of separate, fragmented and overlapping strategy, planning and implementation projects from a number of actors. Simultaneously, decision-makers face an overflow of information coming from various actors, various themes, and in various formats. Unless a decision-maker is conscious of the prevailing situation and the societal complexity, also benign planning decisions may have undesired and surprising outcomes.

The point of departure was to analyze how urban planning decision-makers perceive various projects' position in the overall urban planning and development process of an area (situation awareness), the connections between various projects influencing each other (systemic understanding), and the information used in generating situation awareness (information use). The situation awareness of a decision-maker will affect the quality of a decision, and through that the planning, sustainability, livability, functionality and accessibility of an area.

The scope of this study was to analyze mobility planning decision-making in Otaniemi campus and T3 area (Espoo, Finland). The West Metro project (scheduled to be completed in 2015), as well as the Otaniemi campus and T3 development projects, will have various effects on the planning and development of the case area, which made the mobility planning an interesting and topical theme for this study. Mobility planning is divided into various scales and sub-systems, and a decision on one scale or sub-system will have a plethora of influences on other scales and sub-systems.

In the qualitative analysis of the case material (planning and decision making documentation and 17 key person interviews), three main development needs were identified. First, process documentation should be developed for improving the possibility of validating the decisions made and information used. Second, the methods for round-table meetings as a way of facilitating the discussion and interaction, and the generation of systemic understanding within the planning ecosystem, should be developed. And third, there is a need for improving the understanding of qualitative information and user experience by creating methods for utilizing user information.

Keywords situation awareness, urban planning, decision-making, planning ecosystem

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Tiivistelmä

Kaupunkialueiden kehittäminen jakautuu useisiin eri toimijoiden käynnistämiin strategia-, suunnittelu- ja toteutusprojekteihin, jotka etenevät kukin omana prosessinaan kehittäen osin päällekkäisiä ja ristiriitaisiakin ratkaisuja. Yhdyskuntasuunnittelun päätöksentekijät törmäävät työssään valtavaan tietotulvaan, joka vaikeuttaa päätösten kannalta oleellisten asioiden löytämistä ja ymmärrystä. Mikäli päätöksentekijä ei ole tietoinen suunnitteluekosysteemin kokonaistilanteesta ja eri osaprosessien systeemisistä yhteyksistä, myös hyväntahtoisilla suunnittelupäätöksillä voi olla epätoivottuja ja yllättäviä vaikutuksia.

Työn lähtökohtana oli analysoida, miten yhdyskuntasuunnittelun päätöksentekijät ymmärtävät eri projektien muodostaman kokonaiskehittämisprosessin (tilannetietoisuus), hahmottavat eri projektien väliset vaikutukset (systeeminen ymmärrys), ja minkälaista tietoa päätöksentekoprosessissa hyödynnetään (tiedonkäyttö). Päätöksentekijöiden tilannetietoisuus vaikuttaa päätösten laatuun, ja niiden kautta alueiden suunnitteluun, kestävyyteen, viihtyisyyteen, toiminnallisuuteen ja saavutettavuuteen.

Tutkimuskohteena analysoitiin Espoossa sijaitsevan Otaniemen kampuksen ja T3-alueen liikkumisen suunnittelun päätöksentekoprosessia. Liikkumisen suunnittelu jakautuu eri tasoihin ja alasysteemeihin, ja päätös yhdellä tasolla vaikuttaa merkittävästi myös muiden tasojen suunnitteluun. Aihe on ajankohtainen, sillä länsimetron rakentaminen (tavoitteena avata liikenteelle vuonna 2015) sekä Otaniemen kampuksen ja muun T3-alueen kehittämishankkeet vaikuttavat merkittävästi kohdealueen maankäytön ja liikkumisen suunnitteluun.

Tutkimusaineistona käytettiin alueen liikkumisen suunnitteluun ja päätöksentekoon liittyvää dokumentaatiota sekä tehtiin 17 avainhenkilöhaastattelua. Aineiston kvalitatiivisen analyysin kautta tunnistettiin kolme kehitystarvetta. Prosessidokumentaatiota tulee kehittää päätöksenteon eri vaiheiden seuraamiseksi ja ymmärtämiseksi. Suunnitteluekosysteemin systeemisen ja kokonaisymmärryksen tukemiseen, esimerkiksi työryhmätyöskentelyn fasilitoimiseen, tulee kehittää menetelmiä. Lisäksi kvalitatiivisen tiedon ja käyttäjäkokemuksen ymmärrystä tulee tukea kehittämällä käyttäjätiedon hyödyntämismenetelmiä.

Avainsanat tilannetietoisuus, yhdyskuntasuunnittelu, päätöksenteko, suunnitteluekosysteemi

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1 INTRODUCTION

1.1 Background

Today's society is facing challenges like urbanization, climate change, globalization, and societal differentiation. With over a half of the world population living in cities, these all set prerequisites for sustainable urban planning, which lays the foundation for robust, livable and functioning societies. Planning under these conditions requires holistic understanding of the interconnections between various societal sectors and levels. Therefore, sustainable communities cannot be planned and designed in silos, but ask for the ability of more systemic thinking.

Vision-building is frequently used in planning decision-making as a tool for envisioning the desired future. However, developing the steps leading to the desired future, decision-makers should have an awareness of what the situation is now, and how the various parts of the society are connected with each other. This can be called situation awareness, defined as *"the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future"* (Endsley 1995, 36-37). Endsley (1995) defines situation awareness in relation to elements, meanings and their projections in the near future, without acknowledging the holistic understanding of the environment. However, situation awareness in urban planning can be understood more as a holistic understanding of the urban elements and sub-systems, and their complex relationships and influence on each other.

Unless a decision-maker is conscious of the prevailing situation and the social complexity, also benign planning decisions may have more undesired and surprising outcomes, which have not been acknowledged or understood during the decision-making process. Even the process of developing a single urban area is divided into a number of separate, fragmented and overlapping strategy, planning and implementation projects from a number of actors. The effective pursuit for sustainability requires a systems approach to the development of policies and intervention strategies, as if there is not a full understanding of system implications there is a risk of unintended consequences (Fiksel 2006, 14). Therefore, it seems more useful to first develop shared knowledge about crucial relationships than to develop a final vision or a plan (Te Bömmelstroet & Bertolini 2010, 101).

Decision-makers face an overflow of information coming from various actors, various themes, and in various formats. What happens within a city is not only determined by the decision-makers alone, but more and more actors are entering the realm of affecting urban development processes. Planning support systems bringing all available information together have been developed for assisting planners and decision-makers in their work. However, these systems do not have the ability to filtrate, condensate or prioritize the most essential information the decision-makers may need. So, it comes back to the decision-makers' ability to find the needed information from the plethora of data and information available. What is, then, the information used in decision-making? Where do decision-makers base their situation awareness and understanding of the position of various projects within the planning

ecosystem of an area? How can the generation of situation awareness be assisted in a complex planning decision-making ecosystem?

1.2 Purpose of the study

The aim of this study is to analyze how urban planning decision-makers understand various projects' position in the overall urban planning and development process of an area, the connections between various projects influencing each other, and what kind of information they use for creating the situation awareness. This study will critically analyze the prevailing planning decision-making practice in the complex urban planning ecosystem from the viewpoint of situation awareness adding to the understanding of the planning process, and the reasoning of planning decision-making. The main research question is broken into three research questions, as outlined in figure 1:

- **Q:** How can the generation of situation awareness be assisted in a complex planning decision-making ecosystem?
    - **Q1:** What kind of information do urban planning decision-makers use for generating situation awareness?
    - **Q2:** How do urban planning decision-makers perceive their current project's position in the overall urban planning and development process of an area?
    - **Q3:** How do urban planning decision-makers conceive the connections with their project to other projects influencing each other?

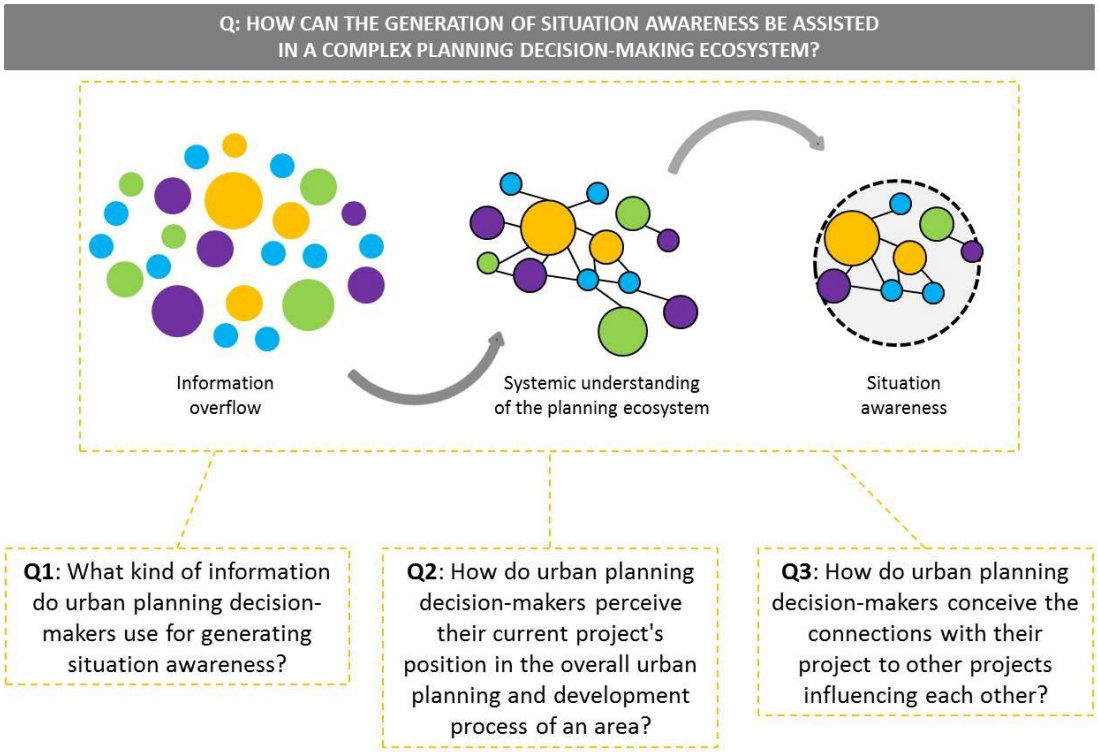

Figure 1: *Research questions.*

It is not feasible to create a general description of situation awareness in urban planning decision-making processes within the scope of this study. However, with a clearly defined case it is possible to describe the most important aspects of generating situation awareness within a certain development process. The scope of this study is to analyze the mobility planning decision-making process in Otaniemi campus area as a part of the T3 area (Espoo, Finland). The objective of T3 area is to develop the area of Otaniemi-Keilaniemi-Tapiola by integrating science (Tiede), culture (Taide), and business (Talous) for creating a global innovation ecosystem.

It is estimated that one fifth of greenhouse gas emissions are caused by solely transportation, which is closely interconnected with other elements of urban space (housing, services, recreation areas etc.) (Uudenmaan liitto 2008). Mobility planning is divided into various scales (building, block, neighborhood, city, metropolitan area etc.) and sub-systems like technological, infrastructure, service and social systems; and a decision on one scale or sub-system will have a plethora of influences on other scales and sub-systems. The situation awareness of the decision-maker will affect the quality of a decision, and through that, the future planning, sustainability, livability, functionality and accessibility of an area.

The case area for this study is Otaniemi campus area as a part of the nationally acknowledged T3 area (Tapiola-Otaniemi-Keilaniemi) in the city of Espoo, situated in the Helsinki Metropolitan Area in Finland, as outlined in figure 2. T3 area serves as the location for Aalto University, other research institutes, and many national and international companies. The West Metro project (scheduled to be completed in 2015), as well as Aalto University's Otaniemi campus development project, will have various effects on the planning and development of the area, which makes the mobility planning within the area an interesting and topical theme for this study.

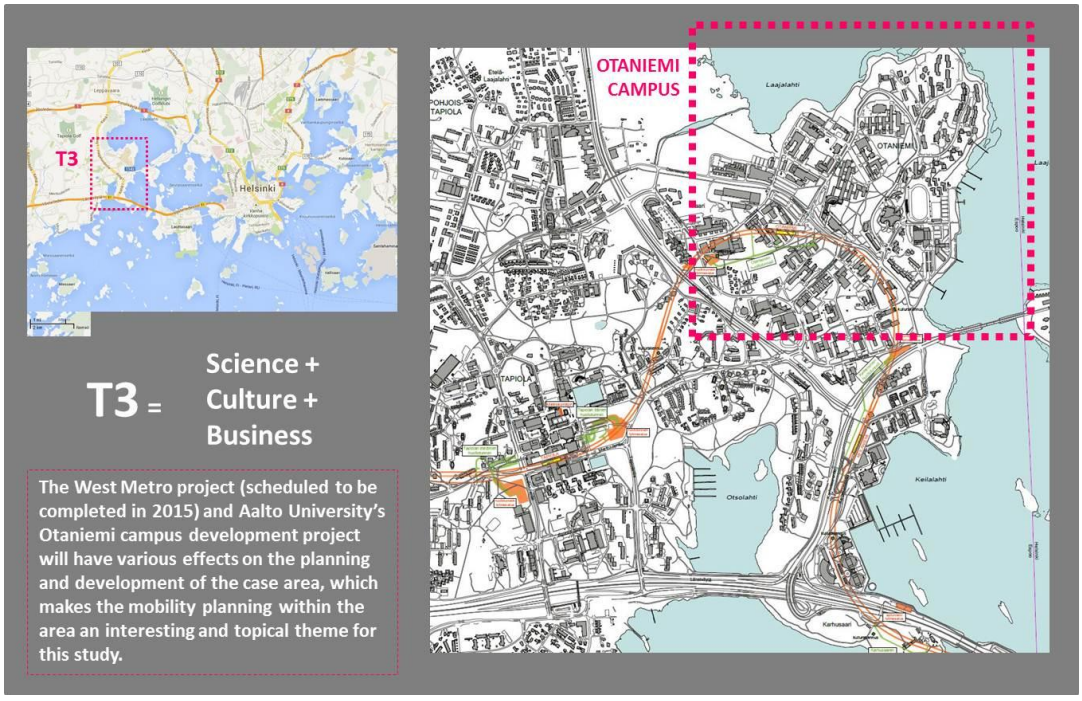

Figure 2: *Context of the study*[1].

[1] Picture references. Left: maps.google.com. Right: www.lansimetro.fi.

The objective of this study is to take part into the discussion about the need for revising the current urban planning decision-making practices pointed out for example by Healey (2007), Väyrynen (2010), Flyvbjerg (1998), and van Hoek & Wigmans (2011). The meaning of this study is not only to point out the possible challenges in the decision-making process, but also to highlight the process development needs of assisting the generation of situation awareness in a complex planning decision-making ecosystem, based on the analysis. This thesis was made as a part of the national RYM-SHOK Energizing Urban Ecosystems (EUE) research program.

1.3 Conceptual framework

The study is based on recent literature discussing the urban planning practice, and on the topic-related theoretical framework consisting of theories about situation awareness, information and knowledge systems, urban complexity and systems thinking, and interconnections within land use and mobility planning system. No clear theory of *situation awareness in urban planning ecosystems* is available, which creates a need for this study in testing and understanding the theory and theme of situation awareness in a complex urban planning ecosystem. The topic is approached with the help of theories from four disciplines, as shown in figure 3.

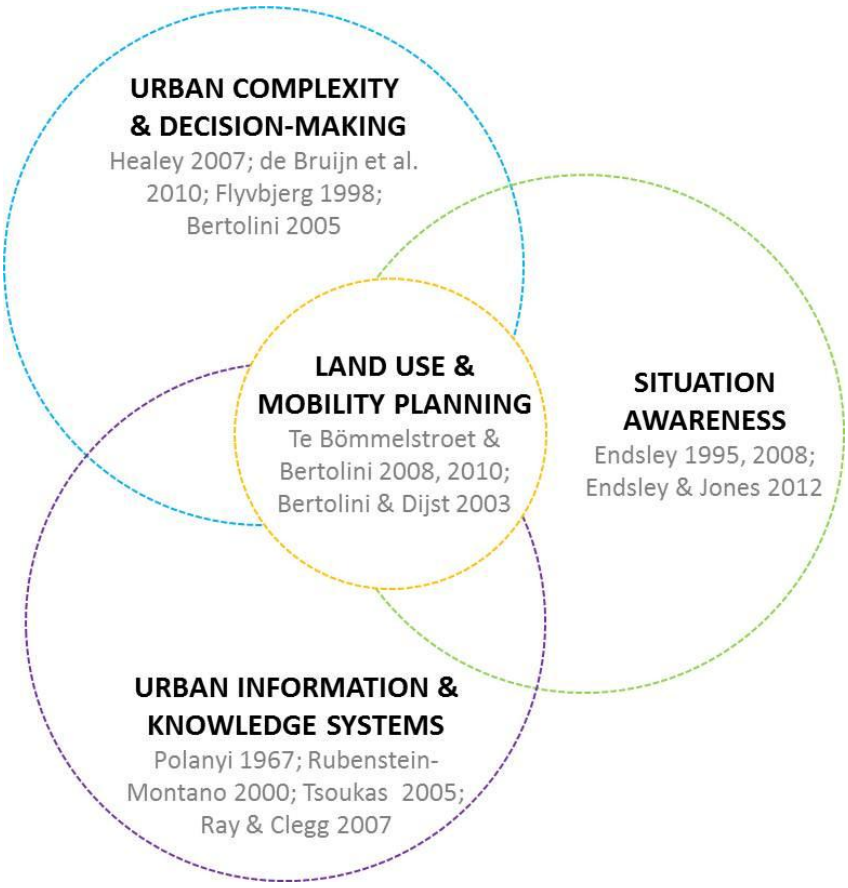

Figure 3: *Theoretical framework of the study.*

The main concepts of this study are shortly introduced here. More thorough literature and conceptual review can be found in part 2.

Situation awareness refers to the understanding of one's operating environment, and can be defined as "*the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future"* (Endsley 1995, 36–37). Endsley (1995) defines situation awareness in relation to elements, meanings and their projections in the near future, without acknowledging the holistic understanding of the environment. However, *situation awareness in urban planning can be understood more as a holistic understanding of the urban elements and sub-systems, and their complex relationships and influence on each other*.

In Western philosophy, **knowledge** is often defined as *a belief that is true and justified* (Hunt 2003, Gao et al. 2003, Polanyi 1967), and can be understood as tacit and explicit knowledge. Defined by Polanyi (1967), *we can know more than we can tell*. Thus, **tacit knowledge** *can be possessed by itself*, whereas **explicit knowledge** *must rely on being tacitly understood* (Gourlay & Nurse 2005, 302).

Urban complexity at system level can be thought of as a function of *"the number of items incorporated in the system; the degree of interaction or interdependence of those items in creating functionality; the system dynamics, indicating how fast the status of items and interactions will change in the system; and predictability of such changes"* (Endsley & Jones 2012, 131).

Land use and mobility planning understood in broader spatial terms as planning mobility environments can be defined as *"the whole of the external conditions that may have an influence on the presence of people in a given location, featuring both the transportation services available there (e.g. capacity, speed, scale of operation, time, schedules, price), the activity place in itself (e.g. functional mix and densities, opening times, structure of the public space), and institutional arrangements (e.g. regulation of entry and behavior)"* (Bertolini & Dijst 2003, 31).

Planning ecosystem is understood as *the totality of the separate, fragmented, multi-scalar and overlapping strategy, planning and implementation projects of urban development, initiated by a number of actors.*

Decision-making process is in this study understood not only as the official municipal decision-making carried out for example by CityCouncil and CityBoard, but as *a process beginning already in the first negotiations of a need for an issue or a problem to be solved, and continuing through the municipal planning and official municipal decision-making processes. From the first negotiations onwards, decisions of varying importance are made on what issues to highlight*

and what to downgrade, what to communicate further in the planning decision-making process and what not to communicate. The final and official decision is only a tip of the iceberg in the process with an enormous amount of decisions made and things locked up already beforehand. Accordingly, **decision-makers** are understood as *actors who continuously participate or actively influence the decision-making process at least at some stage of the decision-making process, including also other than municipal decision-makers.*

1.4 Research methods and material

The approach of this study is descriptive, and in the analysis the focus is placed on themes dealing with the situation awareness in mobility planning decision-making, as well as the relationship of land use and mobility planning. No system operates in isolation. For understanding the mobility planning decision-making in the selected area, the planning ecosystem was carefully examined. The analysis process is divided into three parts, all supporting each other:

1. Planning ecosystem analysis;
2. Mobility planning decision-making material analysis; and
3. Key person interview analysis.

In the first and second part of the analysis, various Otaniemi campus and T3 area mobility planning decision-making materials are used for forming an image of the local mobility planning ecosystem, and pointing out the main themes in the local mobility and land use planning related discourses. The material consists of four parts and altogether 42 documents:

- Decision-making minutes of Espoo City Council, Espoo City Board and Espoo City Planning Board;
- Mobility planning documents of regional level;
- Mobility planning documents of municipal level; and
- Mobility planning documents of the Otaniemi campus and T3 area level.

For a deeper understanding of the decision-making process and factors influencing the final decisions, 17 key actor interviews were performed, representing the main actors influencing the decision-making process identified during the analysis of the mobility planning decision-making materials. The interview analysis was performed through discourse and content analysis, pointing out main themes and development needs based on the interview material. The interviewees in this study are:

- Elo, Tiina (I Vice-Chairman of Espoo City Board, The Green League);
- Hahl, Tuomo (Senior Expert at Senate Properties);
- Hokkanen, Torsti (Director of City Planning at City of Espoo);
- Immonen, Vesa (CEO at LocalTapiola Real Estate Asset Management Ltd);
- Kokkinen, Matti (CEO at Länsimetro Oy);
- Kontturi, Kari (Managing Director at Aalto University Properties Ltd);
- Kuosmanen, Piia (President of the Board at Aalto University Student Union);

- Markkula, Markku (Chairman of Espoo City Planning Board);
- Mäkelä, Jukka (Mayor at City of Espoo);
- Mäkinen, Antti (Project manager of the Renewal project of Tapiola centre at City of Espoo);
- Nylund, Nils-Olof (Research Professor at VTT Technical Research Centre of Finland);
- Penttilä, Matti (Senior Research Scientist at VTT Technical Research Centre of Finland);
- Pihlajamaa, Olli (Senior Scientist at VTT Technical Research Centre of Finland);
- Sistonen, Markku (II Vice-Chairman of Espoo City Board, The Social Democratic Party of Finland);
- Sundell, Laura (Public transportation planner at HSL Helsinki Region Transport);
- Särkijärvi, Jouni J. (Member of Espoo City Board, National Coalition Party); and
- Teeri, Tuula (President at Aalto University).

1.5 Limitations of the study

The research process has been evolving again and again. Many things have been revised during the process. For example, when the study began, the interest was focused very broadly on situation awareness in urban planning decision-making. However, when the first theoretical outlooks were made, it soon became clear that situation awareness and urban planning are both so extensive areas that they cannot be well comprehended in one Master's thesis. As situation awareness is the bearing theme of the thesis, the scope of urban planning was limited to mobility planning decision-making, which already in itself is a multi-scale and multi-actor process consisting of many sub-systems. Next, the view of situation awareness was defined, and the focus was put on the information use and systems understanding parts, leaving out the broader discussion of e.g. personal abilities, experience, training, and memory capacity.

For being able to tackle the chosen theme deeply enough, a case area was needed. As the T3 area (Otaniemi–Keilaniemi–Tapiola) is going through massive development process initiated partly because of the West Metro process, the mobility planning decision-making of this area was put under scrutiny. As the collection and analysis of the research material proceeded, it became clear that T3 area is not a very consistent concept or area, but for the documents and interviewees in most cases discussed only some sub-area of T3. Based on the research material, Otaniemi campus area was selected to be the main focus area of the study, supported by some comparison with and remarks to the other T3 sub-areas (Tapiola, Keilaniemi) as well.

The development within the T3 area will be done in already existing urban environment. The challenges and decision-making of developing existing urban environment differs to some extent from the case of developing new urban areas. Also, the actor group within every urban area is different, so the conclusions of this study cannot be fully utilized in assessing decision-making processes in other areas.

The focus of this thesis is on mobility planning decision-making, the level of the analysis is on the relationship of mobility planning and urban planning, urban structure, and cityscape. Mobility planning is used as an example of one sort of a topical planning decision-making theme in the case area. Hence, technical details of transportation or vehicle planning are not discussed very thoroughly. In some parts, these can be used as examples of challenges, where many compelling alternatives are possible, especially if they have come up in the actor and decision-maker interviews.

The analysis of this study is based more on textual and interview analysis. For research economic reasons, the detailed analysis of the visual decision-making and planning material has been left out of this study even though it would be a good supplementary part to this study as visual documentation is also an important part of urban planning documentation.

1.6 Structure of the thesis

The first part of the thesis introduces the background and purpose of the study. The conceptual framework of the study was outlined, connecting the study to previous literature and current academic discussion. Also, general introductions of the research material and analysis methods, as well as topics which have been limited out of the study were given.

The second part of the thesis outlines the main concepts of the study introducing for example the urban planning system, systemic understanding and urban complexity, urban information and knowledge system, and situation awareness. The third part of the study describes more thoroughly the research process focusing on research materials, analysis methods and reliability of the study.

The fourth part of the study describes the three-step analysis of the research material. The objective is to introduce the analysis of the planning ecosystem, decision-making and planning material, and the key person interviews. The fifth part discusses the main results of the study replying the research questions. Finally, the study is concluded in the sixth part.

2 LITERATURE REVIEW: OUTLINING THE DECISION-MAKING CONTEXT IN URBAN ENVIRONMENT

This part defines the most important concepts of the study. First, the urban planning system is introduced. Thereafter, the most important aspects of urban complexity and systemic understanding are defined. Third, focus is put on introducing urban information and knowledge system. Finally, the concept of situation awareness is outlined.

2.1 Urban planning system

2.1.1 Finnish urban planning process

In Finland, the most important tool guiding land use and building is the Land Use and Building Act[2] (132/1999), which came into force in 2000 (Finland's environmental administration 2013). Its goals are to organize land use and building for creating a basis for high-quality living environments, promoting sustainable development, ensuring public participation during planning processes, and ensuring the use of wide expertise in planning. The law is supplemented by the Land Use and Building Decree (895/1999), and various more detailed provisions and regulations issued by decree, ministerial decision or in a local authority's building ordinance (132/1999 §2). The Finnish land use planning system is described in figure 4.

***Figure 4**: Finnish land use planning system (Finland's environmental administration 2013).*

Regional land use plan. Regional planning includes the regional scheme, the regional plan which steers other land use planning, and the regional development

[2] Unofficial English translation of the Land Use and Building Act can be found at: http://www.ym.fi/download/noname/%7B0AA8EC52-5A9B-4480-81DF-E6B7FB7722C1%7D/58015.

program. National land use objectives and special needs deriving from regional conditions must be taken into account and adapted to regional and local land use objectives setting out principles of land use and community structure. The regional plan is approved by the regional council's highest decision-making body. Following approval, the regional plan is submitted to the competent ministry for ratification. (132/1999 §25, §28, §31)

Local master plan. The objective of a local master plan is to provide general guidance regarding community structure and land use of a municipality, presenting the principles of targeted development and indicating the areas required as a foundation for detailed planning. The local master plan is approved by the local council. (132/1999 §35, §37)

Local detailed plan. Local detailed plan describes the detailed organization of land use, building and development by designating areas necessary for various purposes as required by local conditions, townscape and landscape and good building practice. The local detailed plan is approved by the local council. (132/1999 §50, §52)

2.1.2 Integrating land use and transportation planning

Since the dawn of civilization, infrastructural network systems have profoundly affected development. From the exclusively natural landscape, the man-made dimension of built infrastructural networks began to affect the political, economic and social development already in the ancient days (Fusero 2008, 18). From amorphous conglomerations of houses, cities evolved rapidly into sites of complex interacting systems characterized by sophisticated infrastructures and cultures (Wallace & Wallace 2008, 2) with mobility networks gaining ever more growing importance in carrying people, goods and information flows across the growing hinterland. Already in 1960, Lynch pointed out that paths and connections have an important role within areas in creating experiences and leading people from one place to another, affecting what people see or don't see, where they go or don't go.

Mobility and transportation network affects also the overall sustainability of an area. It is estimated that one fifth of greenhouse gas emissions are caused by transportation alone (Uudenmaan liitto 2008), which is closely interconnected with other spatial elements like housing, services, recreation areas etc. Transportation and mobility affect sustainability also other ways, as the mobility of human beings for example allows a city to exploit a vast hinterland for its purposes. For example the ecological footprint of London is approximately 125 times the surface area of London (Bradshaw 2003, 86). Mobility and accessibility of people and resources enable a city to grow larger than it would otherwise. Accordingly, the integration of transport and land use planning is recognized as an essential precondition of sustainable development, but often this relationship is neglected (Bertolini et al. 2005; Te Bömmelstroet & Bertolini 2010). Figure 5 shows various mobility environments in equally sized blocks.

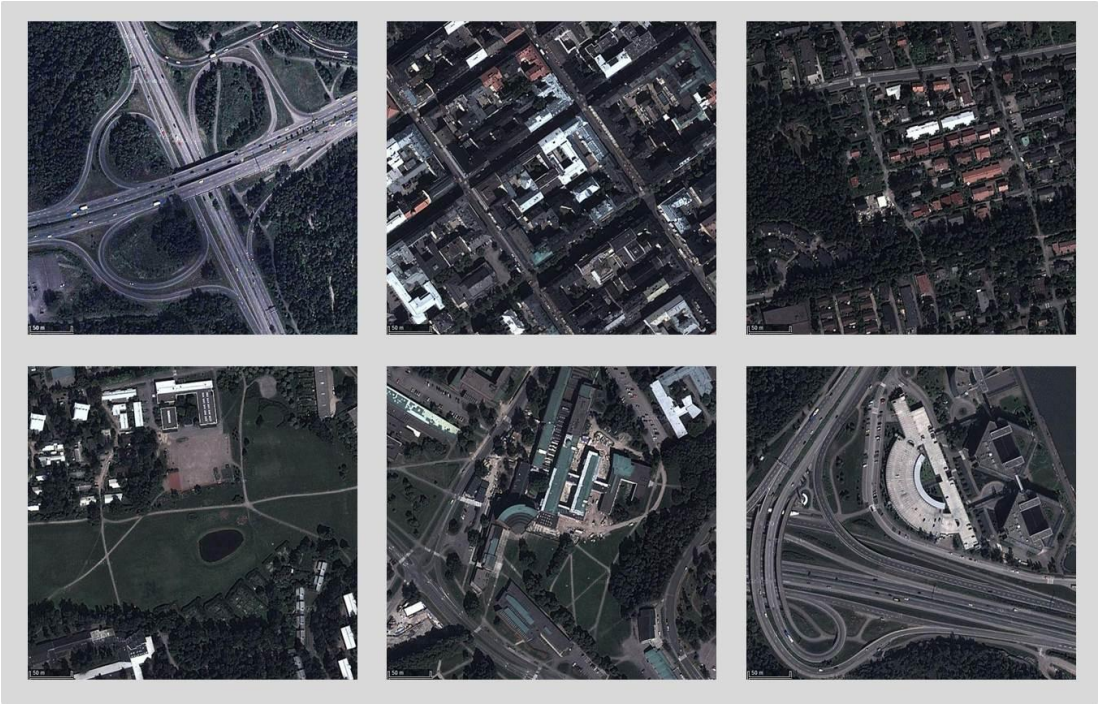

***Figure 5**: Various mobility environments[3] in equally sized blocks. Upper row: Junction of Ring Road I and Hämeenlinna highway (E12), Töölö, and Maunula. Lower row: Tapiola, Otaniemi, and Keilaniemi (T3).*

Barriers for the integration are for example distinctive budgets, different procedures, weak or contradictory incentives for cooperation, and reluctant departmental cultures. Additionally, there are some substantive differences between land use and transportation planning domains, such as planning objects (places vs. networks/flows); tools and instruments (spatial GIS vs. mathematical transport models); operational modes (holistic visioning vs. optimizing problem solving); and educational reasons. (Te Bömmelstroet & Bertolini 2010, 86). Accordingly, the differences of knowledge and traditions in land use and transportation planning are often mentioned as the main barriers for integrated strategy-making.

Land use and transportation systems support each other, and hence, planning theory considers that the integration should occur already in early phases of the planning process (Friedmann 1987; Healey 2007; Te Bömmelstroet & Bertolini 2008). Various strategies for articulating the integration of land use and transportation have been developed for cities, such as 'mobility environments' and 'network cities' (Bertolini & Dijst 2003, 27).

Bertolini et al. (2005, 209) define **accessibility** as *"the amount and the diversity of places of activity that can be reached within a given time and/or cost"*, and the goal of maximizing **synergy between sustainability and accessibility** as the goal of *"developing transport and land use conditions for as large as possible a share of environmentally friendlier transportation methods than the conventional car, while at the same time maintaining and possibly increasing the amount and the diversity of*

[3] Source: https://maps.google.fi/

activity places that people can reach within a given travel time and/or cost". Figure 6 outlines the policy implications of accessible and sustainable urban form.

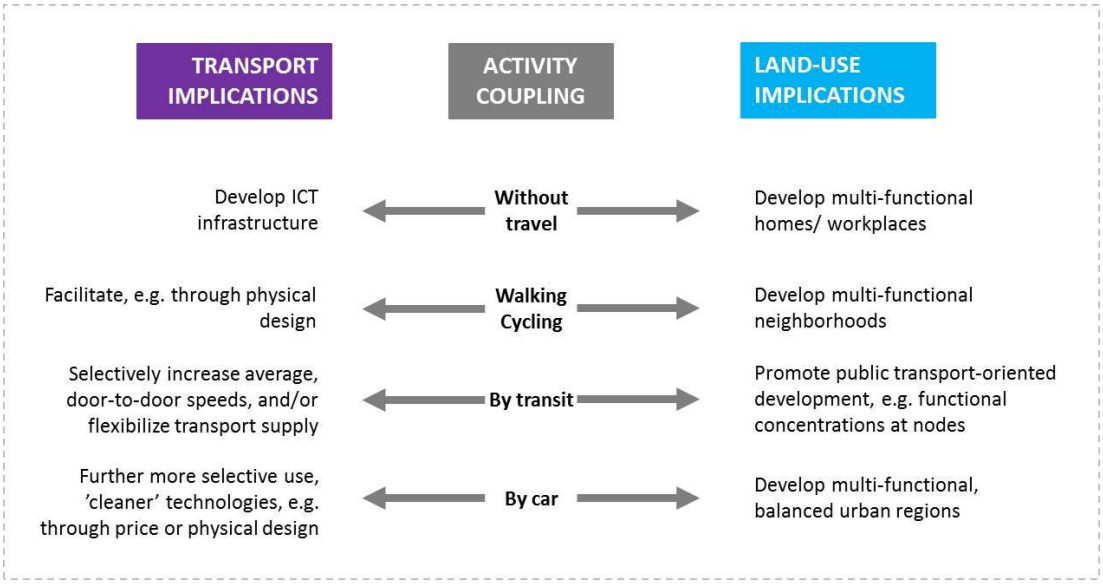

***Figure 6**: Policy implications of accessible and sustainable urban form (Bertolini et al. 2005, 210).*

In broader terms, **mobility environments**, as understood also in this study, can be defined as *"the whole of the external conditions that may have an influence on the presence of people in a given location, featuring both the transportation services available there (e.g. capacity, speed, scale of operation, time, schedules, price), the activity place in itself (e.g. functional mix and densities, opening times, structure of the public space), and institutional arrangements (e.g. regulation of entry and behavior)"* (Bertolini & Dijst 2003, 31). So accessibility is not only about featuring a transportation node, but also about thinking of the place of activities, not only about where people can go, but also about what people can do.

According to Bertolini & Dijst (2003, 40), urban planning and design strategies in which mobility environments are a leading concept can be effective in influencing spatial developments in an increasingly mobile society. But, as a precondition, planners and designers should root their decisions and policies on the sources of mobility, such as the needs and constraints of individuals as members of different types of social organizations (Bertolini & Dijst 2003, 40).

2.1.3 Outlining the mobility planning ecosystem

Mobility planning is divided into various scales (building, block, neighborhood, municipality, region etc.), and sub-systems like technological, infrastructure, service and social systems. A decision on one scale will have a plethora of influences on other scales as well, affecting the future planning, sustainability, livability, functionality and accessibility of an area. Figure 7 shows some themes of the various sub-systems that have to be considered of on the various scales of the mobility planning ecosystem, using electric vehicles as an example.

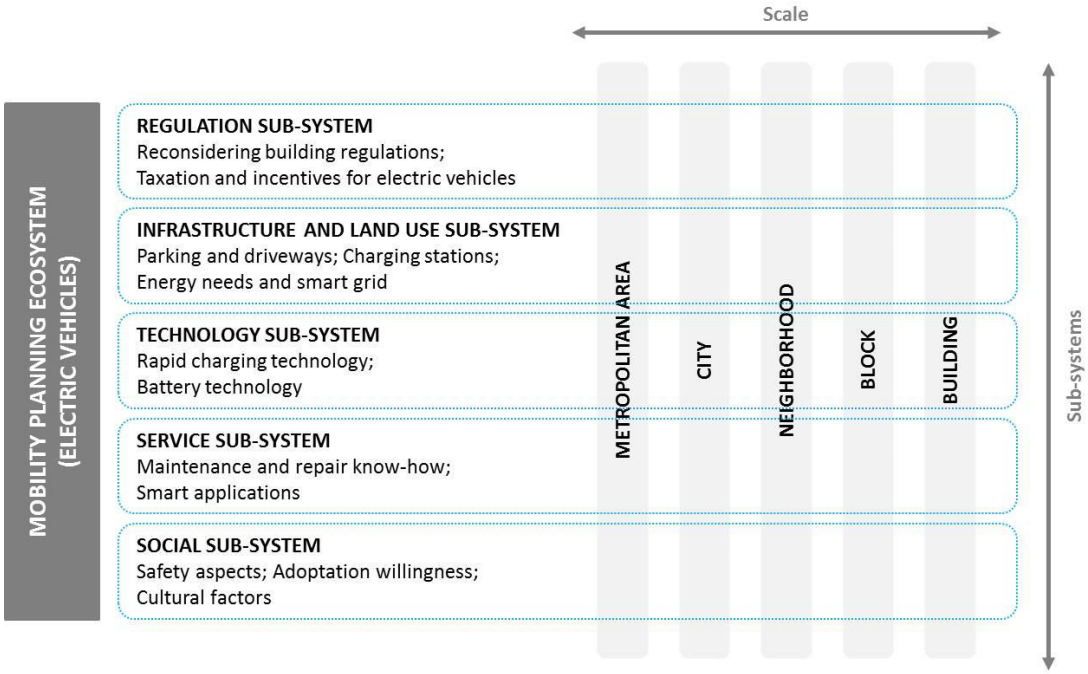

***Figure 7**: Example of sub-systems in the mobility planning ecosystem, an example of electric vehicles.*

An example of the multi-scale and sub-system mobility environment is provided by Eco Urban Living (2011, 24) outlining the changes needed for electric cars to take off. Changes are needed for example in the electricity grid, in the transportation planning system, and a lot of new technologies have to be developed. Accordingly, no single company will be prepared to start its own development part without having some guarantee that the market will come. (Eco Urban Living 2011, 24). Figure 8 roughly outlines some of the actors involved in the electric mobility ecosystems showing the complexity of the network concerning a decision that might sound simple at first. Decisions and actions at many different levels are needed in order to the electric mobility (here thought of as a car or a bus) to take off.

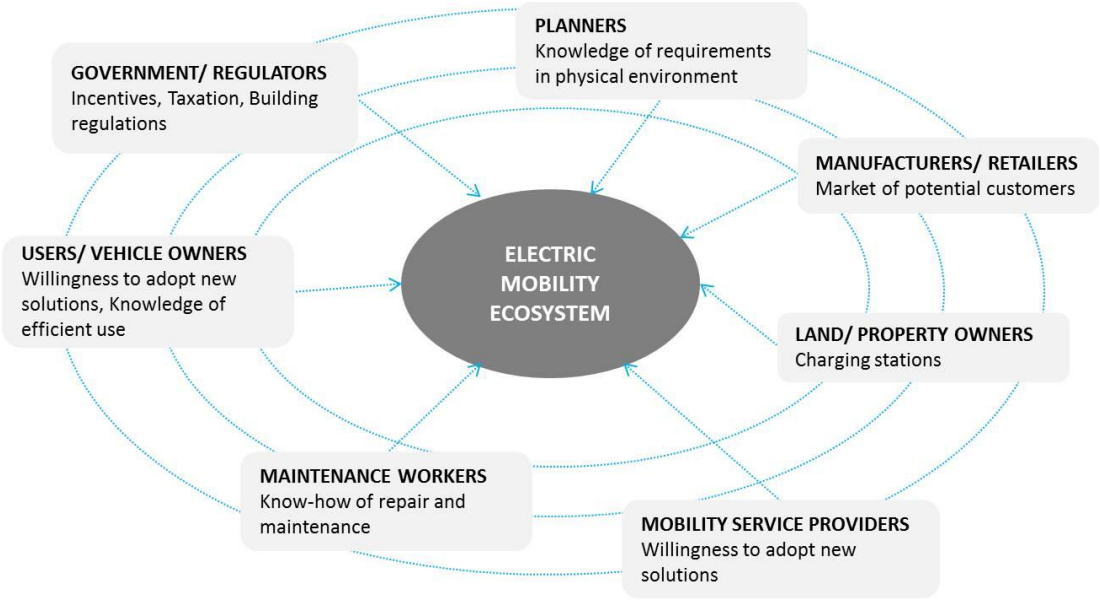

***Figure 8**: Actors involved in the electric mobility ecosystem.*

The variety of sub-systems within the mobility planning framework is wide. For example, mobility is a highly cultural factor, and the status meaning of various modes of transportation varies highly from one culture to another. For example in Beijing bicycle is seen as a means of transportation for the urban poor, who cannot afford to have an own car, whereas in Amsterdam it has become more and more a way of transportation for the majority of the urban population, used also by businessmen. The cultural differences don't only apply to the choices between the various transportation modes, but also between the more technical solutions of the vehicles. For example, diesel engines are becoming ever more popular in Finland, whereas in the USA they are not very widely accepted. Mobility choices are seen as delivering a life-style, not only mobility.

2.1.4 New requirements for the urban planning decision-making

In addition to the legally regulated plans, various vision documents have become widely used in urban planning processes. Visions and strategies are widely used in urban planning for gathering together the municipal goals and aspirations. Planning strategies used to be nested in urban planning authorities, but as economic and political forces are operating on an increasingly wider scale, strategies have to be linked to the new conditions as well (Salet & Thornley 2007, 188). More stakeholders from various spatial scales are taking part in the urban development process. According to Salet & Thornley (2007, 190), this raises a question of how much *multi-scalar* public and private action can be coordinated in a context of institutional fragmentation and continuing detachment from spatial dynamics.

Salet & Thornley (2007, 191) discuss the coordination of metropolitan policies stating that solutions to the problems of coordination and spatial planning are not to be found in the mere establishment of new encompassing territorial government, but in the new methods of organizing connectivity. In addition to the metropolitan level, this can be thought to be true also at city level urban planning. More connectivity

between the traditional silos is needed for reaching justified and well-working decisions with systemic understanding.

In addition to the multi-scalarity, the urban planning field has also become *multi-actor* with new public and private actors actively involving in the urban development processes. According to van 't Verlaat & Wigmans (2011, 31), urban area development occurs within a complex context and a long time-scale, combining a sum of a large number of complex processes performed by many individual actors and organizations with their own interests and claims. Thus, strategic urban planning initiatives involve working in, around and through complex tensions, struggles and conflicts (Healey 2007, 4).

Urban development process approaches network management, in which all actors do not strive for the same objective, but in which their individual interests are combined in a way that leads to positive results for all involved (van ‘t Verlaat & Wigmans 2011, 29). As van ‘t Verlaat & Wigmans (2011, 30) continue, traditional project management must take its place as a part of a broader spectrum of process management in urban development, where the process manager recognizes that even if the different actors are not completely dependent on each other, they must be directed to the point where they start co-operating. Accordingly, urban development process management becomes relations management.

As Healey (2007, 1) describes, cities are essentially dynamic places of social interaction. Policy formulation must work with this, not thinking in terms of some final, formal plan, nor with an assumption of a reachable permanent harmony of peace, but a new politics for cities must be equally *fluid and processual* in nature (Healey 2007), being able to adapt and answer to the constant changes and dynamics in the planning ecosystem.

2.2 Systemic understanding and urban complexity

2.2.1 Sustainable urban development

Cities are in a constant fluctuation of various flows: people, goods, information etc. As Holland (1995) says, like the standing wave in front of a rock in a fast-moving stream, a city is a pattern in time as no constituent remains in place, but the city persists. This creates a demand for a sustainable and smart planning process, which understands the dynamic and systemic nature of a city. Since the 1987 Brundtland Report drew attention to the importance of cities as a means through which to address the challenge of sustainable development, concepts of sustainable cities and urban sustainability have gained significant ground internationally (Bulkeley & Betsill 2005, 42). However, the Brundtland’s (1987) definition of sustainable development as *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* is considered vague, and no more exact definitions have been agreed on ever since.

Sustainable communities cannot be planned and designed in silos, but ask for the ability for more systemic thinking. Spirn (2003, 205) discusses the relationship between urban planning and its environmental context stating that thousands of decisions of the city are made daily, usually without any concern for the city's larger

environmental context. Spirn's though can easily be adapted to broader than purely environmental view of decision-making as well. Collectively the independently made and benign decisions can create surprising effects if the systemic interrelations are not understood well enough during the decision-making process.

The traditional way of planning cities in separate silos cannot be seen to survive under the circumstances described above by Holland, Spirn and Fiksel. The process of developing a single urban area is divided into a number of separate, fragmented and overlapping strategy, planning and implementation projects from a number of actors. In cities, tasks are divided between various departments and there are some tasks, which don't belong to any single department. The complexity of the tasks exceeds the complexity of the planning system and some tasks fall in between various departments. If the departments don't collaborate actively, these tasks may be left unaddressed. As Rubenstein-Montano (2000, 161) addresses, systems thinking is championed on the premise that there are emergent properties of systems that do not exist when systems are decoupled into smaller parts.

As de Bruijn et al. (2010, 1) state, a change in complex issues always has three characteristics: there are always multiple actors involved in network settings, these actors are dependent on each other and negotiate, and the negotiation is a process that can take place at various levels. According to Healey (2007, 2), the places of cities and urban areas cannot be understood as integrated unities with a singular driving dynamic, contained within clearly defined spatial boundaries, but are instead complex constructions created by the interaction of actors in multiple networks. As Te Bömmelstroet and Bertolini (2010, 101) say, under these circumstances it seems more useful to develop shared knowledge about crucial relationships than to develop a final vision or plan.

2.2.2 Smart cities

Another vague concept associated with current urban planning is smart cities. According to Chourabi et al. (2012, 2289), a smart city is an icon of a sustainable and livable city. Since 2005, when Urenio Watch began recording developments in the field of innovation ecosystems and intelligent cities, the increasing diversity of cities adopting intelligent city strategies has been noted (Komninos 2011, 172). According to Komninos (2011, 174), the concept of spatial intelligence refers to the ability of a community to use its intellectual capital, institutions and material infrastructure to deal with a range of problems and challenges. Komninos (2011, 174) states that urban development has actually become dependent on innovation ecosystems, knowledge-driven localities, innovation clusters and creative hubs, in which R&D, knowledge, innovation, people’s creativity, learning, and training are connected by forces of agglomeration and locality, trust, knowledge spillovers, and tacit knowledge transmission. These objectives are seen also in the T3 area strategy, as described in part 4.1.1.

An intelligent city is a multi-player territorial innovation system combining knowledge-intensive activities, institutions for cooperation in learning and innovation, and digital communication infrastructure and e-services that increase the problem-solving capabilities of the urban population individually and as a whole (Komninos 2006). But how does such an active and competent multi-actor

environment affect decision-making in the area? Part 4.1.2 reveals the mobility planning decision-making actors and stakeholders of the T3 area.

One of the most recent contributions to the intelligent cities discussion is the initiative developed by IBM *Smart Planet – Smarter Cities*[4] talking about interconnected, instrumented and intelligent cities as shown in Figure 9. Interconnection means different parts of a core system being joined and communicating with each other, turning data into information. Instrumentation is producing data on key performance indicators so that the system becomes measurable with instruments and smart meters. Intelligence means the ability to use the acquired information to model patterns of behavior, and to develop projective models of likely outcomes allowing better decision-making and informed actions. (Komninos 2011, 185)

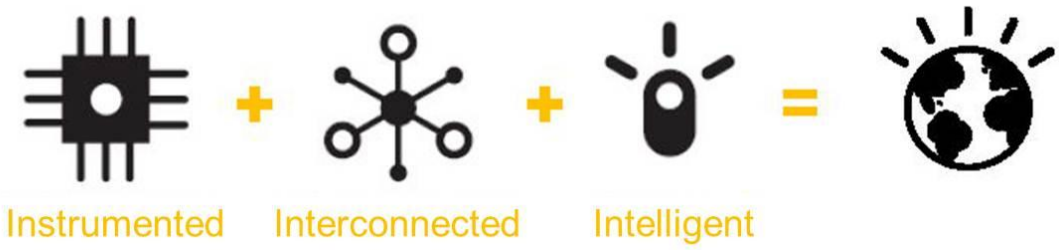

Figure 9*: IBM's Smarter Cities concept is about instrumented, interconnected and intelligent cities (Peltola 2013).*

According to Komninos (2011, 187), we are still in the age of digital rather than intelligent cities, as none of the existing definitions of smarter cities stress the need for integration among innovation actors, open connected communities, digital applications, monitoring and measurement, but instead only the use of ICTs. Indeed, leading a smart city initiative requires a comprehensive understanding of the complexities and interconnections in a city (Nam & Pardo 2011, 288).

2.2.3 Decision-making in multi-actor environment

Traditional project approach assumes that problems and solutions are reasonably stable within certain limits, resulting in linear and structured decision-making (de Bruijn et al. 2010, 15). Urban decision-making, however, is seldom linear and easily structured. For example, the multi-scalarity and multi-actor environment affect the decision-making process of unstructured problems. In urban decision-making, actors involved have different information and knowledge about the problem.

According to de Bruijn et al. (2010, 2), the substantive outcome of a process depends partly on cognitive activities, analyses, calculations, applied models – but perhaps even more on the process following the cognitive activities. Factors like who is involved in the negotiations, what are their roles and relations, how much time was spent on discussing alternative solutions etc. affect the capacity of generating knowledge and making novel decisions. It is not only about receiving knowledge, but

[4] See: http://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/.

also about testing it in group-settings. Complex decisions should be exposed for negotiations in various phases and at various levels of the process. de Bruijn et al. (2010, 21) state that testing different sources of information against each other may, indeed, improve the quality of the information used. For such a reason, it is important to identify the most important actor groups early enough in the decision-making process. The four core elements of a process management -based decision-making design are presented in Figure 10.

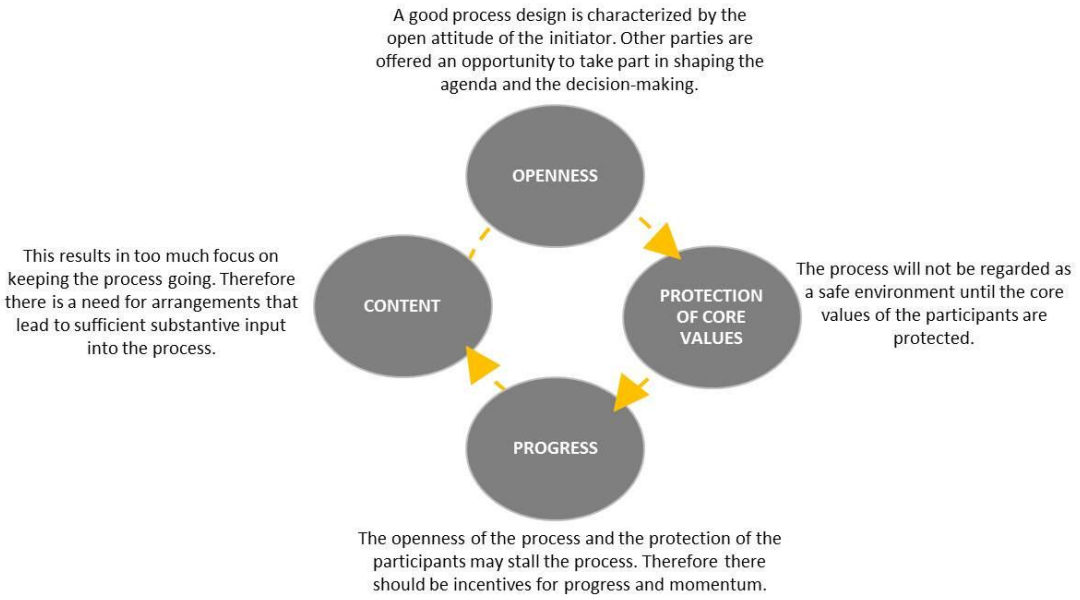

***Figure 10**: The four core elements of a process design (de Bruijn et al. 2010, 42).*

2.2.4 Is knowledge power in decision-making?

Then, how rational is decision-making? According to Flyvbjerg (1998, 2), rationality is context-dependent, and the context of rationality is power, blurring the dividing line between rationality and rationalization. Flyvbjerg (1998, 2) refers to Kant having said that the possession of power unavoidably spoils the free use of reason. As Flyvbjerg (1998, 35) continues, efforts to analyze and document are made more in order to rationalize and legitimate established attitudes and prior decisions than to produce a balanced, documentary basis for making decisions. Where there is disagreement regarding the decisions, the documentation is manipulated or left out in order to strengthen one's own positions or weaken that of the opponents' (Flyvbjerg 1998, 35).

Power does not limit itself in defining a specific kind of knowledge, conception, or discourse of reality. Rather, power defines physical, economic, ecological, and social reality itself. Power is more concerned with defining a specific reality than with understanding what reality is. Thus, power seeks change, not knowledge. And power may very well see knowledge as an obstacle to the change power wants. (Flyvbjerg 1998, 36) Flyvbjerg (1998, 37) states, that one of the privileges of power, and an integral part of its rationality, is the freedom to define reality. As Flyvbjerg (1998, 80) asks, why concern oneself with how reality really is when one has the privilege of defining it, and why use the force of the better argument when force alone will suffice?

Flyvbjerg's (1998) theory of rationality and power in decision-making has also faced critique (for example in Forester 2001, and Lapintie 2003), as it has been considered as controversial, over-generalized and vague, or even contradictory. For example Forester (2001, 264) has pointed out that if Flyvbjerg's theory was accepted as it is, the reader of the theory should understand it as a same sort of manipulation and deception, which was described in Flyvbjerg's case description.

2.3 Urban information and knowledge system

2.3.1 Knowledge management in urban settings

There is no commonly shared definition of *knowledge*, but it has been defined in different ways by various academics and practicioners. One commonly used model is the division between data, information and knowledge, introduced for example by Laurini (2001). According to Laurini (2001, 41), **data** is usually referred to as a succession of digits or letters without any semantic connotation. **Information** is data that has been organized so that it has meaning to the recipient, being able to interpret the meaning and draw conclusions for making decisions and plan actions. **Knowledge** is the application of data and information to make a decision through analyzing and synthesizing of information. (Laurini 2001, 42) The quantity and degree of abstraction vary between data, information and knowledge, as shown in figure 11.

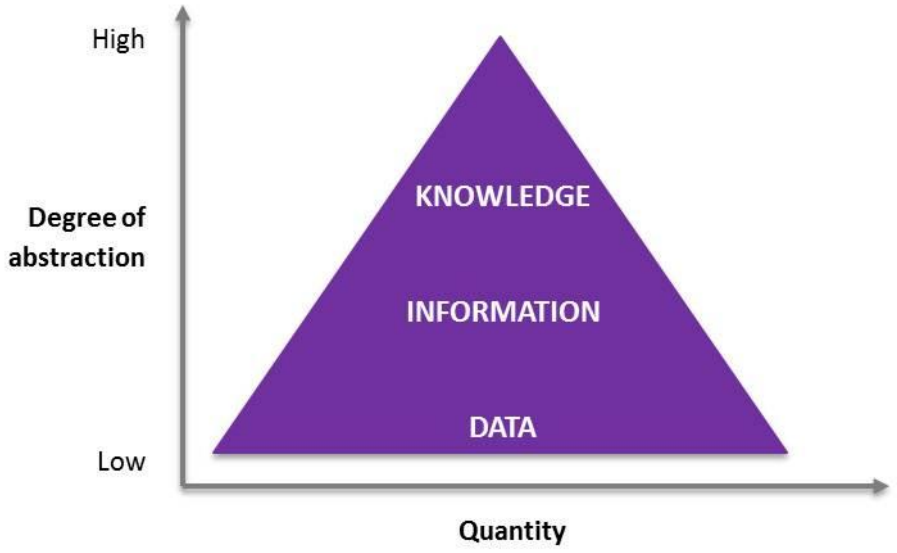

Figure 11: *The quantity and degree of abstraction vary between data, information and knowledge (Laurini 2001, 43).*

Another common definition, used for example in Knowledge Management, is to divide explicit and tacit knowledge. **Explicit knowledge** is formal (data, scientific formulas, general principles and theories etc.), residing for example within certain disciplines and following institutionalized rules about the manner of creating new knowledge, conducting analysis or surveys, and the validity of evidence or argumentation. **Tacit knowledge** is more personal and hard to formalize, making it

difficult to communicate or share with others (practical know-how, intuition etc.), and is related to people's individual experiences rather than to particular disciplines. (Nonaka & Konno 1998, Te Bömmelstroet & Bertolini 2010, Dalkir 2005)

Nonaka and Takeuchi (1995) have conceptualized four key modes of converting explicit and tacit knowledge in their SECI model, presented in Figure 12. Socialization is about sharing experiences to create new tacit knowledge, observing other participants, and brainstorming without criticism. Externalization means articulating tacit knowledge explicitly, writing it down, and creating metaphors, indicators and models. Combination is manipulating explicit knowledge by sorting, adding, combining, and looking at best practices. Internalization is learning by doing, developing shared mental models, and goal based training. (Nonaka & Takeuchi 1995)

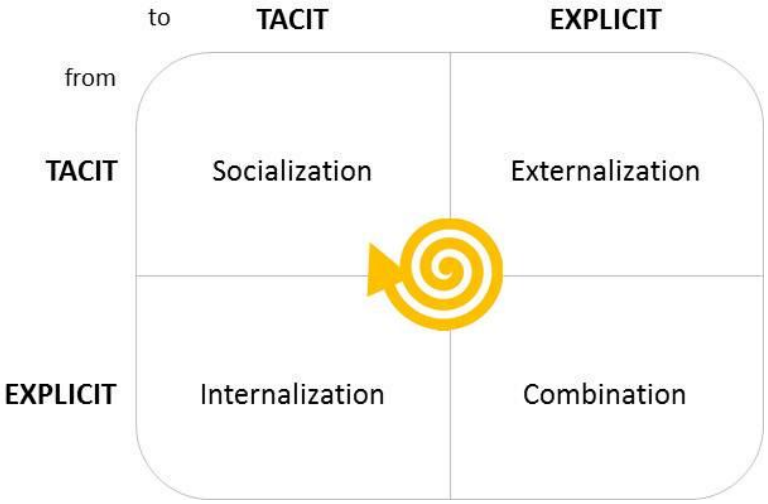

***Figure 12**: The SECI model of knowledge generation (Nonaka & Takeuchi 1995, 61).*

The definitions in Knowledge Management theories (for example by Nonaka & Takeuchi 1995, and Nonaka & Konno 1998) have, however, been also criticized by many authors (for example Tsoukas 2005, Ray & Clegg 2007, Hunt 2003, Gao et al. 2003, and Gourlay & Nurse 2005). In Western philosophy knowledge is often defined as a belief that is true and justified (Hunt 2003, Gao et al. 2003, Polanyi 1967). Polanyi (1967) understands the relationship of explicit and tacit knowledge differently from the Knowledge Management literature's view, also making a distinction between 'knowing-how' (procedural knowledge) and 'knowing-what' (declarative knowledge).

Polanyi's (1967, 4) argument that "we can know more than we can tell" is an integral part of his definition of tacit knowledge. According to Tsoukas (2005, 3), Polanyi's meaning of *tacit knowledge* has been misunderstood in Knowledge Management as a whole, if it is defined as an opposition to explicit knowledge and reduced only to what can be articulated, whereas it is in fact only its other side. According to Gourlay & Nurse (2005, 302), what Polanyi initially meant was that explicit and tacit knowledge are not opposites or completely independent, but instead **tacit knowledge** can be possessed by itself, and **explicit knowledge** must rely on being tacitly understood. Ray & Clegg (2007) also question Knowledge Management's definition

of *explicit knowledge*, as according to them, the definition is too vague and means merely the same as *information*.

2.3.2 City as an urban information system

According to Healey (2007, 27), all knowledge is constructed through social processes filtering what is experienced, observed and imagined as it is arranged into systems of meaning. It is in the social processes that various forms of knowledge encounter each other, are filtered, and arranged into arguments, justifications and concepts (Healey 2007, 27). As van 't Verlaat & Wigmans (2011, 18) state, it is not merely about allocating financial means, available land and land policy that are the instruments for urban development, but knowledge and skills are also needed to formulate a direction, allowing an insight into the various consequences brought about by the interventions. As Hibbard & Carillo (1998) say, people and organization culture are the driving factors that ultimately determine the success or failure of knowledge management initiatives, whereas technology only accounts for a small percentage of the knowledge management endeavor.

Te Bömmelstroet & Bertolini (2008, 253) describe the main differences between transport and land use planning, and their information use, collected in figure 13. Even though the figure outlines a rather simplistic view of the reality, educational and professional background and experience seem to have some influence in what kind of information is used.

	TRANSPORT PLANNING	LAND USE PLANNING
INFORMATION USED	Quantitative information concerning e.g. transport flows, levels of service and costs	Qualitative spatial information about places and functions
WORKING STYLE	General theories and computer models	Communicative settings
BACKGROUND	Engineering	Design or "soft" social sciences
FOCUS ON	Solving problems (i.e. congestion) and optimizing the transport system, without much attention for wider (social, economic) goals that can be achieved	Confronting and bringing together multiple disciplines in inclusive strategies
OBJECTIVE	Finding the means (e.g. congestion charge or highway extension) for a given goal (e.g. efficient functioning of the network)	Dealing with uncertainty of the future in many different ways (planning, scenarios and visioning)

***Figure 13**: Main differences between transportation and land use planning (edited based on Te Bömmelstroet & Bertolini 2008, 253).*

According to Rubenstein-Montano (2000, 164), collaboration is relevant in knowledge management discussion since a fundamental objective of knowledge management is to facilitate the sharing and distribution of knowledge between members of an organization. As Harris (1989) continues, interpersonal activity, a type of tacit knowledge describing how individuals complete tasks and communicate ideas, is a significant part of urban planning decision-making process in the form of negotiating, bargaining, explaining and arguing about planning rules, changes and permissions (Rubenstein-Montano 2000, 165).

Ackoff identified the defects of traditional information systems as early on as in 1967 stating that most information systems are actually designed on the assumption that the critical deficiency under which most decision-makers operate is the lack of relevant information, whereas the real problem is that they suffer more from an overabundance of irrelevant information changing the focus of the information system design (Ackoff 1967, 4). According to Endsley (2008, 4) the criteria of designing information systems have changed lately, and in addition to designing systems that provide the needed information and capabilities, the information also has to be provided in a way that is usable cognitively and physically. Various information systems have been developed to support urban planning decision-making, and some of them are presented in part 2.3.5.

2.3.3 Urban information flow

Decision-makers in urban environment face an overflow of information coming from various actors, various themes, and in various formats. As Wurman stated already in 1989, more information had been produced in the last 30 years than the previous 5000. And after entering the information age, the rate of producing and accessing information has grown. However, various planning support systems, introduced in part 2.3.5, do not have the ability to filtrate, condensate or prioritize the most essential information the decision-makers may need. Thus, it comes back to the decision-makers' ability to find the needed pieces of reliable information from the plethora of data and information available.

As Endsley & Jones (2012, 3) say, the human "operator" can be severely challenged in rapidly bringing all of the available information together in a form that is manageable for making accurate decisions in a timely manner. Moreover, there is an enormous gap between the data being produced and disseminated, and the human ability to find the bits that are needed and process them together with the other bits to arrive at the actual needed information (Endsley & Jones 2012, 3). A considerable amount of work is required to find out the needed information, but how does the information-seeking happen in dynamic and hectic decision-making environments?

Urban systems differ from many other systems in that usually no severe or sudden error will follow the made decisions, but consequences will be seen after years or decades, making the decision-consequence loop harder to understand. This makes the relevant information use and systemic understanding important features of the urban decision-making practice. It is not solely about understanding the pieces of information available, but also about understanding the systemic interrelations between various pieces of information and various parts of the system.

When decision-making in real-world complex settings has been studied, significant differences from idealized model of decision-making in which optimization across possible alternatives is featured, have been found (Endsley & Jones 2012, 10). As Endsley & Jones (2012, 10) continue, experts use pattern-matching mechanisms to draw upon long-term memory structures that allow them to quickly understand given situations, rarely spending time in considering possible alternative courses of action. In these situations, a decision-maker's situation awareness, introduced in part 2.4, becomes significant.

2.3.4 City mental model as a representation of a city

City mental model is everyone's personal image of a city. As Laurini (2001, 32) defines, the image is generally a particular vision of the city helping anyone to understand the city, each action bringing some additional knowledge in this mental model in order to design a comprehensive personal information system of a city. According to Healey (2007, 27–28), the challenge in urban regions is that an urban region or a city is not a 'thing', but an imagined phenomenon, understood in different ways by different people. City changes all the time, and so does the mental representation of the city.

Mental models are complex structures people use to model the behavior of specific systems, based on both semantic knowledge and systems knowledge, and helping people to determine what information is important to attend to (Endsley & Jones 2012, 21). According to Endsley & Jones (2012, 22), mental models are also an important enabler of the higher levels of situation awareness (see part 2.4), and without a mental model a person would be very poor at understanding what is happening, or what is likely to happen in the future.

As planning decision-making in urban environments usually take place in group settings, the presence of shared mental models becomes interesting. The presence of shared mental models is believed to enhance greatly the ability of teams to develop the same understanding, and without shared mental models team members are more likely to process information differently and arrive at different interpretation of what is happening (Endsley & Jones 2012, 204). The need and challenges of communicating parts of the personal mental models in order to generate shared understanding of the situations is discussed more in part 2.4.3.

2.3.5 Examples of existing urban information systems

As Lapintie (2003, 15) says, the words, pictures and numbers used are not an objective way of representing a city, but describe only one possible truth. Interactive methods can, thereby, increase the understanding of the urban complexity. The shared understanding of a city can be supported by various decision-making support systems created for complex urban environments. However, for designing an information system for urban planning, compromises have to be made in deciding between the cost and the quality of the information (Laurini 2001, 70). According to Endsley (2001, 2), success in these endeavors involves far more than having a lot of data, and achieving the goals depends on understanding how people process and utilize information in their decision-making.

According to Endsley and Jones (2012, 5), information systems have traditionally been designed and developed from a technology-centered perspective so that engineers developed the sensors and systems that were needed to perform each function, adding more and more displays into the settings, and leaving people with keeping up with the exponential growth of data created by this process. In systems like these, a considerable amount of additional work is required to find what is needed from the vast amount of data. However, in the more recent user-centered design tradition the premise is that a person does not need to perform every task, but does need to be in control of managing what the systems are doing in order to maintain the situation awareness needed for successful performance in complex and dynamic systems (Endsley & Jones 2012, 11). Information in user-centered systems is represented in terms of the operator's major goals instead of a technology-oriented way.

One group of recent urban information system solutions are various digital cities platforms, where people from a local community can interact and exchange knowledge, experiences, services, or simply share interests through internet (Fusero 2008, 104). One example of these are the **4P forums**[5], which were used and developed in the city of Espoo until the end of the year 2011. 4P forums were virtual information building environments, working as an interface between planners and local actors, gathering together local information.

Other digital cities platforms are for example the **Amsterdam Digital City**, which allows citizens to interact with the public administration in order to obtain services or information; and the **Helsinki Arena Project**[6], which created a virtual 3D model of the city (Fusero 2008, 104). Digital cities platforms are used merely for representing local information and creating virtual interface between the public domain and citizens. These platforms can be used in public participation phases of the decision-making processes, but are not commonly used as a part of the decision-making itself.

Various tools have been developed in order to support the decisions taken in a multi-actor environment, such as the **Urban Decision Room UDR**, which was developed at the faculty of architecture at the Delft University of technology. UDR was specifically aimed at decision-making processes in complex urban area development projects (van Loon et al. 2008). An urban decision room is an interactive computer simulation system used simultaneously by more than one actor to simulate alternative outcomes of complex planning decisions. In UDR, participants are asked to provide concrete solutions for urban design problems, whereafter a computer network is used to calculate a 'common solution space' of all the participants' preferences for further negotiations. UDR is designed for concrete planning decisions, and more abstract visions, strategies and overall alignments cannot be discussed with the help of this tool. (Barendse et al. 2011, 205)

Immersive environments are usually cube-shaped spaces equipped with high-resolution projectors, motion sensors and other advanced technology, allowing the user to virtually experience what objects and spaces would look like in reality. These

[5] 4P forums were created for three areas in the city of Espoo: Espoo center, Hista and Lillhemt. More information about the 4P forums and their development can be found in Staffans & Väyrynen 2009.
[6] See: http://www.virtualhelsinki.net/english/index.html.

immersive environments are considered most useful when designing complex but finite things, as they can reveal important details that traditional techniques fail to communicate, but they often limit the number of concurrent users to one or two. **Collaborative virtual platforms**, as **Arizona State University's Decision Theater**[7], have also been developed. They exchange the sense of immersion and level of detail for easily transformable input data and real-time exploration of design alternatives enabling the studying of a large number of scenarios within one meeting. (Kauppi & Vanamo 2012, 4–6) These still leave much space for the possibilities of selecting and visualizing relevant information of what should be highlighted, and what should be left aside.

One example of information visualization for assisting mobility decision-making process is the campus mobility interface, which is currently in the development phase in Massachusettes Institute of Technology. The **MIT Residential Footprint**[8] (2013) visualizes MIT's mobility footprint for institutional level decision-making, assisting the institution in better understanding its own mobility habits. If this kind of an application would be used in multi-actor decision-making situation, the importance of having data in compatible formats would be necessary for reaching comparability.

2.4 Situation awareness

2.4.1 Defining situation awareness

Developing the steps leading to the desired future, decision-makers should have an awareness of what the situation is now, and how the various parts of the society are connected with each other. This can be called situation awareness. Debate still exists regarding how to best define situation awareness, but one commonly accepted definition is by Endsley (1995, 36–37), who defines situation awareness as *"the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future"*.

The situation awareness of the decision-maker will affect the quality of a decision, and through that, the future planning, sustainability, livability, functionality and accessibility of an area. Acquiring and maintaining situation awareness becomes increasingly difficult as the complexity and dynamics of the environment increase, as many decisions are required across a fairly narrow space of time, tasks are dependent on an on-going and up-to-date analysis of the environment (Endsley 1995, 33).

Several factors influence the process of acquiring and maintaining situation awareness, as shown in Figure 14. Situation awareness is built over time and is highly temporal in nature, consisting of awareness of conditions in history, at the given situation, and projections about the future. However important and relevant for the decision-making process, established doctrines, rules, procedures, checklists and the like fall outside the boundaries of situation awareness (Endsley 1995, 36).

[7] See: http://dt.asu.edu/.
[8] See: http://web.media.mit.edu/~clwen/mit-footprint/#.

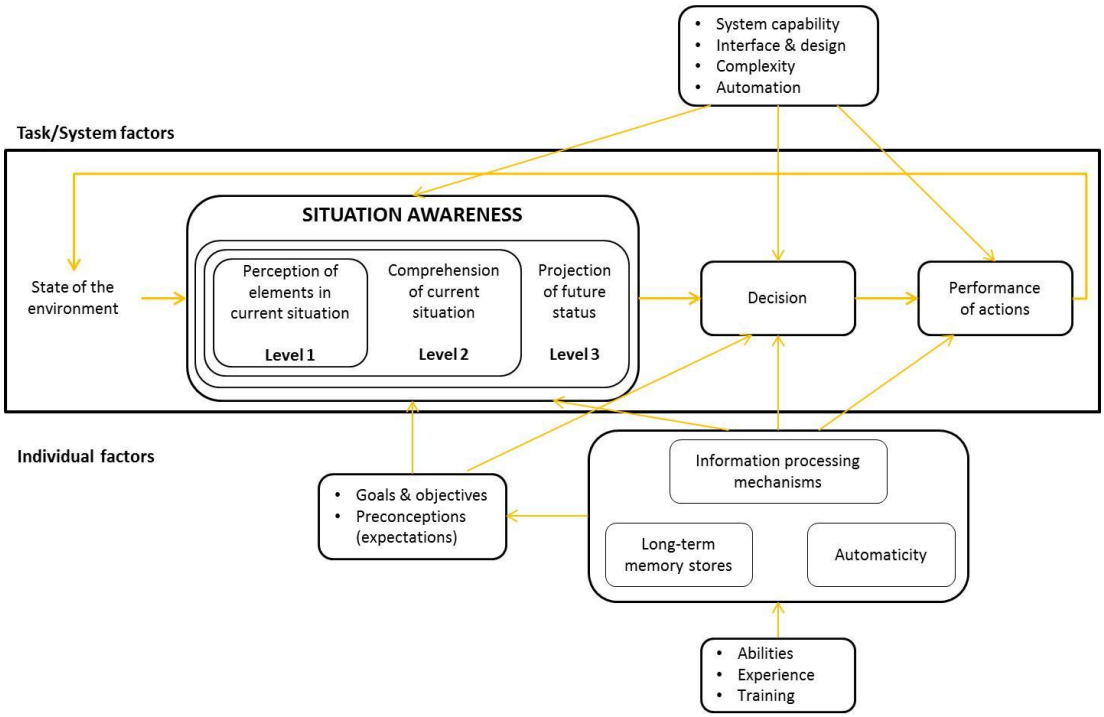

***Figure 14**: Model of situation awareness in dynamic decision-making (Endsley 1995, 35).*

As Endsley (2001, 7) states, one of the key benefits of studying situation awareness is that it tells us how data and information need to be combined and understood. Instead of sharing every piece of information with everyone, by understanding the generation of situation awareness within urban planning decision-making, conclusions of how to form meaningful integration and groupings of the information so that it can be easily absorbed and assimilated in the current context, can be formed. As an example of supporting situation awareness in a dynamic and data rich environment, Endsley (2001, 10) mentions multi-modal displays for assisting parallel processing.

Situation awareness is based on more than simply perceiving information of the environment. The first level (L1 SA) is about the perception of the elements in the environment, the second level (L2 SA) is about comprehending the current situation, and the third level (L3 SA) is about the projection of future status as shown in the figure 15. (Endsley 1995, 36–37) Breakdowns or errors in situation awareness can occur at any of these levels.

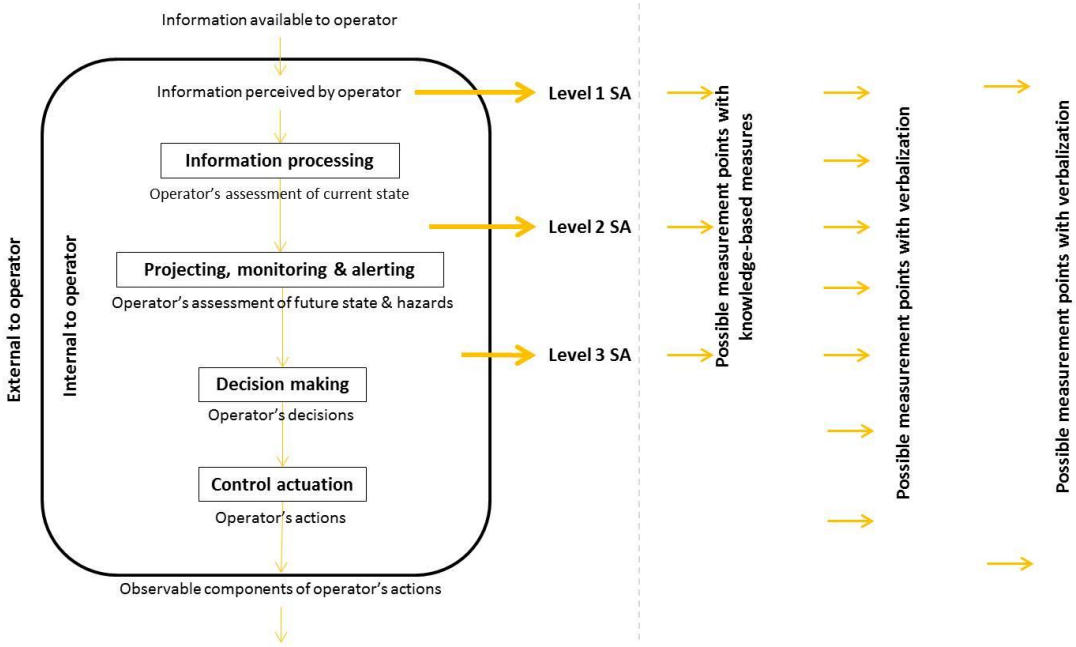

***Figure 15**: Levels of situation awareness in the decision process and measurement points with knowledge-based measures (combined from: Pritchett & Hansman 2008, 193, 195).*

2.4.2 Generating situation awareness

Although system designers usually focus on the information provided through the system and its operator interface, situation awareness is derived from all of the various sources of information through visual, aural, tactile, olfactory, and taste receptors (Endsley 2008, 10). Thus, situation awareness is derived from a combination of the real world environment, the system's displays, and other people as integrated and interpreted by the individual (Endsley 2008, 12), as shown in figure 16. Designers of closed or highly fixed systems usually focus only on the information provided by the system and the interface, for which reason Endsley (2008) has highlighted also the importance of acknowledging the meaning of information coming from the real world by direct observations in figure 16. It should be noted, however, that while some information can be more easily processed simultaneously, some types of information are difficult for simultaneous procession, forming a bottleneck for situation awareness (Endsley & Jones 2012, 20).

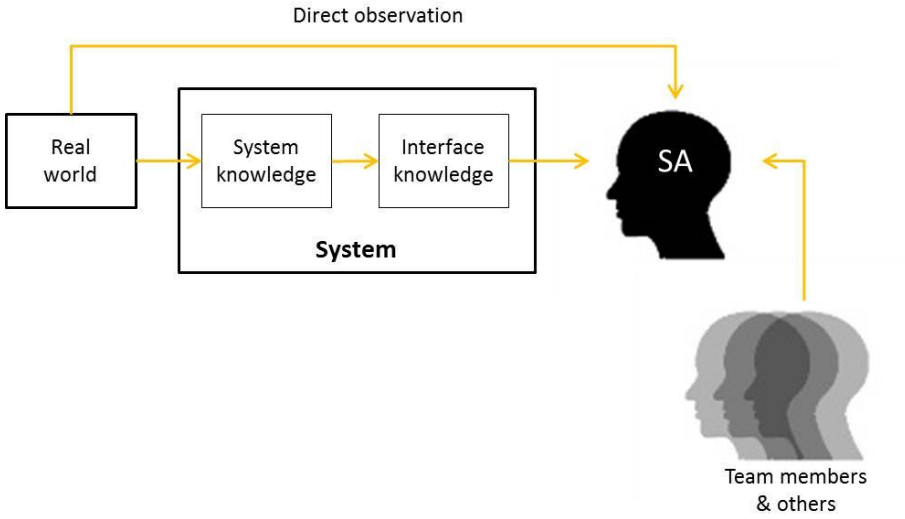

***Figure 16**: Deriving situation awareness (SA) (Endsley 2008, 10).*

However, several factors influence the accuracy and completeness of the situation awareness derived from the environment. This is because the capabilities of working memory and attention are limited, and the way attention is employed in a complex environment with multiple competing cues is essential in determining which aspects of the situation will be processed to form situation awareness (Endsley 2008, 12). According to Endsley (2008, 13), attention to information is prioritized based on how important that information is perceived to be. Experience helps to develop internal models of the systems and environments, directing the limited attention in efficient ways and providing a means of integrating information without loading working memory (Endsley 2008, 13), as shown in figure 17.

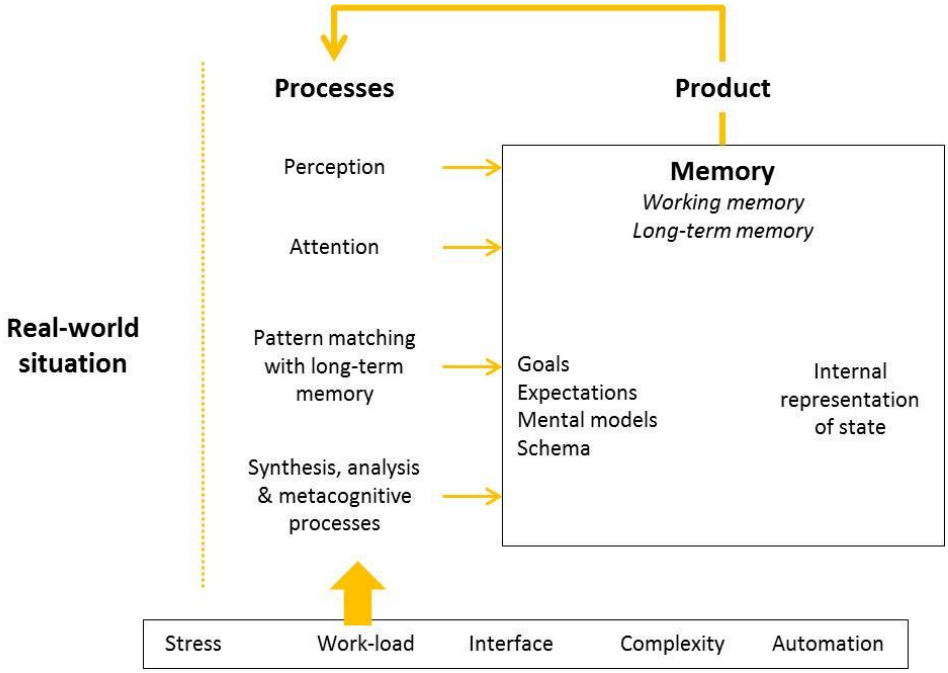

***Figure 17**: Mechanisms and processes involved in situation awareness (Endsley 2008, 13).*

2.4.3 Situation awareness in decision-making processes

It is possible to talk about situation awareness also in terms of teams, as in many situations several individuals may work together as a team to carry out actions or decisions. According to Endsley (1995, 39), in this case one can conceive of overall team situation awareness, whereby each team member has a specific set of situation awareness elements about which he or she is concerned, as determined by each member's responsibilities within a team, as shown in figure 18. Thus, shared team situation awareness is dependent on the situation awareness of the individuals involved, but is more complicated as not everyone in the team needs to be completely aware of all the same information. Shared situation awareness involves also the understanding of the status of other team members, and how they progress on the tasks that affect one's own goals and tasks (Endsley & Jones 2012, 201). Endsley and Jones (1997, 2001) define shared situation awareness as *"the degree to which team members have the same situation awareness on shared situation awareness requirements"*. For example so that every team member is required to know A, even though member 1 knows also B, member 2 knows also C, member 3 knows also D etc.

As Artman (1999, 15) says, controlling large dynamic systems is beyond the competence of one single individual, and should be instead coordinated and controlled by a team working co-operatively. Accordingly, Saner et al. (2009, 280) argue that individuals performing as teams in dynamic contexts need to develop an accurate common understanding of the prevailing situation, as well as ways of communicating it.

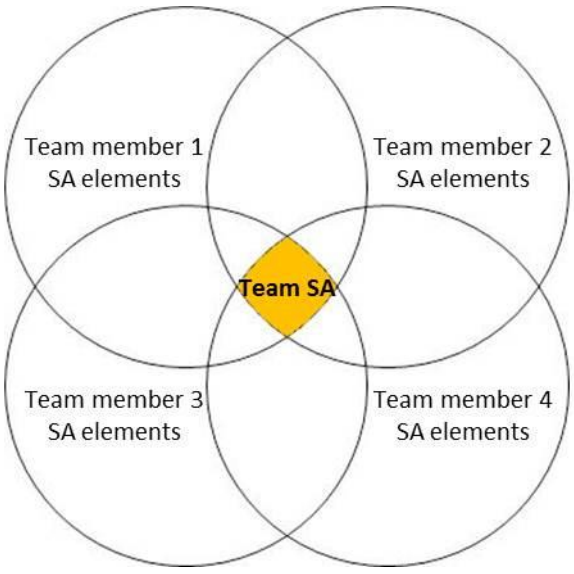

***Figure 18**: Team situation awareness (Endsley 1995, 39).*

The importance of information and knowledge verbalization, and fluent and relevant communication is essential for team situation awareness to evolve, as has been argued by many researchers (for e.g. Schwartz 1990; Orasanu 1995; Salas, Prince, Baker & Shrestha 1995). In systems where there is much overlap in situation awareness requirements between team members, visual displays will generally be required to aid in transmitting and visualizing complex and spatial information

(Endsley & Jones 2012, 214). Focus has to be put on what information is relevant for the various team members, what information should be shared and with who, and how the information should be shared so that it is easily understandable and perceivable.

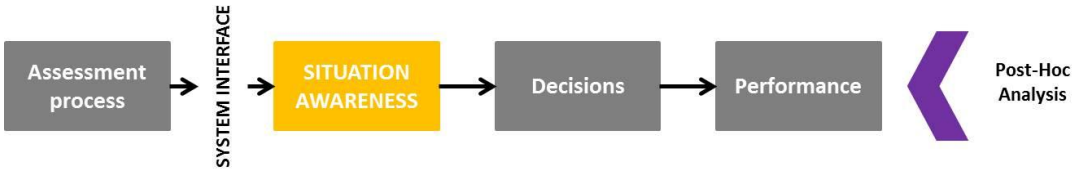

***Figure 19**: Situation awareness in the decision-making process (Endsley & Garland 2008, xiii).*

Situation awareness is depicted as a person's internal model of the state of the environment (or mental model, as described in part 2.3.4), based on which the person can decide what to do about the situation and carry out any necessary actions (Endsley 2008, 8), as shown in figure 19. Accordingly, the importance of good situation awareness in the decision-making process is strong. However, as Endsley (2008, 25) notes, there may be a disconnection between the processes used and the resultant situation awareness, as well as between the situation awareness and the decisions made. Figure 20 outlines the potential blocks to satisfactory actions by the operator (decision-maker). Good situation awareness increases the probability of good decisions and good performance, but does not guarantee it, as decisions rarely happen in a vacuum.

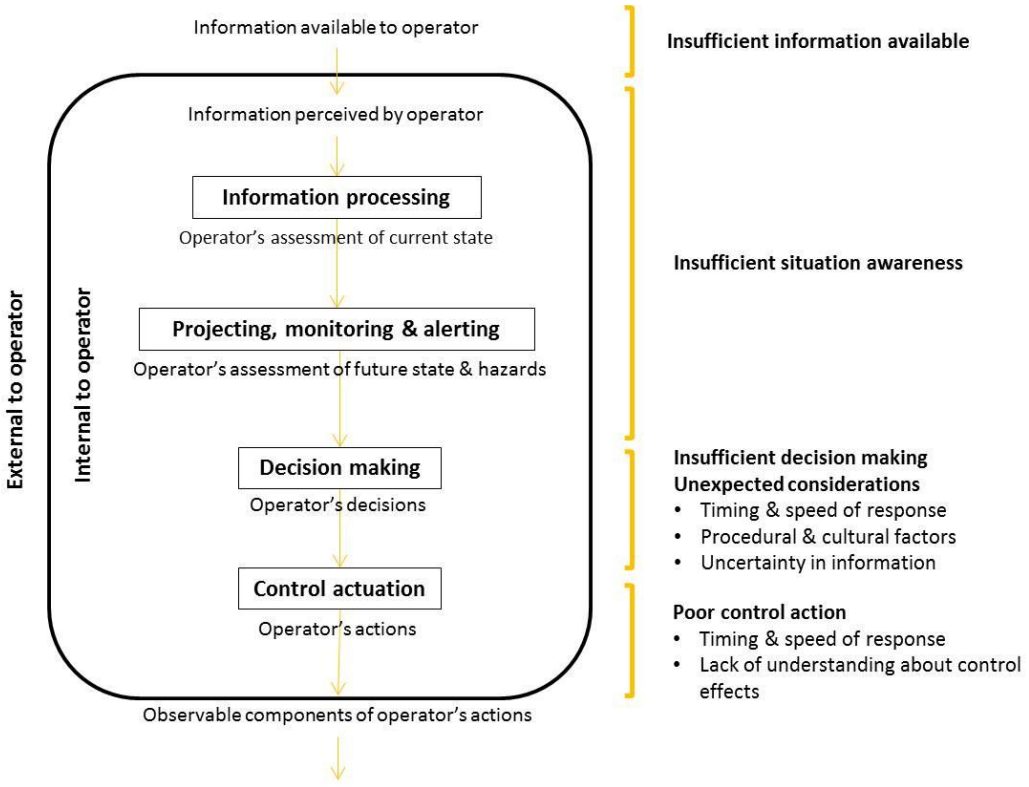

***Figure 20**: Potential blocks to satisfactory actions by the operator (Pritchett & Hansman 2008, 198).*

2.4.4 Assessing situation awareness

According to Rodgers et al. (2008, 73), occupations requiring interaction with complex, dynamic systems make the post hoc assessment of situation awareness problematic due to the lack of available information that directly relates to the cognitive processes of relevant personnel. Moreover, what should be noted is that differences in information requirements associated with various occupations make the assessment of situation awareness domain-specific (Rodgers et al. 2008, 73).

One way of assessing situation awareness is using subjective assessment methods, such as linear scaling with verbal descriptors as used by many researchers. Using self-rating metrics is not trouble-free, as errors and systematic bias in human judgement and recall, as well as limits on working memory, hinder the levels of accuracy and sensitivity that can be achieved with these measures. (Jones 2008, 113) Another set of assessment methods is using observer ratings.

A situation awareness global assessment technique (SAGAT) has been developed to assess situation awareness across all of its elements based on a comprehensive assessment of situation awareness requirements. Using SAGAT, a simulation employing a system of interest is frozen at randomly selected times and operators are queried as to their perceptions of the situation at that time (Endsley 2008b, 147).

Knowledge-based measures, on the other hand, attempt to directly ascertain the subject's internal awareness, having the advantage of providing direct insight into the operator's awareness and the mechanisms used to maintain it (Pritchett & Hansman 2008, 194–197). As shown in figure 15, all levels of situation awareness (L1, L2 and L3) can be measured with knowledge-based measures. Figure 21 outlines the main strengths and limitations of various situation awareness measures. Various measures of situation awareness are usually easy to combine, as they examine different data at different times (Pritchett & Hansman 2008, 200).

KNOWLEDGE-BASED MEASURES OF SA	
Strengths	*Potential limitations*
• Isolates components of current situation awareness • Provides insight into development and maintenance of situation awareness	• Can not necessarily be used to predict final performance of operator • Easier to measure declarative knowledge than procedural knowledge • Possibly intrusive into operator's task
VERBALIZATION MEASURES OF SA	
Strengths	*Potential limitations*
• Provides insight into both situation awareness and thought processes • Provides insight into perceived importance of information	• Can not necessarily be used to predict final performance of operator • Easier to measure declarative knowledge than procedural knowledge • Limited by user's ability to relate all considerations during experiment runs • Possibly distracting
PERFORMANCE-BASED MEASURES OF SA	
Strengths	*Potential limitations*
• Assesses final performance of system and records operator's actions • Sufficiency of situation awareness can be inferred in some situations	• Not a direct measurement of operator's situation awareness • Easier to measure procedural knowledge than declarative knowledge • Limited by descriptiveness of available performance measures

***Figure 21**: Strengths and limitations of various situation awareness measures (Pritchett & Hansman 2008, 196).*

As Endsley and Jones (2012, 260) describe, situation awareness is an internalized mental construct, which makes creating measures to adequately assess and describe it a difficult task. According to Endsley and Jones (2012, 260), direct and objective measurement of situation awareness is the best way to approach the evaluation, as indirect measures try to infer how much situation awareness a person has by measuring the cognitive processes involved in developing situation awareness or by measuring performance issues related to the operator's interaction with the system.

However, due to the long time range, direct self-rating, observer-rating and SAGAT techniques are not very applicable in urban planning. The effects of the made decisions can usually be seen only after a long time span, which makes estimating the cause-effect relationships difficult and dubious in the complex environment. That is why this study tries to understand the situation awareness in urban planning by using knowledge-based measures.

3 METHODOLOGY

This study is as a case study examining the mobility planning decision-making in the Otaniemi campus and T3 area in more detail. According to Gillham (2005, 167), a research case study aims at investigating phenomena in their contemporary context by building up a comprehensive picture from multiple forms of evidence. For achieving a comprehensive enough description of the case, analysis of existing projects and documents, as well as key person interviews, were performed. The material was defined and supplemented during the research process according to the information retrieved from the documentation and interviews.

As Healey (2007, 10) depicts, research is not outside the world it explores, but is driven by insights and perceptions that are shaped by their own trajectories through which understandings and valuings have evolved. Hence, as authors, researchers cannot avoid being selective in what they present, and normative about what they put forward as success or failure, as positive or negative developments. Also this thesis will look like its author, and is influenced by the background in organization theory, management sciences, and urban planning and design. Accordingly, the results are analyzed not only in the light of the urban planning profession, but also in the light of organization and management theory.

3.1 Research material

At first, the case area for the study was defined as the whole T3 area. However, during the key person interviews it soon turned out, that many people felt most comfortable about discussing the situation in the Otaniemi campus area. Therefore, the area was redefined as being the Otaniemi campus area with some references to the situation in the whole T3 area. When defining the scope of studying urban planning in the area, and outlining the major on-going and future projects, the importance of mobility planning began to stand up. West Metro is already an on-going project, and the decisions about the metro are mostly done. However, currently it is interesting to study what kind of land use and mobility planning projects the West Metro project has launched in the area.

3.1.1 T3 mobility planning decision-making material

In the first part of the analysis, various Otaniemi campus and T3 mobility planning decision-making materials were used for forming an image of the main themes of T3 mobility and land use planning related discourses. The material consists of four parts and altogether 42 documents:

- Decision-making minutes of Espoo City Council, Espoo City Board and Espoo City Planning Board;
- Mobility planning documents of regional level;
- Mobility planning documents of city level; and
- Mobility planning documents of Otaniemi campus and T3 area level.

According to Eskola and Suoranta (2005, 18), in qualitative research the quantity of data does not have a straightforward influence on the success of the study. The scientific criterion for the material is therefore not the quantity, but the quality. Accordingly, a prerequisite for all the documents were the theme of mobility planning and a relation with the Otaniemi campus or T3 area at some scale. A more detailed list of the research material is provided in appendix 1. In the beginning of the material search, no explicit period for material collection was set. Instead, by going through the material, it shortly turned out that two major decisions were seen as affecting significantly the development of the area: the decision of the Espoo City Council about the West Metro line (2006), and the decision of locating the Aalto University Campus in Otaniemi within the T3 area (2011). Accordingly, the period was set for collecting material from 1.1.2006 onwards.

However, it has to be noted that the material collected is only a part of the material available. The material was collected by internet searches and discussions with the mobility planning decision-making representatives. Because the quantity of planning decision-making documents is enormous even within a shorter time, for research economic reasons only the material which was easily accessible within a reasonable time was collected for the analysis.

3.1.2 Interview material

An initial discussion was held in advance for understanding the challenges of mobility planning decision-making in a multi-actor environment. Findings from this discussion were used as a basis for forming the questions for the key person interviews. Traffic planning department of the city of Espoo was selected for gathering general information of how mobility planning works in the Otaniemi campus and T3 area, who are the main actors involved in the planning decision-making process, what documents and information is produced etc.

For a deeper understanding of the decision-making process and factors influencing the final decisions, 17 key person interviews were performed, representing the main actors influencing the decision-making process identified during the analysis of the mobility planning decision-making material. A more detailed list of the interviewees is provided in appendix 1. The list of interviewees was supplemented several times during the research process as new important actors were identified based on the interviews.

The interviews were carried out based on Gillham's (2005, 70) instructions for semi-structured interviews: same thoroughly developed questions were asked of all those involved, and for ensuring the equivalent coverage, interviewees were prompted by supplementary questions if they hadn't dealt spontaneously with some sub-areas of interest. The interviews were carried out as one to two hours semi-structured interviews. The questions were delivered for the interviewees in advance for helping them in preparing for the interview. After the interviews, the material was transcribed for content analysis.

For simplifying the discussion in the interview situation, one case example of mobility planning decision-making was selected for further scrutiny. The initially selected case example was the timely decision of whether to align the Rail-Jokeri

route through Otaniemi or Tapiola. As the alignment is at the moment examined more closely by three consultants, and will be decided by the City Board in the end of 2013, the City Board was selected as the focal point of the decision-making process, although the highest authority in municipal decision-making still relies with the City Council. Within the limits of a Master's thesis, many research economic definings had to be made, and the focus was put at a certain level of the decision-making process. In the future, studies concerning other levels of the decision-making process would be interesting to carry out, as well.

With the help of the example of Rail-Jokeri case, the process of influencing the decision-making was revealed. In the interviews, also two other topical cases came up constantly, and were therefore also selected for a case analysis. The three cases, Rail-Jokeri route alignment under scrutiny for the final time, Ring Road I renewal, and Car-parking norm in Otaniemi, are presented in part 4.4.

3.2 Analysis of the material

No system operates in isolation. For understanding the Otaniemi campus and T3 mobility planning context, the planning ecosystem was carefully examined for identifying the main actors and processes taking place in the area. Situation awareness in urban planning has not been studied previously, so established methods and best practices don't yet exist. The existing methods of assessing situation awareness were introduced in part 2.4.4, stating that due to the long time range of urban planning decision-making processes, direct self-rating, observer-rating, and SAGAT techniques do not seem to be very applicable in the urban planning context, as the effects of the made decisions can usually be seen only after a long time span. Studying situation awareness with knowledge-based measures is, therefore, seen more applicable for the context of this study, providing insight into the development and maintenance of situation awareness.

The research method in the first part of the analysis is discourse analysis. According to Eskola & Suoranta (2005, 195) discourse analysis is defined as a method of analyzing how reality is produced in social practice. A typical feature for discourse analysis is that the issues outlined in the material are not taken as granted, but are understood as a part of producing the social reality (Eskola & Suoranta 2005, 194).

Jokinen et al. (1993, 27) define a discourse as a relatively harmonious system of regular relations of meanings, which is based on social practices and is, simultaneously, producing social reality. According to Jokinen et al. (1999, 18), in discourse analysis it is essential to ponder, how various actors make the social reality understandable. Written texts are not, then, describing the subject, but instead actively forming some kind of version of the situation. People are using language in order to make things happen, and for constructing versions of the social reality (Eskola & Suoranta 2005, 196). Accordingly, the documentation is seen as a struggle between various definitions, perceptions and competing discourses. The material does not serve as describing the 'truth', but more as outlining a narrative of what is desired to be highlighted.

Because texts are a part of producing the social reality, it is interesting to analyze how the gathered material tells about mobility planning decision-making in the case

area. The image formed by the mobility planning decision-making material tells a story, interpreted by the researcher, about how the actors want to compose the image of the mobility planning decision-making in the selected case area. In the analysis, individual words are not given emphasis, but instead, by analyzing broader meanings, a more holistic view of the situation is portrayed. The analysis is not comparing the identity or organizational status of the writers, but the texts are understood as being a part of telling the story of mobility planning decision-making in the case area. The aim of the analysis is to portray an image of the main themes about the relation of mobility and land use planning in the material.

In the beginning, the material was read through several times for gaining an overall image of the themes coming up from the text. Based on those themes, a more precise discourse analysis was performed simultaneously with exploring the theoretical knowledge about the identified themes in order to understand the mobility planning decision-making context in the case area.

3.3 Reliability of the study

In the evaluation of the reliability of a qualitative study, important criteria are the ability to evaluate the analysis process, and the repeatability of the analysis (Mäkelä 1990). Ability to evaluate means that the reader has to be able to follow the thought and reasoning of the researcher. Repeatability means that the categorization and interpretation criteria used in the study are represented thoroughly and unequivocally. As a study always looks like its author, the course of the analysis has been described in part 3.2 in order to help the reliability evaluation of the study.

The aim of discourse analysis is not to strive for generalizable interpretations that can be directly applied to other cases. Instead, the meaning is to tell about the exact case and material that has been studied. It is also important not to detach meanings from their context as things may mean different things in different contexts (Eskola & Suoranta 2005, 196). For this reason, examples are used whenever it is essential for understanding the interpretations, and the course of analysis has been outlined in the study. In this study, focus has been put on analyzing sentences and larger unities in order not to detach meanings from their contexts.

According to Eskola & Suoranta (2005, 198), qualitative analysis reports usually utilize numerous direct quotations for representing the material. In this study the report has been written in English, whereas all of the material is in Finnish. For this reason, the quotations have been translated by the author in order to give examples of the discourses. The translation process has also distanced the voice of the interviewees from the selected quotations so that they cannot be identified from the text. In addition, things have been described during the course of the part 4, for assisting the reader to understand and follow the reasoning and interpretation process. Used documentation (in Finnish) has been listed in appendix 1 in case the reader wants to make the acquaintance of it. Transcripts of the key person interviews are confidential, and are therefore not published in the appendices. However, they are securely stored in case they are needed during the review process of the study.

4 FINDINGS: MOBILITY PLANNING DECISION-MAKING IN THE OTANIEMI CAMPUS AND T3 AREA

This part outlines the main findings of the study. First, planning ecosystem analysis is introduced for familiarizing the reader with the case area of the Otaniemi campus and T3. Thereafter, discourses in mobility planning decision-making material are outlined. Third, focus is put on introducing the key person interview analysis. Finally, a more thorough overview of three case examples of mobility planning decision-making in the area is provided.

4.1 T3 Planning ecosystem analysis

4.1.1 Defining T3 area

T3 area is mentioned as the most important town planning target within the city of Espoo, carrying also a national significance (City of Espoo 2013b[9]), and serving as the location for Aalto University and many national and international companies. The West Metro project (scheduled to be completed in 2015) will have various effects on the planning and development of the area. T3 area consists of three sub-areas: Tapiola, Otaniemi and Keilaniemi. Figure 22 shows the position of the T3 area (red square) in the Helsinki Metropolitan area, roughly 10 km from Helsinki city center, and the forthcoming West Metro line. The objective of T3 is to develop the area by integrating science (Tiede), culture (Taide), and business (Talous) for creating a global innovation ecosystem.

***Figure 22**: Position of T3 area in the Helsinki Metropolitan area[10], and the forthcoming West Metro line[11], showing also the location of the Otaniemi campus within the T3 area.*

[9] City of Espoo. 2013b. Town Planning. Accessed: 28.8.2013. Available: http://www.espoo.fi/en-US/Housing_and_environment/City_planning/Town_planning

[10] Map from: maps.google.fi.

[11] Picture from: City of Espoo. 2012. Facts about Espoo - a Nordic Story of Youth, Growth and Excellence. Accessed: 28.8.2013. Available: http://www.espoo.fi/download/noname/%7B07B004C2-A125-4A32-88EB-9DDAFDDBEA3F%7D/27544. p. 14.

Otaniemi campus accommodates Aalto University campus, various research institutions, and small startup companies, and represents technology and science. Approximately 20 R&D centers are located in Otaniemi, and its ecosystem of companies, universities and technology centers account for approximately 50% of the R&D value of Finland (City of Espoo 2012, 11[12]). Tapiola became famous already in the 1950's as a garden city. Tapiola with sports facilities, Espoo Cultural Centre and the Espoo Museum of Modern Art is the cultural hub of the region (Eco Urban Living 2011, 8). Keilaniemi serves as the location for national and multinational companies and their headquarters, such as Nokia, Kone, Fortum and Rovio. Keilaniemi is the most important business district in the city of Espoo, and 50 % of turnover at Helsinki Stock Exchange comes from Espoo-based companies (City of Espoo 2012, 10[13]).

T3 area is mentioned in various municipal and regional strategies, and its importance for the development of a regional innovation environment is highlighted. For example the Espoo strategy 2010–2013[14] outlines the area as a dynamic, competitive and sustainable hub, which attracts people and companies nationally and internationally. Also the regional Prosperous metropolis, Competitiveness strategy for the Helsinki Metropolitan Area[15] addresses the importance of T3 area for example in the action line 11: *"Otaniemi, Tapiola and Keilaniemi, characterised by the words 'science', 'art' and 'economy' (T3), can form, acting together and in interaction with each other, a globally unique innovation environment"*.

4.1.2 Mobility planning decision-making stakeholders

The mobility planning decision-making process in the case area is divided into various scales of decisions and stakeholders presented here as: municipal decision-making; city planning department; national associations; local associations; public transportation operators; property owners, developers and constructors; user organizations; and individual users. According to the interviews, the planning ecosystem in the Otaniemi campus area is easiest to understand, as there are only a few big actors in the area trying to influence the decision-making process. In Tapiola and Keilaniemi, the actor network is much more complicated because of the larger amount of various property owners and user organizations.

For introducing a part of the decision-making actor network, the Otaniemi campus area was selected for more detailed examination. Based on the interviews, figure 23 outlines the mobility planning decision-making stakeholder network in Otaniemi area. Figure 24 shows the main network between these stakeholder groups, making a

[12] City of Espoo. 2012. Facts about Espoo - a Nordic Story of Youth, Growth and Excellence. Accessed: 28.8.2013. Available: http://www.espoo.fi/download/noname/%7B07B004C2-A125-4A32-88EB-9DDAFDDBEA3F%7D/27544.

[13] City of Espoo. 2012. Facts about Espoo - a Nordic Story of Youth, Growth and Excellence. Accessed: 28.8.2013. Available: http://www.espoo.fi/download/noname/%7B07B004C2-A125-4A32-88EB-9DDAFDDBEA3F%7D/27544.

[14] Espoo strategy 2010-2013. Accessed: 28.8.2013. Available: http://prod07.tjhosting.com/Espoo/Epadyna/intrakun_e.nsf/64436ab8f406db5ac225657c0062b8ac/5a9cbccce39bd6f3c2257632003890cb/$FILE/Espoo-strategia.pdf

[15] Prosperous metropolis Competitiveness Strategy for the Helsinki Metropolitan Area. 2009. Accessed: 28.8.2013. Available: http://www.hel.fi/hel2/Helsinginseutu/Pks/PKS_kilpailukykystrategia_engl_011009.pdf. p. 21.

distinction between two-way collaboration and mainly one-way communication. Thereafter, the most influential stakeholders are shortly introduced.

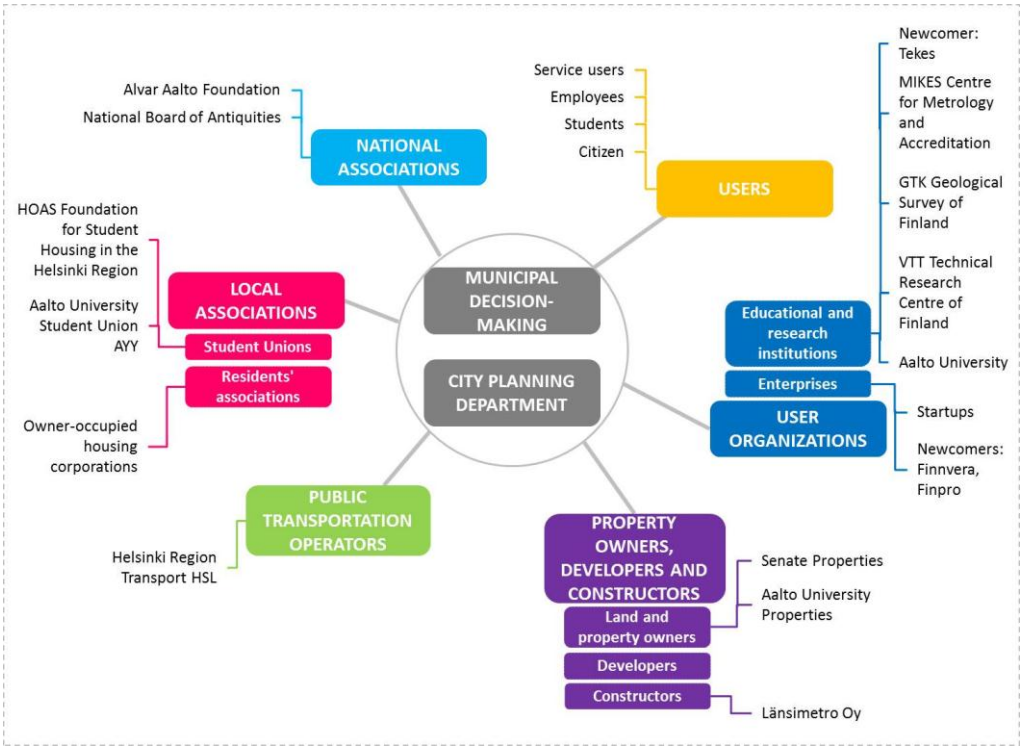

***Figure 23**: Mobility planning network of Otaniemi area.*

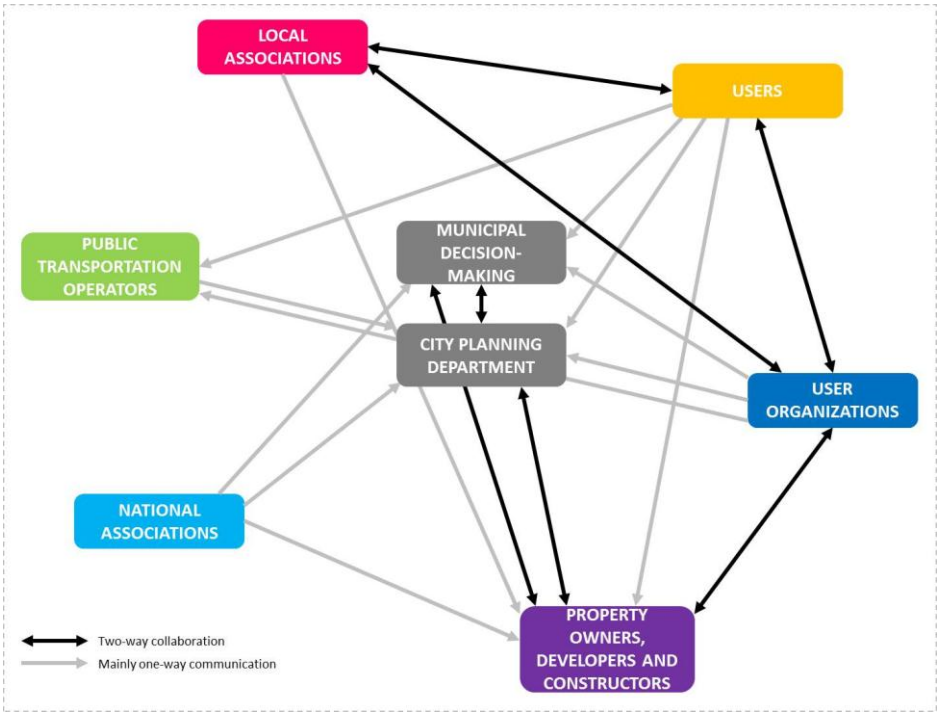

***Figure 24**: Main collaboration and communication network between the various stakeholder groups.*

Municipal decision-making. Municipal self-administration has been guaranteed in the Constitution of Finland. The cornerstones of local administrations are representative democracy, i.e. municipal elections; direct influence of residents and service users; the right to levy taxes; responsibilities imposed by law as well as the flexibility to organize one's own operations and administration. (City of Espoo 2013[16]) Municipal decision-making power in Espoo is used by City Council and City Board, assisted by committees and boards, and advisory boards and councils, City Planning Board being the one monitoring and guiding city planning.

The highest decision-making authority in the City of Espoo is held by the *City Council* comprising of 75 members elected by residents every four years. The City Council appoints the *City Board* (15 members), which is responsible for the practical running of municipal administration and finances. *The City Planning Board* guides and monitors the city planning. Its key tasks are for example to take care of zoning, developing the cityscape and structure, general environmental development and design as well as traffic planning related to zoning; inform residents about prepared plans as well as on-going and future zoning activities; and approve town plans and town plan modifications with little impact. (City of Espoo 2013[17])

City Planning department. The City Planning Department is in charge of land use and transportation planning in Espoo and its sub-areas. A special *Renewal project of Tapiola center* has been established for coordinating the development in T3 area.

Public transportation operators. *Helsinki Region Transport HSL* is a joint local authority whose member municipalities are Helsinki, Espoo, Vantaa, Kauniainen, Kerava, Kirkkonummi and Sipoo. The objectives of HSL are to plan and organize public transport in the region; procure public transport services; prepare the Helsinki Region Transport System Plan (HLJ); approve the public transport fare and ticketing system and ticket prices; be responsible for public transport marketing and passenger information; and organize ticket sales and ticket inspections. (HSL 2013[18])

Property owners, developers and constructors. In the Otaniemi campus area, there are two large land and property owners: Senate Properties and Aalto University Properties. *Senate Properties* is a government owned enterprise responsible for managing and letting the property assets of the Finnish state (Senate Properties 2013[19]). The largest tenants of Senate Properties in Otaniemi area are VTT Technical Research Centre of Finland, GTK Geological Survey of Finland, MIKES Centre for Metrology and Accreditation, and in the future newcomers like the Finnish Funding Agency for Technology and Innovation Tekes, Finnvera and Finpro. *Aalto University Properties* owns the majority of the premises used by Aalto University for example in Otaniemi, and is responsible for the maintenance of the properties as well as related support functions and property development (Aalto University Properties

[16] City of Espoo. 2013. Decision-making. Accessed: 1.6.2013. Available: http://www.espoo.fi/en-US/City_of_Espoo/Decisionmaking.
[17] City of Espoo. 2013. Decision-making. Accessed: 1.6.2013. Available: http://www.espoo.fi/en-US/City_of_Espoo/Decisionmaking.
[18] HSL. 2013. Helsinki Regional Transport. Accessed: 28.8.2013. Available: http://www.hsl.fi/en/helsinki-regional-transport-authority.
[19] Senate Properties. 2013. Senate Properties - Finland`s largest property asset manager. Accessed: 28.8.2013. Available: http://www.senaatti.com/document.asp?siteID=2&docID=11.

2013[20]). The main construction company working in the area at the moment is *Länsimetro Oy*, which is responsible for the construction work of the West Metro line.

User organizations. User organizations in the Otaniemi area are mainly educational and research institutions, but recently the number of small start-up companies has also increased substantially. The largest user organization is *Aalto University* consisting of six schools: the School of Arts, Design and Architecture; the School of Business; the School of Chemical Technology; the School of Electrical Engineering; the School of Engineering; and the School of Science. Aalto University is currently developing the Otaniemi campus for centralizing its functions in the area. Accordingly, an open international architectural design competition Campus2015[21] for Otaniemi central campus was recently organized. The second largest user organization in the area is *VTT Technical Research Centre of Finland*, which is the biggest multi-technological applied research organization in the Northern Europe (VTT 2013[22]) working for example in the fields of electric and smart mobility.

Local associations. The largest local association having interest in the mobility planning decision-making in the area is the *Aalto University Student Union AYY*, a 15 000-member student organization for the students of Aalto University. Also *HOAS Foundation for Student Housing in the Helsinki Region* and the few *owner-occupied housing corporations* in the area take occasionally part in the planning decision-making process.

National associations. The national associations *National Board of Antiquities* and *Alvar Aalto Foundation* don't actively take part in the mobility planning decision-making, but give expert opinions about the effects of the development work on the cultural historically protected built environment in the Otaniemi campus area.

4.1.3 Planning ecosystem and planning information

According to the research material, there are several important mobility planning projects under consideration in the Otaniemi campus area. Majority of the interviewees defined the West Metro project, car-parking initiatives, renewal of Ring Road I, and pedestrian and bicycle friendly connections as the most important mobility planning projects in the area.

For illustrating the complexity of the T3 planning ecosystem, figure 25 was compiled to put together the main projects, actors and documents concerning T3 mobility planning decision-making. A larger version of the figure can be found in appendix 2. Even though the focus was on a carefully restricted geographical area, and only a minor part of the whole urban planning process (mobility planning), still, the diversity and complexity of the development process is substantial. Eventually, the development process involves a large number of sub-projects. It should, however, be noted here, that the ecosystem analysis is based on the documents and interviews

[20] Aalto University Properties. 2013. Company. Accessed: 28.8.2013. Available: http://www.aaltonet.fi/en/company.
[21] See: campus2015.aalto.fi/en.
[22] VTT. 2013. VTT overview. Accessed: 28.8.2013. Available: http://www.vtt.fi/vtt/index.jsp.

mentioned in appendix 1, and thus, other projects, actors, and documents dealing with mobility planning decision-making in the area may, and most probably do, exist. The diversity of sub-processes is vast, and the figure 25 outlines for example only one major local detailed planning process per area (Tapiola, Otaniemi, Keilaniemi), even though several different local detailed planning processes are going on simultaneously.

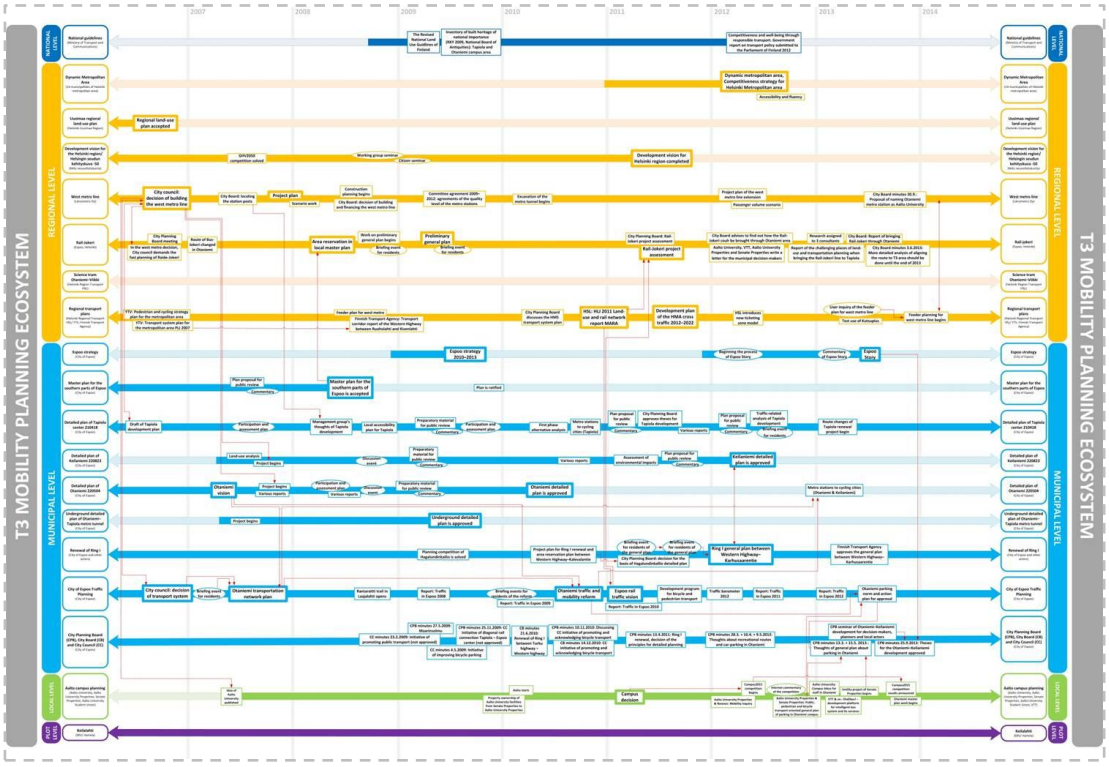

***Figure 25**: T3 mobility planning ecosystem sub-processes.*

Figure 26 makes a distinction between the various sources and types of information available in the mobility planning decision-making process according to the information that was found in the documents. Later on, figure 36 will outline the information use according to the key actor interviews.

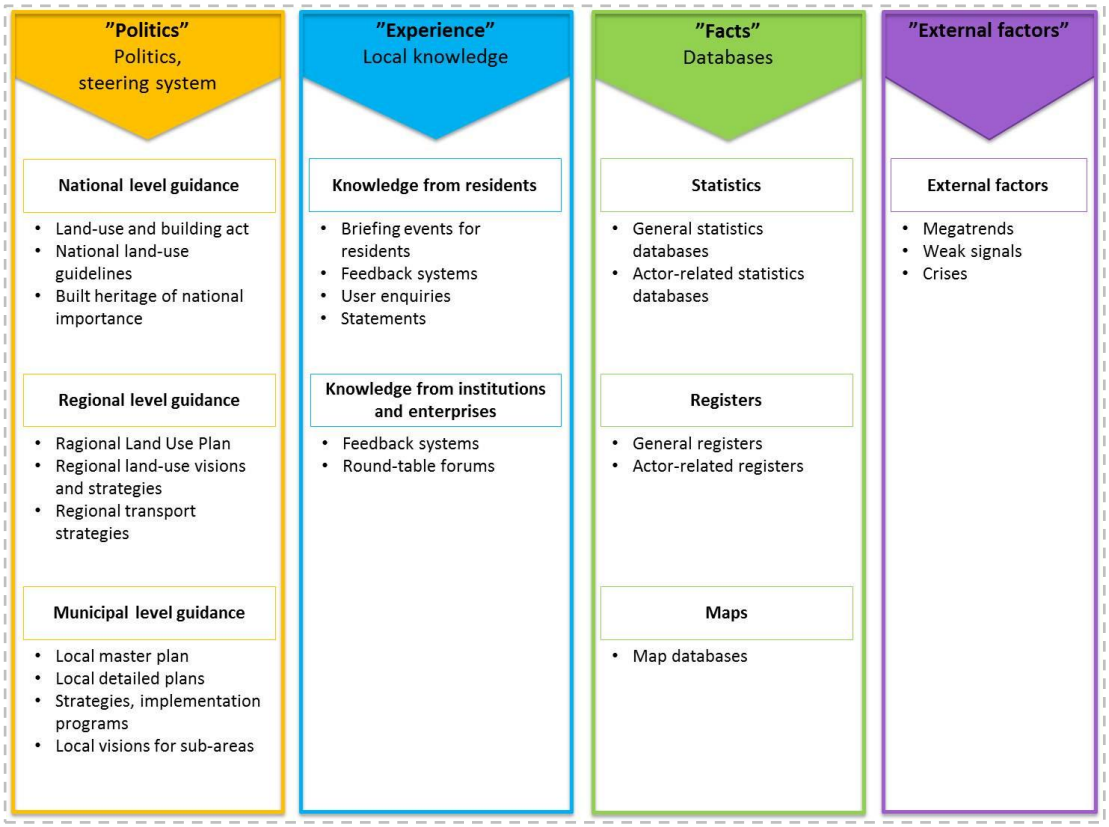

***Figure 26**: Various sources and types of information available in the mobility planning decision-making process.*

4.2 Discourses in the Otaniemi campus and T3 mobility planning decision-making material

The previous planning ecosystem analysis shows the plentitude of the material available concerning the Otaniemi campus and T3 mobility planning decision-making. Every sub-process produces various reports, descriptions, analyses and decisions, which affect the following phases of the area development. But what kinds of themes are discussed in that material? What kind of directions does it offer for the development process?

For understanding the impact and guidance of these documents, an analysis was performed in order to outline the main discourses in the mobility planning decision-making material concerning the case area. What themes are highlighted in the material? What is missing? The analysis is based on a sample of the material. It includes reports from projects of various scales, and minutes of Espoo City Council, Espoo City Board and Espoo City Planning Board. A detailed introduction to the analysis methods and process is outlined in part 3.

What is noteworthy about the material search is that the material was highly scattered in various databases and information sources. Even the final reports concerning the very limited area were rarely found in the same place, even though they all would have been made by the City of Espoo. Much time was spent on finding the fragmented material. This raises a question concerning information availability. Even

though plenty of information is publicly available even online, much of it may be hardly accessible as finding the material takes much time. The question of what material is used in the decision-making processes is asked later on in part 4.3.

4.2.1 Introduction to the analysis

The aim of the analysis was to outline a general view of the discourses, and not focus on a broader analysis of individual projects, reports and minutes, and their possible differences and similarities. Instead of focusing on discourses about various means of transportation (car, public transportation, cycling, and pedestrian) – as the themes in this material were usually divided – the interest was in concentrating on the relationship between mobility planning and land use planning. As was suggested by Strafica (2012), mobility planning has transformed from passively reacting to the changes in car transportation to actively affecting the status of various transportation modes and their competitiveness within the mobility environment. The aim is not to consider the technical solutions of transportation, but to think about the aspects of land use planning, urban structure and cityscape.

Going through the selected material time and again, four partly interrelated discourses began to come up, as shown in figure 27. The *Image and cityscape* discourse describes the meaning of high quality cityscape and innovative mobility solutions in image creation and communication. The *Public transportation as a backbone of urban development* discourse deals with the impact of creating a comprehensive public transportation network in the area. The *Effects of the changing mobility environment* discourse discusses the main impacts of mobility planning choices on local land use. The final *Influencing mobility choices and attitudes* discourse speaks about the possibilities and means of actively influencing the mobility choices in the area.

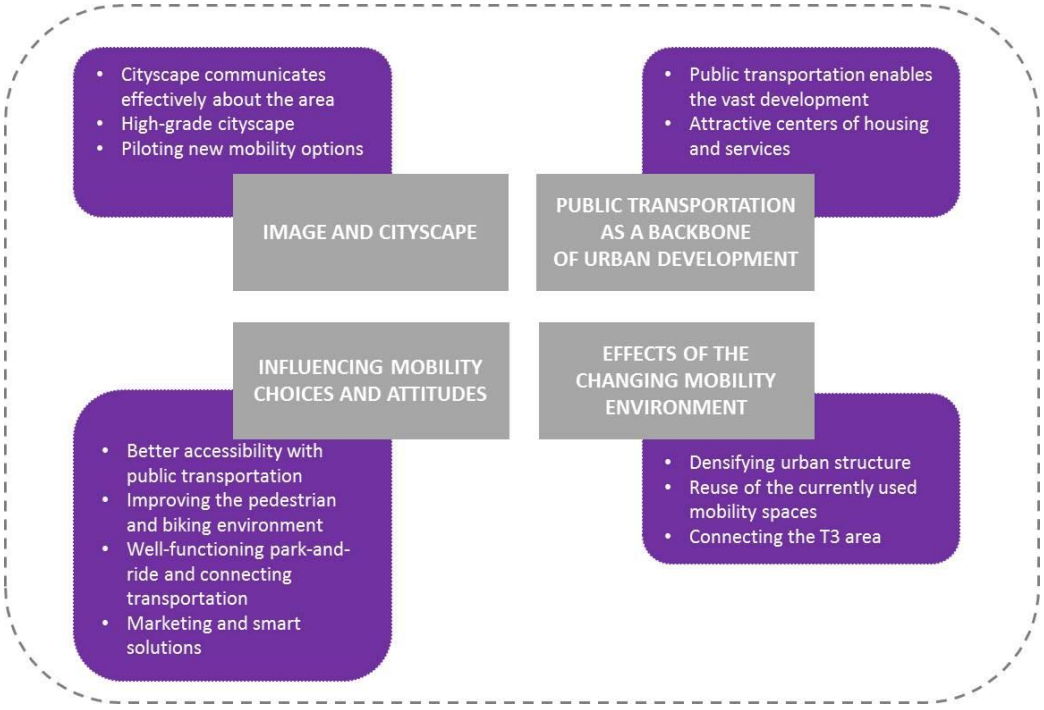

***Figure 27**: Discourses in T3 mobility planning decision-making material.*

In addition to the four main discourses, four meta-discourses appearing in all of the other discourses were revealed, as shown in the figure 28. First, *high quality and respectability* were introduced as an important means of affecting personal mobility choices in the area. It was also seen as a premise for building the image of the area, and setting the level of urban planning and design decisions and solutions. Quality and respectability were often mentioned, but not defined.

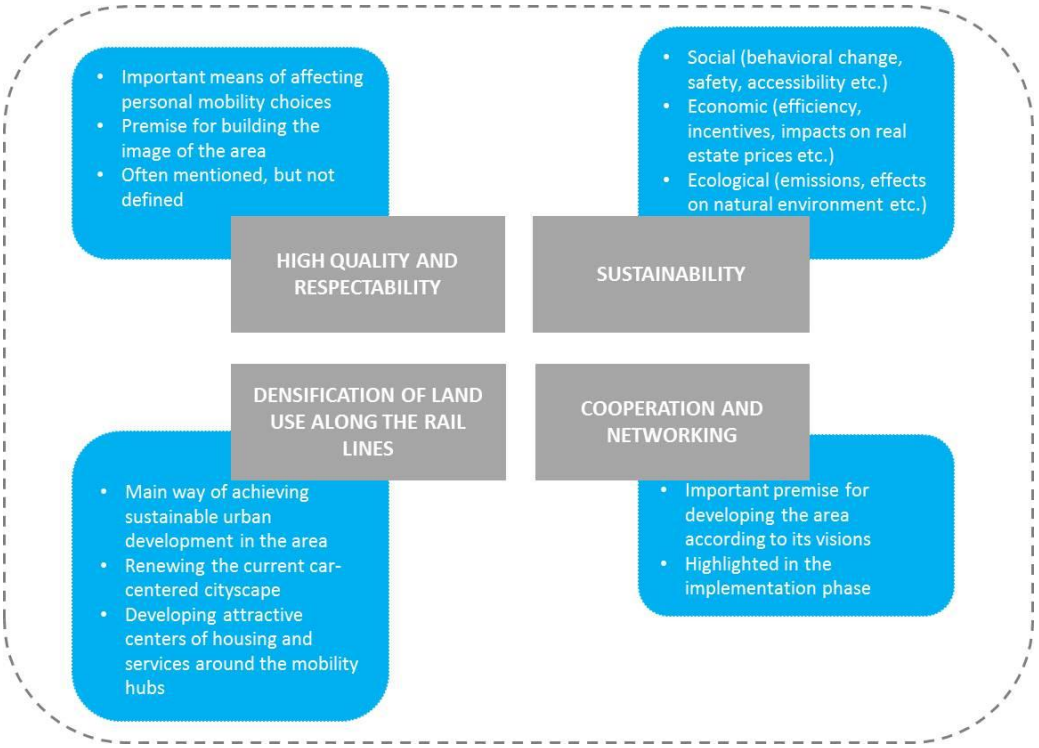

***Figure 28**: Meta-level discourses.*

Second, *sustainability* was mentioned as an important factor of image making in the area with rail traffic as its backbone. For example in the Otaniemi mobility and transportation reform 2010 (City of Espoo & Ramboll 2010), it was mentioned that sustainable mobility choices have to be a precondition in all of the planning and development projects in the area. The meaning of sustainability was not introduced, but T3 was envisioned to be a showpiece of a sustainable area. Even though it was not thoroughly defined, many themes can be seen as indicating the various aspects of sustainability, such as the social (behavioral change, safety, accessibility), economic (efficiency, incentives, impacts on real estate prices, marketing purposes, competitiveness and image creation), and ecological (emissions, effects on natural environment, testing more ecological means of transportation) sides of sustainability.

Third, as a part of the sustainability discourse, the *densification of land use along the rail lines* is seen as a main way of achieving sustainable urban development in the area. All of the four discourses are much focused on the effects of the new rail connections, and their impacts and demands on the land use, such as renewing the current car-centered cityscape, and developing attractive centers of housing and services around the mobility hubs.

Fourth, *cooperation and networking* of the various local actors was seen as an important premise for developing the area according to its visions. Cooperation was not so often mentioned as a part of the visioning process, but was especially highlighted in the implementation phase. However, in order to commit the actors to the long term and high cost implementation, taking them into the visioning and planning phases would also be important. This discourse revealed the importance of pondering the question of process-based decision-making instead of interactive decision-making in the existing built environment, where many actors are actively pursuing their own goals.

As Fusero (2008, 28) describes, the current situation induces OECD countries to direct their priority investments to the maintenance and modernization of existing networks rather than their expansion, partly because the tax-based public budgets will no longer be capable of satisfying the need for investment in different infrastructural sectors. Instead, greater resource to the private sphere and increasingly diversified entries in the public sector will become a necessity (Fusero 2008, 32).

The local actors were seen important for example in testing new modes of transportation (for example joint use cars and bicycles, electric bicycles), active human resource management possibilities (promoting for example joint use bicycles in companies, promoting flextime for distributing the traffic load during the rush hours), promoting efficient land use as a means of high quality environment (eco- and cost-efficient parking), and funding the implementation phase. In addition to this, integrating various experts into the planning process of the area was seen significant in understanding holistically the relations between land use planning and mobility choices. So, cooperation and networking is not only about integrating the local actors into the process, but also about confirming the level of expertise in the open and innovative planning process, as was outlined by City of Espoo, City Planning Board (2012c).

4.2.2 Image and cityscape

The *Image and cityscape* discourse describes the meaning of high quality cityscape and innovative mobility solutions in image creation and communication. It portrays the T3 area as a showpiece of sustainable urban development, where new sustainable means of mobility and smart mobility management applications are tested in collaboration with the active network of local actors. This discourse outlines an image oriented view of the urban development and mobility planning processes. Every choice is carefully refined to accentuate and underline the vision of T3 area as a high-tech and innovation node, and the cityscape should reflect the image of the area with high quality mobility environment.

The image and cityscape discourse is closely connected to the recent discussion about city marketing and competitiveness. Although the impact of mobility planning choices on city image is discussed in the material, the impacts of city image on T3 area and its development – for instance the possibility of impacting real estate prices, attractiveness for companies etc. – are not outlined. The image and cityscape discourse is divided in three sub-discourses, as outlined in figure 29: *High-grade cityscape*, *Cityscape communicates effectively about the area*, and *Piloting new mobility options*.

Figure 29: *Three sub-discourses of Image and Cityscape.*

High-grade cityscape outlines the main problems of the current situation in the area and identifies the ways of renewing the cityscape with mobility planning solutions. The large number of vehicles, vast parking areas, and inadequate pedestrian and bicycle connections were identified as the most severe challenges affecting the cityscape and urban environment in the T3, and especially the Otaniemi campus area[23]. Due to the high percentage of driveways of the whole surface of the area, the cityscape was described as being unpleasant and poor.

In the future planning, high quality solutions should be acknowledged from the smallest details (lamps, bus stop furniture etc.) to the larger scale solutions (metro stations, interchanges, park-and-ride facilities, bicycle lanes etc.) for unifying the cityscape in the area[24]. The whole change process in the area was seen as a possibility of executing many simultaneous, contemporary and high-class improvements within the area, and positively improving the comfort, attractiveness and image of T3[25]. One of the most important projects affecting the cityscape in the area was seen to be the renewal of the Ring road I between Kalevalantie and the Western Highway (51). Interchanges and tunnels were portrayed as fitting better to the visioned image as a world-class high-tech and innovativeness node[26].

Cityscape communicates effectively about the area describes the marketing potential of a high-grade cityscape. Being in the center of the leading innovation hub of Europe should be seen in the cityscape and mobility environment, and the planning solutions in the area should act as a positive signpost for the whole Helsinki metropolitan area[27]. With the visioned renewals, the area is described to advance to a new level: Tapiola as a unique and diverse pedestrian center, Otaniemi as a showpiece a of sustainable campus and new pioneering mobility choices[28]. It is said[29] that the whole T3 area has a great significance for Finland's international success and welfare, and every detail in the area should meet the quality level of an international high tech center and support the contentual and functional development of the area.

[23] See for example: City of Espoo & Ramboll 2010.
[24] See for example: City of Espoo, City Planning Board 2012c; Uusimaa Centre for Economic Development, Transport and the Environment 2012.
[25] See for example: City of Espoo, City Planning Board 2012c; The Finnish Transport Agency 2008.
[26] See for example: Uusimaa Centre for Economic Development, Transport and the Environment 2012.
[27] See for example: City of Espoo, City Board 2010; City of Espoo, City Planning Board 2010b.
[28] See for example: See for example: City of Espoo, City Planning Board 2012c; City of Espoo, City Planning Board 2011f.
[29] See for example: Uusimaa Centre for Economic Development, Transport and the Environment 2012; City of Espoo & Sito-yhtiöt 2007.

Piloting new mobility options takes the advantage of identifying T3 as a high-tech center and encourages the piloting of new sustainable mobility options within the area. In this process, involvement of the local actors is needed. They are urged for example to provide parking places to joint use cars; implement a functioning loaning system for joint use bicycles, campus bicycles and electric bicycles; and develop and test more environmentally friendly transportation options like e-cars or e-buses[30]. In addition to this, Otaniemi campus could act as a piloting area for driverless cars, or a laboratory for intensified public transportation[31].

4.2.3 Public transportation as a backbone of urban development

The *Public transportation as a backbone of urban development* discourse deals with the impact of creating a comprehensive public transportation network in the area. A good public transportation network enables changes in the mobility environment as the focus is transferred from car-centered planning to more public transportation, pedestrian and bicycle -centered planning. The new public transportation options change the need for driveways and parking places, opening up a possibility of renewing the land use in the area. This discourse is very much connected with the next *Effects of the changing mobility environment* discourse, which is introduced in part 4.2.4. Whereas this discourse deals with the meaning of public transportation in the whole vitality of the area, the next one outlines the more concrete land use planning effects of the renewing mobility environment. The public transportation as a backbone of urban development discourse is divided into two sub-discourses, as outlined in figure 30: *Public transportation enables the vast development*, and *Attractive centers of housing and services*.

Figure 30: *Two sub-discourses of Public transportation as a backbone of urban development.*

Public transportation enables the vast development describes the meaning of the new public transportation network in developing the land use planning in T3 area. The new transportation hubs, such as Tapiola metro station, are seen as being key factors in the overall development process of the area, and especially the meaning of creating a comprehensive rail network is significant for example in supporting the development of diverse housing and service areas[32].

[30] See for example: City of Espoo, City Planning Board 2013a; City of Espoo & Ramboll 2010; Strafica 2012.
[31] See for example: City of Espoo, City Planning Board. 2013a; City of Espoo & Ramboll 2010.
[32] See for example: City of Espoo, City Planning Board 2012c; City of Espoo, City Planning Board 2011e; City of Espoo & Strafica 2011; City of Helsinki, City Planning Department 2013b; City of Helsinki, City Planning Department 2011; City of Helsinki, City of Espoo, YTV, Ministry of Transport and Communications & WSP Finland 2009; City of Espoo, City Board 2013.

In the development visions rail traffic works as a clear backbone for the surrounding urban development and structure. As a long-term investment it also creates a confidence for the local actors and investors that the area is not declining in terms of public transportation accessibility in the future. High quality park-and-ride facilities, connecting bus lines and comfortable pedestrian and bicycle connections support the overall accessibility and attractiveness of using public transportation. This, in turn, reduces the need of private cars and their demand on infrastructure and land use.

Attractive centers of housing and services discourse outlines the development of housing and service centers along the rail lines and around the mobility hubs. The overall vision is a diverse urban locus with active and attractive centers of housing and services, where the fluency of accessibility and reduction in noise level caused by renewals in the mobility environment will enhance the societal and economic preconditions in the area[33]. Increasing the amount of housing construction in the core areas supports the overall vitality and attractiveness, and developing the urban structure along rail lines is in line with sustainability guidelines, and acts as a significant image advantage for the local actors[34].

Along with the development of rail lines, also the accessibility by road connections has to be ensured so that the new land use development pressure won't escape to more remote areas with worse public transportation connections in case the road transportation conditions in the T3 area decline[35].

4.2.4 Effects of the changing mobility environment

The *Effects of the changing mobility environment* discourse discusses the main impacts of mobility planning choices on local land use. Whereas the previous discourse was dealing with the meaning of public transportation in the whole vitality of the area, this discourse outlines the more concrete land use planning effects of the renewing mobility environment, such as densification of the urban structure and the possibility of renewing for example the large parking areas once the centralized parking garage are constructed.

The relationship between land use planning and mobility planning is highlighted with concretizing examples of the effects on cityscape and urban structure. For example the discussion on the problems of high amounts of private cars is focused on the effects on cityscape, whereas traffic jams and congestion are not mentioned so often. The third meta-discourse, densification of land use along the rail lines, is very much highlighted within this discourse and reasoning as well. Effects of the changing mobility environment discourse is divided into three sub-discourses, as outlined in figure 31: *Densifying urban structure*, *Reuse of the currently used mobility spaces*, and *Connecting the T3 area*.

[33] City of Espoo, City Planning Board 2011a; City of Espoo & Ramboll 2010; Uusimaa Centre for Economic Development, Transport and the Environment 2012; City of Espoo, City Planning Board 2012c.
[34] See for example: City of Espoo, City Planning Board 2012c; City of Helsinki, City of Espoo, YTV, Ministry of Transport and Communications & WSP Finland 2009.
[35] See for example: The Finnish Transport Agency 2008.

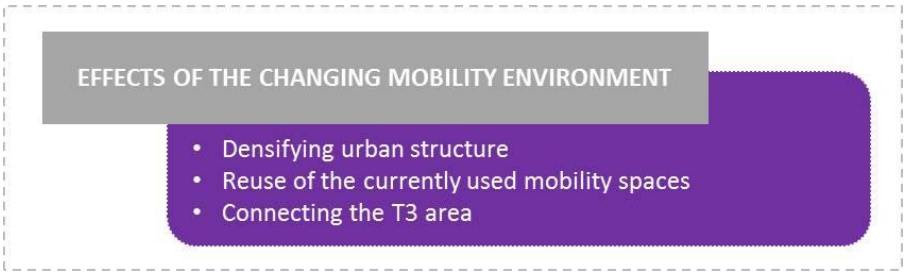

Figure 31: *Three sub-discourses of Effects of the changing mobility environment.*

Densifying urban structure outlines the need for focusing the development along the rail lines in order to follow the sustainability guidelines of creating more rail-dependent urban structure. The creation of attractive and accessible housing and service loci by the densifying structure will also encourage other sustainable means of transportation, such as pedestrian and bicycle use[36]. The reasoning goes also other way round, as the increasing densification creates need for renewing the existing mobility in the area, as it is currently seen as being outdated for the future needs[37].

Reuse of the currently used mobility spaces describes the possibilities of revitalizing for example the existing large parking areas with new construction, as the parking solutions will be more centralized in the future[38]. For making the change possible, also the amount of cars has to be decreased by offering high-quality public transportation, pedestrian and bicycle options, and by developing attracting park-and-ride solutions in the outskirts of the T3 area. Also the economic perspective is highlighted in this discourse, as the areas surrounding the new mobility hubs (such as metro stations) are seen to be too valuable for being left undeveloped[39].

Connecting the T3 area discusses especially the importance of developing the current Ring Road I area with interchanges and tunnels in order to create an inviting functional connection between the three T3 sub-areas (Otaniemi, Keilaniemi and Tapiola). The Ring Road I is seen currently as the major physical factor dividing the T3 area into three unconnected pieces and forming a separate element sticking out from the cityscape[40]. Tunneling it would create new possibilities for pedestrian and bicycle transportation and new construction production by removing the barrier between these three areas.

4.2.5 Influencing mobility choices and attitudes

The final *Influencing mobility choices and attitudes* discourse speaks about the possibilities and means of actively influencing the mobility choices in the area. It is focused on the incentive aspect of affecting personal mobility choices by integrating well-functioning elements of mobility environment, such as free connecting transportation within the area, attractiveness and high quality of the mobility options, up-to-date marketing, and real time guidance with smart solutions. As was outlined

[36] See for example: See for example: Strafica 2012; City of Helsinki, City of Espoo, YTV, Ministry of Transport and Communications & WSP Finland 2009.
[37] See for example: Uusimaa Centre for Economic Development, Transport and the Environment 2012.
[38] See for example: City of Espoo, City Planning Board 2013a; City of Espoo & Ramboll 2010.
[39] See for example: The Finnish Transport Agency 2008.
[40] See for example: City of Espoo, City Board 2010; Uusimaa Centre for Economic Development, Transport and the Environment 2012.

by City of Espoo & Ramboll (2010) and City of Espoo, City Planning Board (2010b), the West Metro line will enable considerable changes in personal mobility habits in the whole T3 area. But in an area with already high levels of public transportation use, the metro connection won't increase the amount of public transportation use unless it is well integrated to the overall mobility environment, connecting transportation and ride-and-park solutions.

This discourse is highly interconnected with the meta-discourse of high quality and respectability (introduced in part 4.2.1), as high-class mobility options are seen as an important and significant way of influencing personal mobility choices, and increasing the usage of public, pedestrian and bicycle transportation, in the area. Influencing mobility choices and attitudes discourse is divided into four sub-discourses, as outlined in figure 32: *Better accessibility with public transportation*, *Improving the pedestrian and biking environment*, *Well-functioning park-and-ride and connecting transportation*, and *Marketing and smart solutions*.

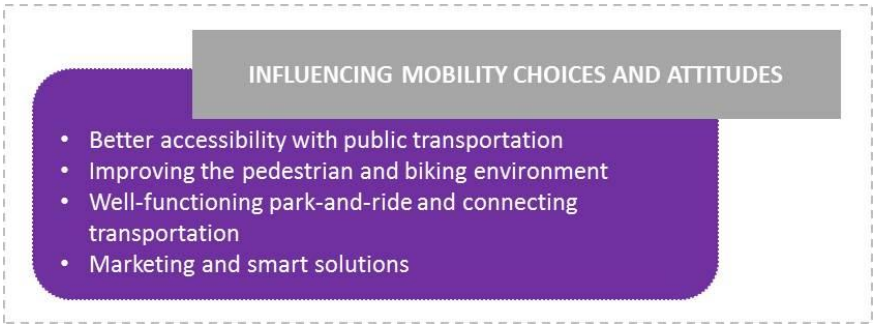

Figure 32: *Four sub-discourses of Influencing mobility choices and attitudes.*

Better accessibility with public transportation outlines the effects of the development on the accessibility by public transportation. By improving the accessibility with public transportation, the attractiveness of using it is anticipated to get better. Together with the development of rail connections in the area, also a ticket reform is planned that would influence the ticket prices, accessibility and attractiveness of public transportation[41]. Attention has also been paid to planning the public transportation hubs so that they are high-quality and easily accessible at all times from various directions, and that the vehicles travel with brief headways, are environmentally friendly and of good quality[42].

Improving the pedestrian and biking environment describes the main challenges of the current pedestrian and biking connections in the area, and the most significant ways of improving them for encouraging their use. Especially unclear and unsafe road arrangements are preventing the increase of biking and walking at the moment[43]. In the future, main ways of improving the situation is developing clear and separate routes for pedestrians and cyclists, lighting the routes well and offering joint use bikes and accurately placed bicycle parking spaces[44]. It was even outlined that the

[41] See for example: City of Espoo, City Planning Board 2013a.
[42] See for example: City of Espoo, City Planning Board 2012c; City of Espoo & Ramboll 2010.
[43] See for example: City of Espoo & Sito-yhtiöt 2007; City of Espoo & Ramboll 2010.
[44] See for example: City of Espoo, City Planning Board 2012c; City of Espoo & Ramboll 2010; Strafica 2011.

whole planning should be based on the needs of pedestrians and cyclists and not on the needs of motorists like at the moment, and especially the status of bicycle use should be highlighted[45]. This discourse was the only one trying to identify differences between various user groups and the three T3 sub-areas[46].

Well-functioning park-and-ride and connecting transportation discusses the importance of offering comprehensive park-and-ride (for cars and bikes) facilities and connecting transportation for reducing the amount of private cars within the area[47]. It was even suggested, that the internal public transportation in the area could be free for people using park-and-ride facilities[48]. Also the suitability of the three T3 sub-areas concerning park-and-ride were outlined. For example Otaniemi was pointed out for being a rather poor location for park-and-ride, because the metro station is inside the area far from the major roads, whereas land value around Tapiola metro station was seen as being too high for devoting it to parking[49]. On the other hand, locating park-and-ride facilities near services were seen as a good incentive for using them[50].

Marketing and smart solutions discourse deals with raising the awareness of people about public, pedestrian and bicycle transportation possibilities in the area, and making their use as easy as possible with smart solutions. People are encouraged to use environmentally friendly transportation by clear, accurately placed and real time guidance, smart mobility solutions, marketing and thematic routes[51]. Especially the meaning of efficient marketing is high in introducing new transportation options, as the experience with Jokeri bus line has shown[52]. Incentives for more environmentally friendly transportation modes are developed, and for example the current bus lanes on the Western Highway (51) could be devoted for eco-cars or cars travelling with the minimum of 1–2 passengers[53].

[45] See for example: City of Espoo & Ramboll 2010; Strafica 2012.
[46] See for example: City of Espoo, Technical Department 2011.
[47] See for example: City of Espoo, City Planning Board 2013a; The Finnish Transport Agency 2008; City of Espoo & Ramboll 2010.
[48] See for example: See for example: City of Espoo & Ramboll 2010.
[49] See for example: The Finnish Transport Agency 2008; City of Espoo, City Planning Board 2010d; City of Espoo, City Planning Board 2013a.
[50] See for example: YTV 2008.
[51] See for example: City of Espoo & Ramboll 2010; City of Espoo, City Planning Board 2013a; The Finnish Transport Agency 2008.
[52] See for example: YTV 2008.
[53] See for example: The Finnish Transport Agency 2008.

4.3 Interview analysis

The analysis of the mobility planning decision-making material shows the various themes and directions presented in the material. But how are these materials used in the decision-making process? What kind of information exactly is used in the decision-making process? How are various actors trying to achieve an overall picture of the whole development process? For having answers to these questions, 17 key actors were interviewed, and the following analysis is based on the interview material. A list of the interviews is offered in appendix 1. A more detailed introduction to the analysis methods and process is outlined in part 3.

The interviews brought forward various insights in relation with the theoretical framework outlined in part 2. The analysis portrays main themes of interest in relation with the information aspect, systemic understanding of the development process, and situation awareness in urban planning decision-making. The analysis is divided into seven themes: *Information use and varying scales of conceptualization, Challenges of the current information use, Creating an overall picture of the development process is not easy, Decision support systems in use, Features of the decision-making network, Optimization problems in land use and mobility planning decision-making, and Argumentation and innovative thinking in the existing framework*. Main themes of the interview analysis have been outlined in figure 33.

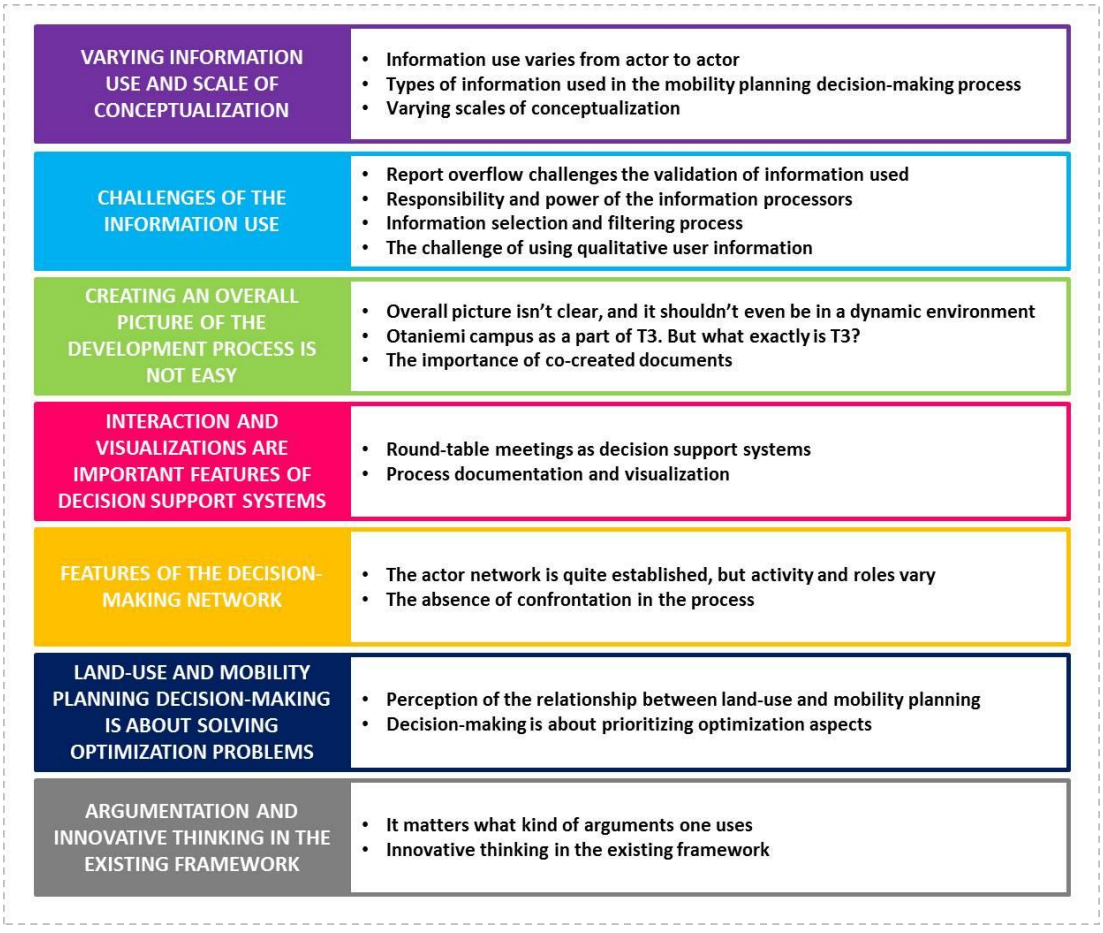

Figure 33: *Main themes of the interview analysis.*

Majority of the interviewees had a long and diverse experience in urban planning related topics in Espoo, T3 and/ or the Otaniemi campus areas. During the interview analysis, the theme of power in decision-making practices came up in many answers. For this reason, some examples of the power discourse are used here as an example, but the complex field of power relations and policy analysis is not covered in full detail for leaving room for the analysis of other aspects coming up in the interviews. Quotations and visualizations are used for assisting the understanding of the complex themes. The interviews were done in Finnish, and the quotations have been translated by the author, so that the interviewees cannot be identified from the text.

> *"I purposely decided to speak this way. Because there is no way of speaking logically about this mess. It should be told as it is."*

4.3.1 Varying information use and scale of conceptualization

Information use varies from actor to actor. This chapter outlines the information used by municipal decision-makers, pointing out the importance of having a reference point for the received information. As well, the types and number of information sources used are portrayed, revealing the interesting point that the use of user information seems to exceed the use of calculated models, although mobility planning is usually described as being highly focused on modeled and quantitative information. Finally, varying scales of conceptualization are outlined, revealing the question of where does the line between holistic enough and detailed enough views go. Personal relations and interest in the area at issue seem to affect the scale of conceptualization to some extent. But do the varying scales easily discuss with each other? Figure 34 outlines the main findings of varying information use and scale of conceptualization.

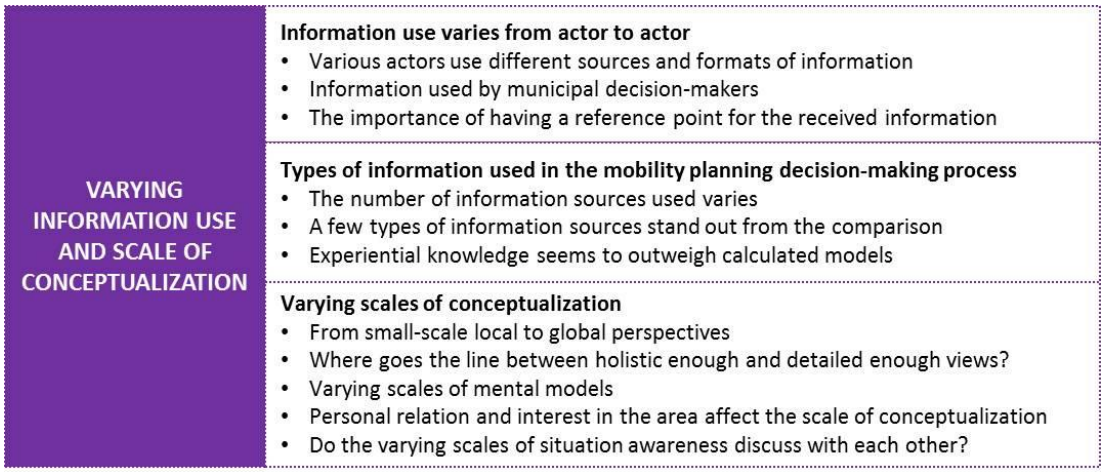

Figure 34: *Varying information use and scale of conceptualization.*

Information use varies from actor to actor

Various actors use different sources and formats of information, according to the interviews. As Te Bömmelstroet and Bertolini (2008, 252) describe the case in land use and transportation planning, various professionals seem to have established traditions of what kind of information to use in planning decision-making, fostered

by the differences in educational backgrounds and the dominant epistemological frameworks that are used. Whereas some people find it more natural to use quantitative or textual knowledge, others find it easier to use visualizations and qualitative information. The actor network of Otaniemi campus area consists of actors from various interest positions and backgrounds, as was shown in figure 23, so varieties in the information use can already be expected based on that observation.

As one aim of this study was to describe the information used in the final decisions that are made in municipal decision-making, figure 35 outlines the information used by municipal decision-makers according to the relevance of information sources reported in the interviews. It seems that municipal decision-makers rely heavily on the information given by the municipal planning process, to some extent on the information given by lobbyists, and to a minor extent on the information related to their own information acquisition according to their own relationship and interest in the area, as well as the political alignments and group decisions.

Decision-makers receive a plentitude of reports and documentation from the official introduction and presentation by the city planning department. As will be described later on in this study, there is an overflow of information, challenging the information use. Going through all the received information takes times, and does not leave much space for spontaneous information acquisition. Accordingly, some interviewees pointed out the importance of having decision-makers from various areas in Espoo. As when the decision-makers don't know the area personally, it is harder for them to evaluate the plans and given information as their view of the area at issue may be based solely on those.

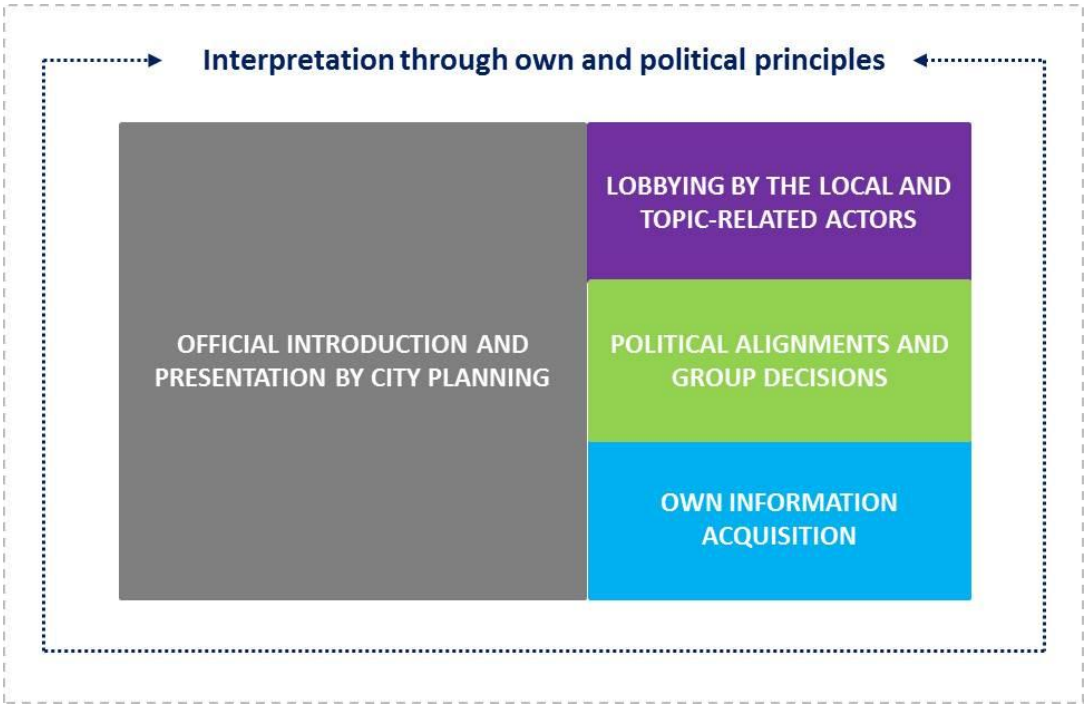

Figure 35: *Information used by municipal decision-makers.*

Types of information used in the mobility planning decision-making process

Figure 36 shows what types of information the interviewees reported to use in their daily decision-making activities, taking into account also other actors than the municipal decision-makers. The figure is compiled so that individual interviewees cannot be identified. But it offers a rough picture of the various types and amounts of information used in the decision-making process. Whether the variations of information used (from one to nine sources) reflect the whole truth, can be questioned. But at least they reflect the main information sources that came into the mind of the interviewees at the moment of the interview.

The various types of information sources are classified in the picture to being laws, guidelines and regulations; land use and transport plans; databases and calculations; strategies and visions; planning process documents; or experiential knowledge. Some information sources, such as national guidelines, laws and regulations, and master plans seem to be quite rarely prioritized in the information use. Reasons to that may be that they are of a more general level, and thus not directly applicable to very local scale solutions, or that actors see that the directions given in them are already included in the more local level information sources, which are indeed reported to be used more often. These more local level information sources are for example detailed plans, local transport plans, strategies and visions of local actors, as well as user information and round-table discussions. Some interviewees also described loose hierarchies to exist in the information use.

> *"A model can predict how the traffic will conduct. … And then there are the everyday experiences. Even though the model would say something, and your experience shows the opposite, then of course it influences your decision."*

What is interesting in the picture is that even though Te Bömmelstroet & Bertolini (2008, 253) classified transport planning to be more quantitative, calculation and model oriented than land use planning, which was described to rely more on qualitative information about places and functions, figure 36 suggests that databases and calculated models are actually more rarely used than for example user information. The utilization of user information repeatedly came up in the interviews, and is more closely discussed in part 4.3.2.

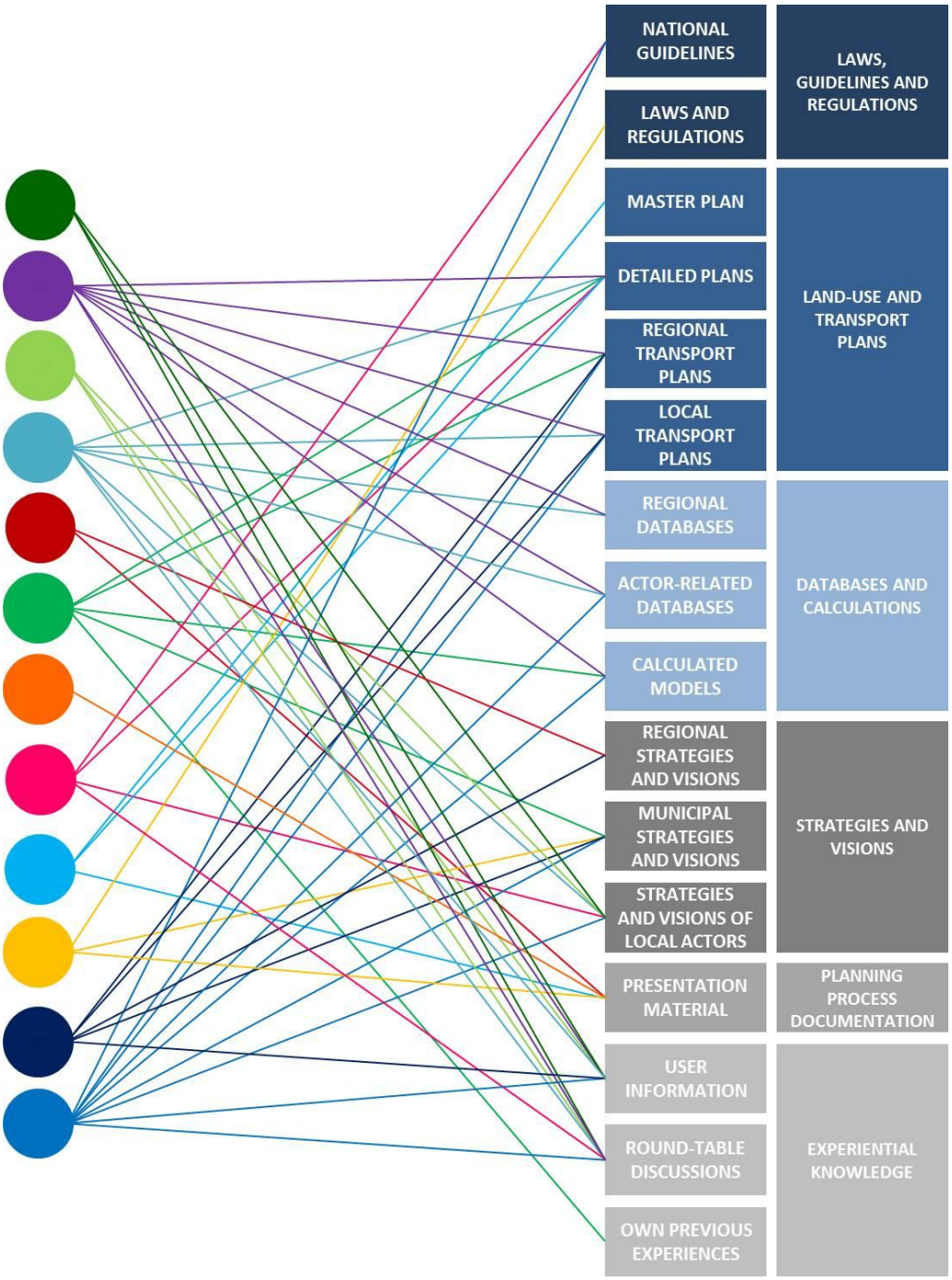

Figure 36: *Information types used in the mobility planning decision-making process according to various actors. When asked what the most important types of information used in the mobility planning decision-making practices in the Otaniemi campus and T3 area are, the interviewees (marked with colored circles) reported using a highly varying number of information types.*

Varying scales of conceptualization

The actors approach the theme of Otaniemi campus mobility planning ecosystem on different scales of conceptualization. When one actor comes from the viewpoint of a technology oriented small-scale local solution, another looks at viewpoint of the area

as being only a part of a larger regional, national or global entity. The scale of the viewpoint is highly correlated with the amount of partners in the planning decision-making processes. Logically, one point local solutions usually require fewer stakeholders in the planning decision-making than the higher scales.

> *"We can never observe only one area, as it is always a part of a larger whole. People travel through it, perhaps also over and under it. It is a part of Espoo, but Espoo is a part of the whole metropolitan region."*

> *"This is complicated. One should have the big picture in mind all the time. But we are still planning bits and pieces."*

> *"Otaniemi is only a small piece of the tapestry."*

According to Artman (1999, 14), hierarchical organization structure often leads to better performance than all-connected organization structure. This is because much information is centralized in the hierarchical organizations, and that central person who has this pool of information is able to produce an image of the global environment rather than just having a limited local and instantaneous view, combining various mental models together for a more holistic view of the development goals within an area. Too high locality and level of detail were in some interviews seen as a problem concerning the regional mobility planning, a part of which the Otaniemi campus area also is. However, it remained unclear where goes the line between the understanding of large enough scale, and the understanding of detailed enough local views.

> *"Now planning happens at municipal level. Every municipality has their own interest as a principal. Only after that comes the regional interest."*

As Healey (2007, 3) describes, those involved in the spatial strategy-making are struggling to grasp the dynamic diversity of the complex co-location of multiple webs of relations that transect and intersect across an urban area, each with their own driving dynamics, history and geography, and each with highly diverse concerns about, and attachments to, the places and connectivities of an urban area. Figure 37 outlines the relation of the decision-making actor network and the varying scale of their prioritized goals.

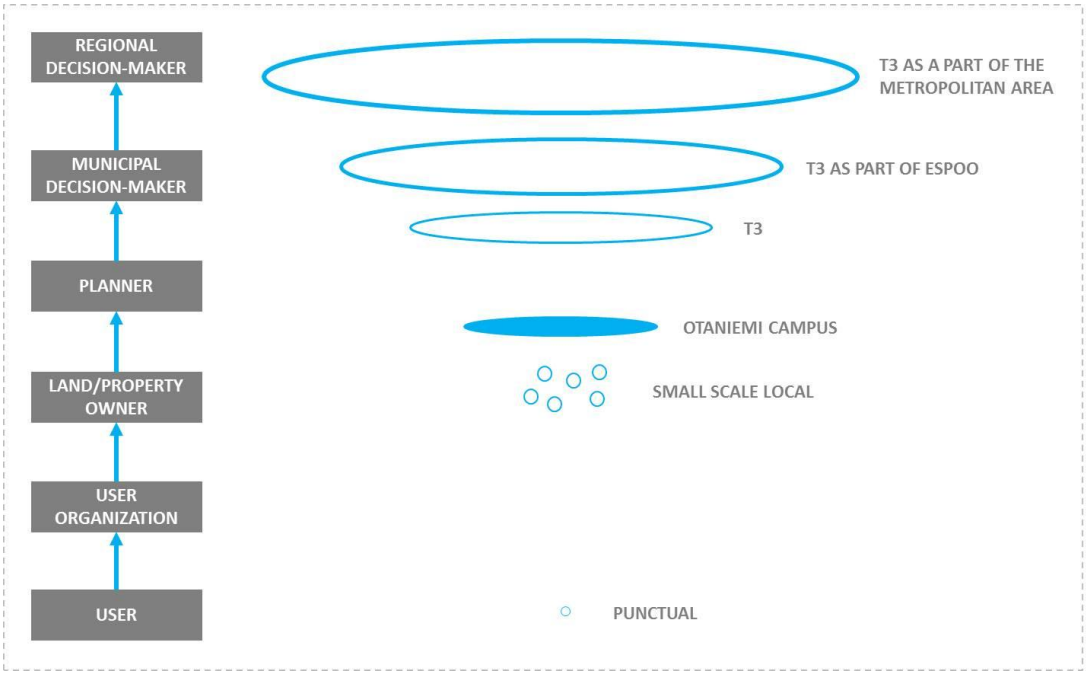

***Figure 37**: Decision-making network and varying scales of T3 mental models.*

According to the interviews, factors affecting the scale of the mental model are the actor's own relation and interest in the area at issue, as well as their scale of planning. The closer the relation and own interest in the area is, the more aware the actors are about things happening at the lower levels of the scale. When the actor has no personal or straightforward professional relation to the area, it is more often treated as "one area among the others" with no special focus. Also the scale of planning affects the mental model of the area, and the scale of the mobility network in the mental model. The more general and strategic the actor's level of planning is, the larger the scale of the mental model tends to be, and vice versa: from T3 area being a part of Helsinki metropolitan area's regional transport system to the level of mobility and accessibility within individual buildings, as shown in figure 38.

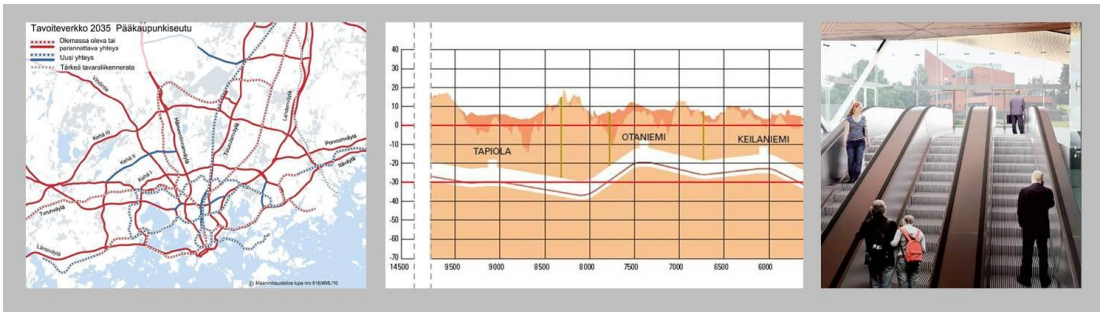

***Figure 38**: Examples of various mobility planning scales, as an example of the West Metro line. From left to right: HLJ 2011[54] representing the metro line as a part of the metropolitan area's main transport network, a section[55] of the West Metro tunnel in the T3 area, and an illustration[56] of the Otaniemi metro station.*

The challenge is, then, how to make these various scales communicate with each other from the higher level strategic views to the more detailed local solutions. This challenge is discussed more in part 4.3.3. The scale of conceptualization also affects directly the actor's situation awareness. As the lower the scale of conceptualization is, the more the situation awareness is focused on issues happening at the local level. And the higher the scale is, the more the situation awareness is focused on the issues happening at the more regional and general levels.

4.3.2 Challenges of the information use

The overflow of information and reports pose various challenges for the information use. This chapter describes how report overflow challenges the validation of information used, and discusses the responsibility and power of the information processors during the decision-making process. In addition, information selection and filtering process is outlined, and the challenge of utilizing user information in the decision-making process is described. What are the main challenges of the current decision-making and information use practices when thinking about situation awareness? Figure 39 outlines the main findings of the challenges in the information use.

[54] Picture reference: HSL. 2011. Helsingin seudun liikennejärjestelmäsuunnitelma HLJ 2011. Accessed: 3.9.2013. Available: http://www.hsl.fi/sites/default/files/uploads/hlj_2011_netti.pdf.
[55] Picture reference (excerpt from): Länsimetro Oy. 2013. Länsimetro. Accessed: 3.9.2013. Available: http://www.lansimetro.fi/images/stories/esitteet/lamet_haitaries_2012_suo_final.pdf.
[56] Picture reference: Länsimetro Oy. 2013. Länsimetro. Accessed: 3.9.2013. Available: http://www.lansimetro.fi/images/stories/esitteet/lamet_haitaries_2012_suo_final.pdf.

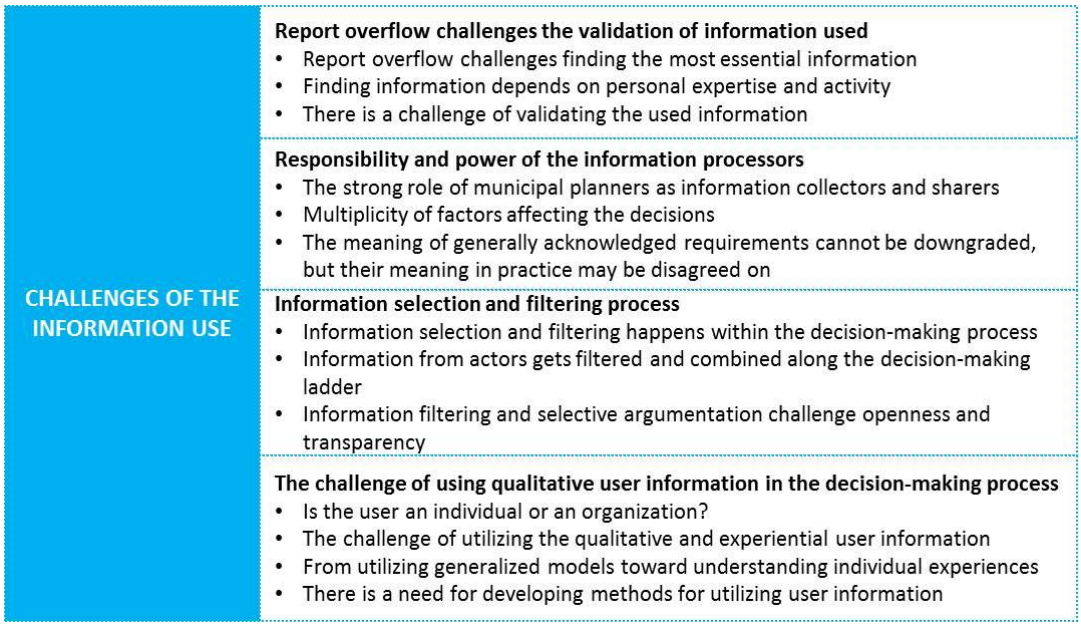

Figure 39: *Challenges of the information use.*

Report overflow challenges the validation of information used

According to the interviews, the statement of decision-makers facing an overflow of information coming from various actors, various themes, and in various formats introduced in part 2.3 seems to hold up. It seems that urban planning, and accordingly decision-making around it, is very report oriented. Numerous reports concerning various themes are prepared continuously. Many interviewees felt that there is such an overflow of reports, that it is difficult to concentrate on finding the essential conclusions in them.

> *"There are these reports. And the problem is that there are too many of those. Same reports repeat themselves over and again. It takes patience and talent to go through them and find the most essential information."*
>
> *"The problem is more that there is so much information and documents. Does one find the relevant information in them?"*
>
> *"More and more reports are published all the time about everything."*
>
> *"There comes so much material that all of that cannot be assimilated."*

The abundance of information should accordingly be acknowledged in reporting. How to put together reports so that the main topics are easy to find? Currently for example visualizations may mislead the concentration from the main message to some minor details. Own professional and educational background, as well as experience in using reports helps in finding the most essential information. However, as will be discussed more thoroughly later on in this study, the impression of what the most essential information is varies for example in relation to the different scales of conceptualization described in part 4.3.1. Whereas some actor may think of for example the West Metro line being only a piece in the regional transportation

network, another may focus on the technical details of the Otaniemi metro station. Accordingly, the information needs are different.

> *"There is not a decision-making support system. It is down to one's own experience to discover where to find the desired information."*

> *"Finding the information depends on one's own activity."*

The higher the level in the decision-making chain, the more information there seems to be available. However, it becomes more processed and less authentic. So is it harder to form situation awareness when all information is already somehow modified? Some interviewees referred to the point that decision-making is based much on processed information, but the information processing itself cannot be validated very easily. So the information processor actually holds much power and responsibility in collecting the information for decision-making.

> *"Decisions are based on research. But the quality of the research is never observed. Is it just scratched together carelessly, in copy-paste style, or is it based on a valid methodology?"*

Responsibility and power of the information processors

Based on the interviews it seems that planners have much power in sharing the information with municipal decision-makers. However, in the Otaniemi campus area majority of the plans are initiated by land-owners who sketch the initial drafts and justify the desired development projects for the planners. So, it is also up to the planner to critically review the given information and estimate its relevance according to the project, and make decisions about what information would still be needed, as the information received from the other actors is affected by the process of information selection and filtering, as described in part 4.3.2.

On the other hand, the planner is also expected to understand the needs and positions of various local actors. In this kind of a land-owner driven environment it is identified as a challenge, how well the municipal planning organization is aware of things happening in the area. Municipal planners receive information from various actors during planning processes. Figure 40 outlines the main actors offering information for a planner. However, also planners dispense information for the actors in the planning decision-making ecosystem.

> *"It is the planner, who has the responsibility of making his/her decisions. Decision-makers give the vision, and the planner has to think over how to reach the vision, and then bring options for the decision-makers to decide."*

> *"The planner should create the preconditions for developing the area, as the plan still is a legal prerequisite for the development. So, the planner should be a facilitator, and not a dictator."*

> *"I guess the local actors have a strong vision of how things should be. And of course the city has their own general interests. … But it would*

be difficult to imagine that the municipal representatives sitting in Espoo center would be especially focused on the campus development. No, it begins from the local interests."

"Many plans are initiated by land-owners. So the plan is tailored for their needs. It means that the planner should know what the reasoning behind the projects is. That where the project is aiming at. And then adapt it according to municipal objectives so that the result is best possible. Often there are contradictory objectives…"

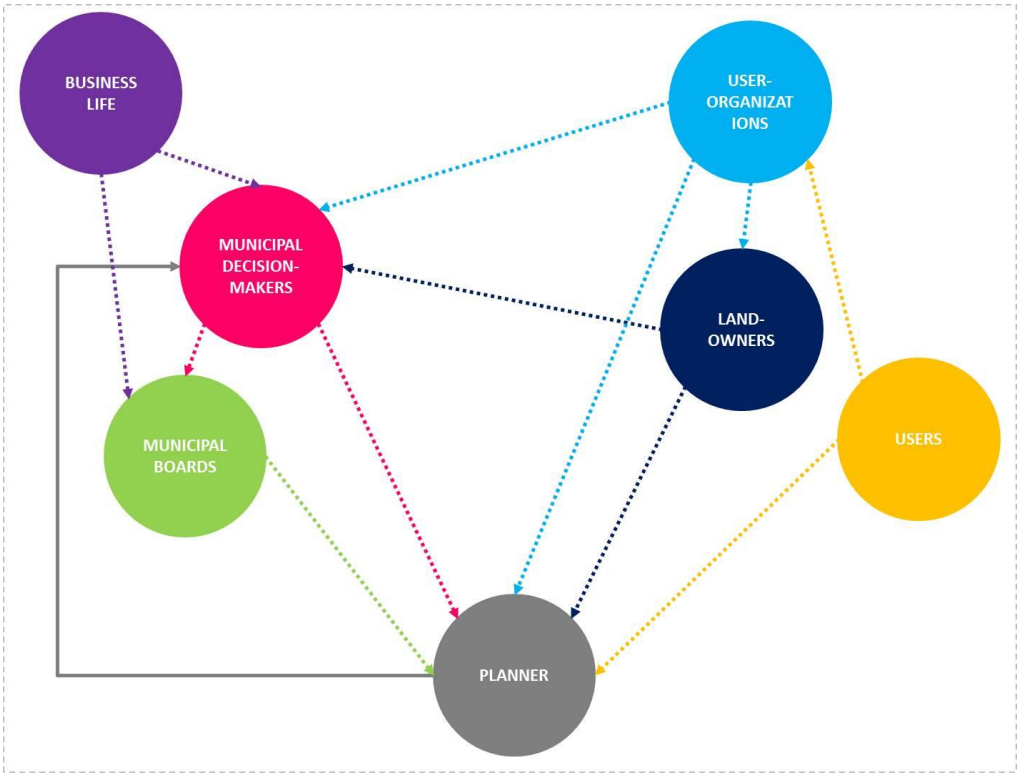

***Figure 40**: Channels of information reception for a municipal planner.*

Decisions of what relations and pieces of information are highlighted in the decision-making process are not only influenced by the understanding and knowledge of an individual, but also by the personal and organizational objectives and aspirations. Some information is purposefully prioritized, while other information is left for minor attention if it doesn't serve one's own goals. According to the interviews, decisions do not always logically follow the prior documentation and decision-making process, but are to some extent also facing the influence of surprises, external factors affecting the process, and personal relations.

As Healey (2007, 26) argues, concepts and priorities emerge not just from the codified knowledge of science, but from experience, ideology, professional concepts and political fixes. Information use, understandings of systems and network relations, prioritizing information and arguments in decision-making are formed by an on-going interaction, reasoning and visioning at for example personal, organizational, regional and municipal levels.

There is also some information, such as the legal or other generally acknowledged requirements, that must be met in the decision-making, and cannot be downgraded. However, sometimes the requirements can be articulated in such a generalized way, that the actors might disagree on their meaning in practice. So, the guidance of for example laws, guidelines and regulations is not very unambiguous or detailed, which may also affect why those were not mentioned as the most important information sources in the interviews, as was presented in figure 36.

> *"Very strong are things like Natura, those are like there is/ there is not. And if there is, you cannot use the area for anything else. And then there are those plans implementing big visions and strategies, which fill up everything that is left."*

> *"Built heritage of national importance is not clearly defined. It is not solely about a building being something particular. It does not focus on individual buildings, but on the whole. It is conceptually challenging."*

> *"Master plan is of course strong, but at the detail level it doesn't have so much influence. There are no such solutions that would exceptionally differ from the master plan."*

Information selection and filtering process

It seems that planners have quite much responsibility of what information and reasoning goes through and forward for the municipal decision-makers. However, according to the interviews it seems that the information selection and filtering process begins already on the lower steps of the decision-making process ladder. According to Healey (2007, 30), the inherent selectivity of strategic thinking is deeply political highlighting some issues and interests and ignoring others, synthesizing some relations and linkages while neglecting others. Also Endsley (2008, 13) states that attention to information is prioritized based on how important that information is perceived to be.

> *"It is quite coincidental, which argument finally comes through. It develops through the process, and is the best alternative that can be attained."*

> *"The process collects everything that can be found. Of course, according to the individual values, and someone values something more than others do. But certainly it is reflected also to the higher level aims, especially those that are together agreed on."*

The information of various actors gets filtered along the process, as is described in figure 41. Rather than all of the various actors actively influencing the municipal decision-makers, their needs, wishes and aims get filtered gradually through the chain of various stakeholders, represented by the actors at the higher levels of the decision-making ladder. For example user-organizations in the area collect together the needs of the individual users combining these views with their own organizational goals and serving the information for the land/property owners. They bind together information from various user organizations using their properties, and

combine this information with their own organizational goals. This information is presented for the planner in order to influence the planning process. Finally, the planner integrates this information with other documentation, reports, and the municipal objectives and presents the plan for the municipal decision-makers.

As the information goes up the decision-making ladder, also the statements from the previous levels of actors may be attached to the document for showing the pressure and importance of changing the plan. Thus, the meaning is to show that for example a land-owner is not the only actor supporting the change, but there is a broader demand for the change to happen.

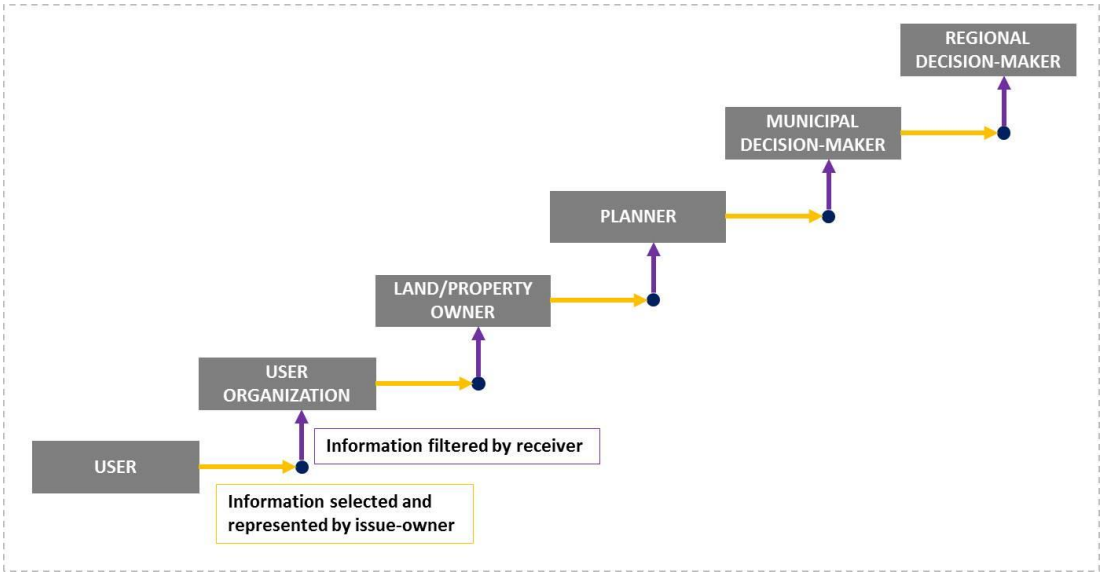

***Figure 41**: Information filtering process.*

Healey (2007, 188) describes the strategy formation process as a product of several filtering phases. According to the interviews it seems that this kind of filtering takes place also at all levels of a decision-making process, both intentionally and unintentionally, affecting the willingness to share information. The information that supports one's own goals is more likely to be shared in the negotiation or decision-making process. Arguments are justified according to the actor-contextual "rationality", which supports the selected objectives. Opposing arguments are seldom offered, reducing the possibility of evaluating the ready given truth. As Flyvbjerg (1998, 36) pointed out, power produces that knowledge and that rationality which is conducive to the reality it wants. The meaning of argumentation is discussed more in part 4.3.7.

> *"For outsiders it may sometimes seem that decisions are made with blurred logic or irrationality, but they are always based on previous decisions. There are no solutions that would please every actor."*

The challenge of utilizing user information in the decision-making process

Another challenge coming up during the interviews was the experienced incapability of utilizing user/ citizen information, which describes the qualitative and immeasurable characteristics of the environment. In the interviews, *user* perspective was commonly understood as the perspective of user-organizations. As is discussed also in part 4.3.5, the development process in the area is quite organization-centered, instead of human-centered. However, in mobility planning the needs of organizations and individuals differ from each other. Organizations' needs comprise for example of logistical and parking needs, whereas individuals are concerned about the streetscape, safe and comfortable living environment, and personal accessibility to home, work, services etc.

The view of individual users was often equaled to the legally mandatory public participation process. However, user surveys have also been performed, but how much impact they have on the development process, remained unclear. Also a few citizen forums concerning the whole T3 development have been organized for all local citizens to participate. However, many interviewees told that although it is relevant to listen to people's desires, it is hard to use this kind of qualitative data in the decision-making process, when one has to plan for everyone, and not for individual people. This is to some extent in line with the findings of Te Bömmelstroet & Bertolini (2008, 253) about the main differences between transportation and land use planning. According to them, transportation planning tends to rely on quantitative information and modeling, whereas land use planning has the tradition of using more qualitative information about places and functions. Integrating user information in the process and just listening to the residents mean different things.

> *"You have to see the whole picture, and not the picture of the individual residents."*
>
> *"Of course we have to listen to the local actors and residents. But simultaneously we have to comprehend the larger picture."*
>
> *"Those are never statistically very valid. But there can come up some themes, which can be studied further. Like 'what's there as people go there so often'."*

Quantitative information, extrapolation and modeling are typical ways of mobility planning decision-making, according to the interviews. For example public transportation is financed by tax money, so the main function is to provide access to public services, like health services, schools etc., relying more on where people should have access than where people are actually going. Mobility decisions affect crowds of people, so how could it be based on individual experiences was indeed a typical point coming up in the interviews. However, the relation of aiming at more attractive sustainable mobility environment, and using extrapolated models of quantitative and historical data, remained unclear. Is the user conceived as being the population of T3, Espoo, or the whole metropolitan area, or is it the individual making everyday choices of how to move around?

> *"We do have general knowledge of how people move."*

"Mobility needs are about the municipal services, which should be accessible to everyone."

"There is an interesting trend in human behavior. It is that the meaning of individualism is increasing. People find it hard to understand that only if someone lives in Kirkkonummi, or if 10 % of people cannot use metro, the whole Otaniemi cannot be planned from that perspective only. … It is not our responsibility to think how they come to work. They should also participate in thinking what would be the most reasonable and sustainable way of transportation for them."

The view of user information and its relevance in planning decision-making is already a broad theme in itself, and is only shortly touched upon in this thesis. The findings, however, show that there is a demand for developing the methods for utilizing user-information and understanding its potential. The possibilities of utilizing user information seem to remain unclear for many actors, and mobility planning decision-making tends to focus on numerical data concerning for example traffic flows and monetary information, dealing with a place more or less as a managerial task. However, certain environments ask and direct certain kind of behavior, so it does matter how user experience is understood in the planning decision-making process.

"User information is what we would need more. And we should also know what it means in the changing circumstances."

"It is really important, we should have more of it. We have information about traffic loads. And information about history. But user information about the future. That is what we would need more."

4.3.3 Creating an overall picture of the development process is not easy

This chapter outlines the main reasons of why creating an overall picture in a dynamic planning ecosystem is not easy. Long time horizon and various simultaneous sub-processes challenge the generation of a detailed enough overall picture. Otaniemi campus is understood as being an integral part of the T3 area, but there remains some challenges. T3 is seen more or less as a slogan, which does not direct the actual methods of development in the area. As well, long psychological distances within the Otaniemi campus and T3 area pose certain challenges for mobility planning in the area. The importance of co-created documents was highlighted as a means for facilitating the generation of an overall picture, but it also involves some challenges. Figure 42 outlines the main findings of why creating an overall picture of the development process is not easy.

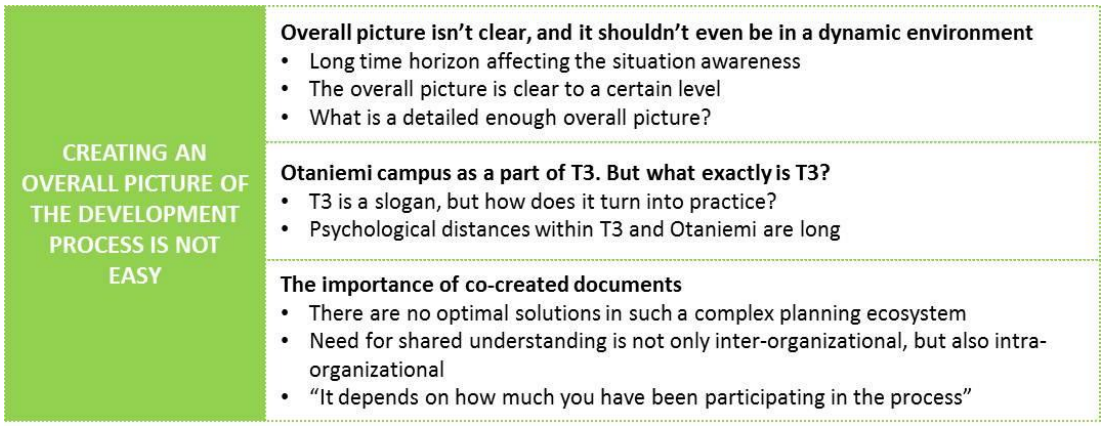

Figure 42: *Creating an overall picture of the development process is not easy.*

Overall picture isn't clear, and it shouldn't even be in a dynamic environment

In urban planning, the time perspective is usually long. Numerous projects in various phases are going on in areas simultaneously, posing a challenge for the situation awareness. Projects and processes can take years and decades from the first drafts to the implementation phase, and the process can suddenly speed up by a single decision. This affects the situation awareness in urban and mobility planning. Even though the planning environment might seem stable at some moment, changes and development might be needed at the next moment. So, even if there wouldn't be dynamic and hectic development going on all the time, the actors should still be aware of the overall picture for being able to react to, and proactively influence the process when it accelerates. According to many interviewees, for economic motives it may be necessary to divide the process into shorter phases. But if no clear roadmap of the development process is available, confusion about the overall picture among the actors may emerge.

> *"The overall picture is not clear, and it shouldn't even be. … This is a different project every year. Of course it cannot change beyond measure, but time goes on and new impulses keep coming in."*

> *"This is kind of a chaotic and self-organizing thing. So some risk exists in every case. Just because there are so many actors. … There is a will, but it is more about the mechanisms of how the Otaniemi project should be organized in a way that some kind of coordination between the various visions and needs would exist."*

T3, discussed more thoroughly later on in this thesis, was mentioned as a concept for managing some kind of an overall picture of the area. Most of the interviewees were aware of the overall aim of T3, as accelerating the development to a regional innovation ecosystem, but the picture of the methods and individual projects for reaching it remained unclear. Every actor sees and understands the area in a different way, from a different perspective. Accordingly, their overall pictures, or mental models, of the area vary much. According to Healey (2007, 27-28), the challenge for any episode in spatial strategy-making focused around urban areas is that an urban 'region' is not a 'thing' to which an analyst can approximate an 'objective'

representation, but more an imagined phenomenon, a conception of a very complex set of overlapping and intersecting relations, understood in different ways by different people.

Thus, the challenge lies in having the various overall pictures and organization-specific plans to discuss with each other for understanding the systemic relations of various projects. Even though the opinions in the interviews ranged from understanding the overall picture as the slogan of T3 and informing everyone about every detail of every project, there is also an area in between these ends. Current means for enhancing the overall picture among various actors are discussed later on in this thesis.

> *"At a general level there is a consensus of the overall picture. But when we get into the discussion of what the upgrading means in practice, the views differ quite much."*

> *"I think the overall picture is clear. But it doesn't mean that one would know exactly what is going to happen. But one knows where we are going, what the framework is, and what the order of proceeding is."*

> *"Usually the overall picture is not clear for various actors. But it is quite natural; we are talking about such a broad thing there. Informing everyone about everything… of course one can share the information, but people cannot receive and understand that much information. And they don't have a framework where to put the single pieces of information. If one just gives the whole bunch of information for people, they don't feel up to reading it all."*

Many interviewees repeated the meaning of having someone to take care of the overall picture. The main worry was that when planning decision-making is done in pieces, how a coherent overall development can be ensured. Who cares for the commons? This was not so much seen as the problem of the larger scale mobility projects like the West Metro or Rail-Jokeri, but more as the problem of the internal connections. In the interviews, the relevance of the external connections was strongly highlighted, whereas the accessibility within the Otaniemi campus was not so much discussed, as is outlined in figure 43. Whether it is because Otaniemi is mainly understood as an area where people come to work and study, and not where people live, but for encouraging the livability of the area, it would perhaps be advantageous to pay attention also to the internal connections, even though their financial and budgetary relevance might not be so high.

> *"There is a detailed plan with a pedestrian zone, where you can go to every direction. But it is not mentioned that it should somehow connect with the surrounding areas. It is only describing the pedestrian traffic within the planned area. Then we just have to hope that also the neighboring property owners think that it would be nice to get through."*

> *"Keilaniemi is a super boring place, if one goes there for a walk. The milieus are only inside the buildings. And what happens between the buildings is not relevant."*

"The user shouldn't be able to see administrational borders when (s)he moves around. It should not be visible for the users."

"Then there are the pedestrian and bicycle connections, which don't come up significantly in the investment plans. If people are to feel well in the area, and move efficiently, and the number of pedestrians and bicyclers is to increase… the connections should of course be improved."

"Then there are these projects, which are not so important financially. But they are significant locally, for example what is planned within Otaniemi."

Figure 43: *Mobility planning projects of the area in order of relevance, according to the interviews.*

Otaniemi campus as a part of T3. But what exactly is T3?

In the interviews it became clear that the T3 area does not have a commonly understood concrete enough definition. Some actors found it good as leaving enough flexibility for the future planning decision-making, whereas others found it difficult, as there was no generally agreed line of what to follow and where to base the decisions. There was a clear agreement of T3 as an area for Science-Art-Business (Tiede-Taide-Talous), but the strategies and tools of how to reach this varied according to the different actors. The vision of T3 was seen as serving as a justification for certain higher level goals as ”sustainability”, ”smart” and ”high-tech”, but was seen as left without any concrete meaning.

"At the higher level, there are quite strong visions about the meaning of T3. But there is not a shared vision about how it will be realized."

"The idea is clear, but has it been communicated well? I'm not sure about that. T3 is clearly a possibility, it is a clear slogan. It is easy to refer to T3 without any content."

> *"T3 is this kind of an idea that can be shown on Power Point. I see that it has never been thought of as a project that would need a project plan, or would require collecting all the information in same place."*

> *"Like what is the T3? I think it would need more beef on the bones. I think quite many know what T3 means. But how many know, what it really means?"*

The shared vision and awareness of the overall process relate also to the question of the justification of focusing so much development resources in Otaniemi and other parts of the T3 area. Some of the interviewees felt strongly that other parts of Espoo should be acknowledged more when allocating the scarce resources. The reasoning of directing so big share of development resources in an area, which was described as already being quite well-off in comparison with some other areas in Espoo, was not fully approved by some interviewees.

> *"How long can we think that Espoo is T3? On one hand it can be understood, because the national meaning is so big. … And it should be boosted and hyped. But still, we have all these other areas as well, which should be developed."*

According to the interviews, T3 area is special in a way that it cannot be easily drawn on a map. Its boundaries are not clearly set, and the meaning of T3 seems to vary from being the whole Tapiola-Otaniemi-Keilaniemi area, to being a combination of Otaniemi-Keilaniemi or Otaniemi-Tapiola, to only being the core campus area of Otaniemi or the center of Tapiola. T3 was adopted as a unifying term for development taking place in the Tapiola-Otaniemi-Keilaniemi area, but it seems that the psychological distances between these areas, and also within the sub-areas, are quite long. It was for example described in an interview that *"the widest street in the world is Otaniementie, separating Aalto University and VTT from each other"*. Although the original idea of the area was in one interview described as being the sharing of facilities between VTT and Aalto University (Helsinki University of Technology at that time), the actors felt this has not been realized in an optimal way.

Although the physical distances between the areas and actors might be short, the psychological distances are far longer. The meaning of psychological distances is highly related to the themes of understanding the meaning of mobility also within the area, and not only as the external connections, as was discussed earlier in this thesis.

> *"If Keilaniemi, Tapiola and Otaniemi are to be connected, there is a great challenge. The mental differences are far more extensive than the physical ones. For example, the distance from Tapiola center to Design Factory is the same as the distance from Stockmann to Senate Square. But very few people would walk that."*

> *"I think that Tapiola, Otaniemi and Keilaniemi should be thought of as a continuum. … These are all close to each other, but urban planning has not supported the interaction. In fact, it is quite hard to go for example from Otaniemi to Keilaniemi, even though it is so close."*

"It is also about thinking about the means of mobility. Because it should be easy to get from one place to another. So maybe an e-bus or similar… Kutsuplussa or something… like 'I'll go to Keilaniemi for a lunch'."

The importance of co-created documents

In a complex planning ecosystem, where actors come from various backgrounds and perspectives, there cannot be a shared vision unless it is co-created with the various actors and clearly argumented so that everyone understands its meaning. The variety of actors and actor-related objectives affects the development of shared and co-created visions. At what level should the shared visions be done so that every actor could agree on them, but they would still be guiding and flexible enough, was a question brought up by some interviewees. On one hand, there are no optimal and detailed solutions, which would please every actor. On the other hand, if the vision is very vague and general, as was described earlier about the T3 vision, it might not serve as a concrete enough road map of where the development should be aimed at.

"There are so many actors. And it is a big challenge. There is no optimal solution. And the interests are partially contradictory. And there should be found shared objectives that would sustain also in the future."

"Like Fortum and Neste are next to each other. And it would be kind of hard to find a shared agreement on whether it should be an electric car, or a gas car. But they could perhaps still both agree on zero-emission transport and ecological solutions."

Reaching a shared understanding is not only about differences between various actors, but can also be intra-organizational. Some actors pointed out the challenge of not consulting intra-organizational actors during the decision-making process, but only hearing them when it is time to make official statements. However, it was seen that this challenge has improved reasonably in the municipal decision-making during the recent years.

Many interviewees mentioned as the most useful ones those documents that they had been actively developing together with other actors. Accordingly, it seems to be easier to commit to something one has been producing. Not only from the perspective of being able to agree on the visions stated in the documents, but also for being better able to understand the reasoning and discussion behind the documents. For example the Otaniemi transport and mobility reform was usually referred to as, on one hand, an important document describing the local features of transport planning, but on the other hand, the interviewees felt that it is hard to refer to, because the actual discussion and meaning behind the document remain a bit unclear.

"Then there are the co-created documents, which are easy to refer to."

"It depends on how much you have been participating in the process."

"The Otaniemi transport and mobility reform work was initiated by the municipality. It was more general, and didn't include the development interests of the local actors. I think it was more like a background check."

4.3.4 Decision support systems in use

Interaction and visualizations are important features of decision support systems. This chapter describes how round-table meetings and working groups are commonly used as decision support systems, whereas digital decision support systems are not commonly in use. Nevertheless, there seems to be also a need for developing process documentation for follow-up, transparency and openness. Visualizations are seen as an easy way of understanding the real meaning of the decisions in the cityscape, but there is no consensus on whether the visualizations should be published and publicly discussed, or not. Figure 44 outlines the main findings of the decision support systems currently in use.

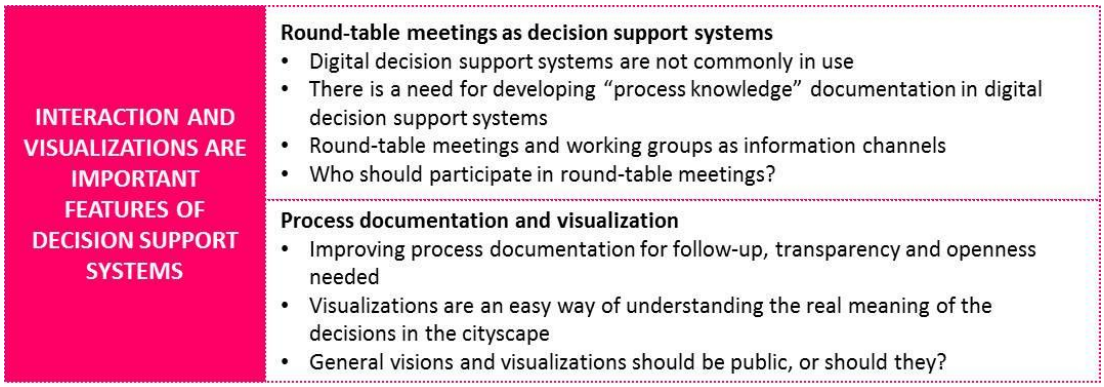

Figure 44: *Interaction and visualizations are important features of decision support systems.*

Round-table meetings as decision support systems

According to Komninos (2011, 179), multiple digital technologies enhance the scalability of collaboration, such as co-design tools, collaborative work environments, real-time communication without cost, crowdsourcing solutions, content mash-ups and data interoperability over urban operational systems. However, the interviewees, apart from one organization, did not mention any digital support systems combining data from multiple sources to be in use. Instead, scattered systems containing data of real estate, topography, transportation usage information etc. are commonly used. One interviewee brought up a notion of a decision support system, which should be in use in the area, but none of the interviewees reported using this system.

Even though digital decision support systems are not commonly in use, there still seems to be an interest and a need for this kind of systems, which would be easier to use than the fragmented systems or paper documents. Some interviewees expressed a need for some kind of an information bank or decision support system for gathering together various pieces of information about the completed, on-going and future projects. As people change, a lot of process information and tacit knowledge is lost

due to the incomplete and vague process documentation. Even though the final plans and decisions might be available, the reasoning and justification of the decisions made during the process might be lost. Nevertheless, there are also challenges with this kind of systems regarding for example of who should be responsible of updating and marketing the systems for new actors, and how to document the "process knowledge".

> *"There are people, who work a long time in the area, and they have all the information and knowledge in their head. And they are aware of the planning process in the area. So the problem comes when they retire or quit. There is a need for a local information bank. That when a new employee comes… There is much tacit knowledge only in someone's head."*

> *"If the area is developed this way, I think there is a need for creating an information system where one could find the information easily according to some classification."*

> *"There is, however, a problem. If one has such a system, someone should update it and put information there. And who should be involved in using the system. … And if there is a new actor, someone should tell that this kind of a system exists."*

In addition to the digital decision support systems, the importance of meetings and interaction was highlighted. Various working groups and round-table meetings of local actors were referred to as important decision support systems, where information is shared and discussed. In the interviews it was mentioned that a change in the key actor network may affect the functioning of the network. For example formerly there was a regular round-table group meeting and keeping each other updated about the situation and new development ideas within the Otaniemi campus area. However, as the maturity of the development process proceeded from early visioning more towards planning, and simultaneously there were some changes in the network members, the tradition ended. According to some interviewees, the lack of round-table meetings has affected the overall picture of the development process in Otaniemi campus area. However, there are plans of revitalizing the round-table tradition in the area.

> *"Usually the web interfaces become quite heavy. … I think there could be a system like that. But not only that. Meeting and interaction are so important. … But it requires someone who is dedicated to facilitating that thing only."*

> *"There is this round-table group. It is for creating a shared vision and moving things forward."*

> *"Certain principles are agreed upon there. And it is also a forum for various actors to discuss and share knowledge. It is kind of a bunch of people coming up with objectives, which are not seen anywhere. It's actually preparatory work."*

But then, who should be present in this kind of round-table groups? If the overall aim is to develop Otaniemi campus as a part of the T3 area, it is not simple and clear who should be involved in the discussions. As the interviewees pointed out, definitions are hard to make, because if all possible actors are invited, there are so many participants that discussion and information sharing become quite impossible, as outlined in figure 45. On the other hand, if only some actors are invited, some relevant aspects might be missed in the discussion. If for example pedestrian and bike connections are discussed, it is not only about internal connections within the Otaniemi campus, as people shouldn't be able to see the administrational borders when they move around. But it is more about developing an attractive mobility ecosystem in the whole area and beyond, which of course increases the number of actors involved.

> *"It seems that the actors who take part in these round-tables think they are a good thing. But then the actors, who are not present, are wondering why the others have been invited and they have not."*

> *"The interest analysis is very broad. It is national. And that's not enough. It's global. There are for example about 800 enterprises."*

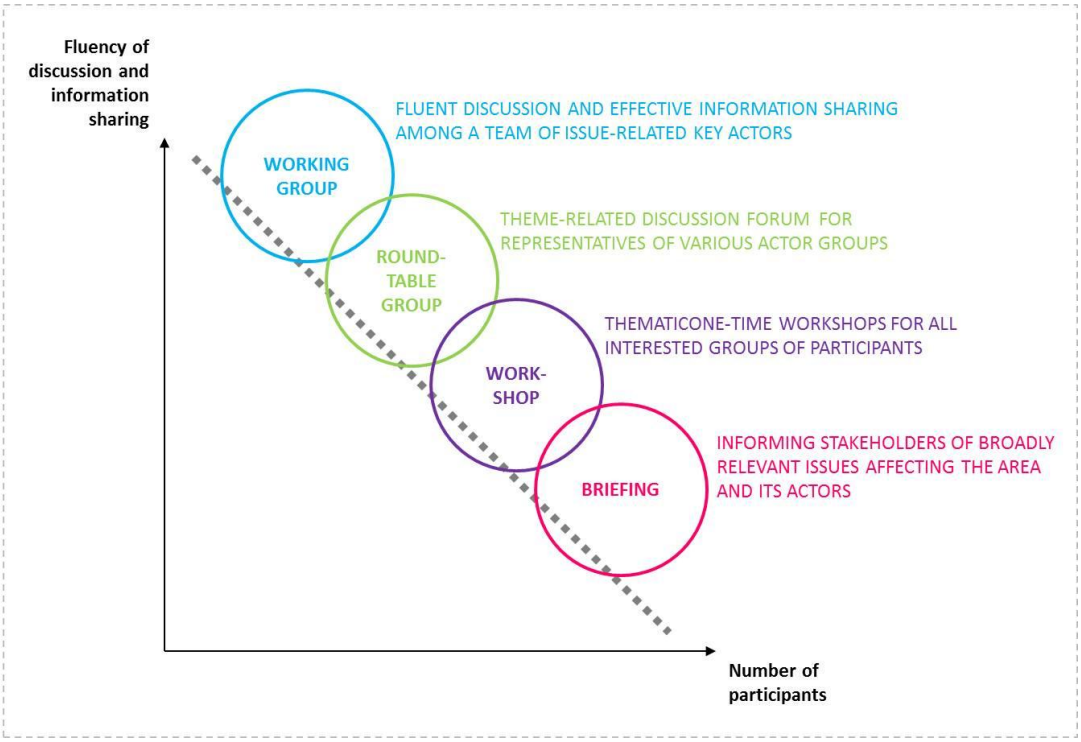

Figure 45: *Classification of various types of round-table groups.*

Process documentation and visualization

According to the interviews, there are numerous challenges in the current process and project documentation. How to maintain situation awareness when situations change, objectives change, people change, and everything is affected by externalities, surprises and human factors along the way? Some challenges of the current

information use, such as information filtration, selection, and difficulty of information validation were outlined already earlier in this thesis. Accordingly, demands for improving process documentation exist.

Even though some interviewees told that subsequent decisions are always based on the previous reports and decisions, some interviewees felt that the follow-up processes are surprisingly weak compared with the ambitions of the processes. As the whole process and smaller decisions, which are made during the way, are not understandably documented, preliminary ideas and decisions are harder to keep alive, and projects have to do overlapping work, starting from almost point zero. As when people change during the process and the sequential phases, the undocumented reasoning, justifications and decisions lose their meaning and drop off from the process.

> *"In the planning system there could be certain points for representing the progress so far."*

> *"The visualizations of the various phases should follow the process all the time. Because it is a challenge to go to the Council when one Board has worked on it for two to five years, but the others see it for the first time. So that there would be visualizations of this is how it was in the first place, and this is how it has changed during the way. Then one could see how much it changes during the way. If one sees it for the first time, (s)he thinks that it's horrible. … So documenting the changes with clear and concrete visualizations… because if people would go and read the minutes of what someone has decided at some point, it would be really laborious. It should be easy and illustrative."*

> *"In that kind of a process it is about the argumentation, and what the decision is based on. Opening up why it was done in the way it was done… sometimes it is not very logical."*

> *"In this kind of an open-data world, aims should be set together. So that they can bear inspection. … I see it is a big challenge for the decision-making. If the objectives cannot be set unanimously enough with best possible argumentation, they are not likely to last."*

> *"I think that if people are involved already in the preparation phase, it helps the decision-making. … And I would also argue that it assists citizen in understanding the process. As it is fine-tuned, and fine-tuned again. So it'd be easier to accept the result, even if it wasn't just like they wanted. Of course it is more laborious, but I still think it would be worth that."*

Visualizations were mentioned as a way of documenting the process in an easily understandable and illustrative way for almost all actor groups. Whereas statistics, calculations, models, plans etc. may require special expertise from the reader, visualizations can usually be done in a way that describes the issue at hand at a scale and detail level, which are practical in the particular situation. Especially discussion of the changes in the cityscape were seen as issues, which can greatly benefit from

easily understandable visualizations, integrating the current situation and the desired future in the same picture.

> *"With good visualizations one would at least have the information of what the decision would look like."*

> *"It is not a plan, because the actual plans will come later on. But it is for getting an overall picture. It is a usable and essential instrument. ... But a bit tricky, because land use and building act does not define visualizations like that."*

> *"In visualizations, one can quickly examine alternatives and try new solutions."*

> *"When it is modeled and visualized that there is a real problem in some place, actors awake to that better than by just saying that this is not good and we think it's like this-and-that. But as soon as one has something to show, it gets more important."*

> *"In the future plans could be visualized so that one could see how it looks like when walking around, for example. ... One cannot see this kind of things from a piece of paper. ... It would clarify the decision-making situation."*

In the Otaniemi campus area there has been done a general level visualization of the implemented, on-going, and envisioned plans, as shown in figure 46. The meaning of the visualization was to see and show all projects simultaneously, for being able to see the whole area as it would be. There are, however, also challenges in this kind of visualizations. This kind of overall pictures are not legally regulated by for example the land use and building act, so there are no process models to follow in the generation and publishing of the visualizations. On the other hand, this is also seen as strength, as the process of creating visualizations of the overall picture is quite free. As they are not legally regulated, and there is no official participation process to follow, the various updating versions of the plans can be quite freely shown around and visualized in an easily understandable way. However, there is no consensus on whether this kind of unofficial visualizations should be published or not.

> *"If one would show a detailed plan, nobody would understand anything. Nobody understands it. This is more of a popular piece of work."*

> *"These visualizations also arouse feelings. That who can publish these, as they are not even ratified anywhere."*

Figure 46: *General visualization*[57] *of the projects implemented and envisioned in the Otaniemi campus area.*

4.3.5 Features of the decision-making network

The actor network in the Otaniemi campus area is quite stable and established. The main actor network was introduced in part 4.1.2. A main feature affecting the decision-making process and network is the exiguity of municipal land-ownership, due to which the development projects are usually initiated by the local actors. The level of activity and lobbying is not constant throughout the decision-making process, and varies from actor to actor. The decision-making process faces low levels of confrontation, because of the stable actor network and the low amount of housing in the area. Influencing is very organization and expert oriented, but it remains unclear how the situation will change in the future as the envisioned projects enter the implementation phase, and more housing is going to be built in the area. Figure 47 outlines the main findings of the features in the decision-making network.

[57] Picture reference: Salmela, Marja. 2012. Otaniemi saa uutta henkeä. Helsingin Sanomat 19.11.2012. Accessed: 11.9.2013. Available: http://www.hs.fi/paivanlehti/20112012/kaupunki/Otaniemi+saa+uutta+henke%C3%A4/a1353325871235.

FEATURES OF THE DECISION-MAKING NETWORK	**The actor network is quite established, but activity and roles vary** • The exiguity of municipal land-ownership affects the decision-making process and network • The level of activity and lobbying is not constant throughout the decision-making process • The relationship between decision-makers and planners is not straightforward – but who influences who?
	The absence of confrontation in the process • Stable actor network and low amount of housing seen as the main factors of low confrontation levels • Influencing is highly organization and expert oriented • Will the situation be as calm also when the envisioned projects enter the implementation phase?

Figure 47: *Features of the decision-making network.*

The actor network is quite established, but activity and roles vary

According to Flyvbjerg (1998, 218), the play of urban planning decision-making does not operate in a vacuum, but new actors may appear, existing power bases may erode, new power bases may emerge, and so on. Actor relations in Otaniemi campus area were, however, told to be quite stable, and no notable changes during the past years were reported. Practices in the mobility planning decision-making process in the area are quite established, raising a question of how easy it would be for new actors to access the network.

According to the interviews, the actor network in the Otaniemi campus area is very much affected by the low rate of municipal land-ownership. Unlike in many other areas, in Otaniemi majority of the land is owned by two actors, who have quite much power and freedom in developing their own areas. Accordingly, many new projects in the area are initiated by the local actors. The role of the municipality is more about taking care of the official planning process, and make sure that the projects meet also the broader municipal and regional visions.

> *"Espoo does not own as much land as the neighboring cities. The role of other actors is larger here."*

> *"The land-owners have their own development projects; they are acting as an engine there. They give ideas to city planning. I think that is how 9/10 plans in the area are initiated. … I think it is because Espoo does not own so much land in the area. If they did, they could think what role the city has in the area. Like what nice and good could be done there. And then initiate the whole thing."*

> *"I don't think that land-owners usually participate so actively in mobility planning. But here it is quite an integral part of the whole thing."*

The interviewees had very differing views of the activity levels within the actor network. Whereas some interviewees felt some actor to be very active and initiative in the development process, another did not perceive any activity coming from the

same actor. One actor group, which was constantly seen missing from the active actor network, was the enterprise sector of the area. According to some interviewees, networking in the decision-making settings does not happen randomly, and actors only need to convince big enough coalitions to achieve their objectives. However, coalitions in the decision-making process do not always follow party alignments, but can also be based on certain thematic views and questions. Accordingly, some interviewees saw that for example the lobbying process affects only some decision-makers. The level of activity and lobbying vary also between the various phases of the decision-making process. As the plan approaches the final stages of decision-making, also the activity toward municipal decision-makers increases.

> *"I think that the land-owners keep in touch. If they don't get what they want, they'll keep more in touch. But if they get what they want, and everything seems to proceed, then it is just a normal process."*

> *"Actors always try to bring forward what they have. There are delegations, presentations, delivery of material and so on. Then, it is a completely different story about do people understand what has been presented in the material."*

Earlier in the interview analysis it was described that planners have quite much responsibility and power in what information they introduce for the municipal decision-makers. However, in the interviews, also a completely different theme of the relationship between decision-maker and planner discussion was pointed out. Some interviewees told that there may be cases when planners might find out during the planning process that the initial visions and objectives are not easily reachable in the given area. However, if the mandate to plan, or lobbying during the planning process, is given from a higher level, sometimes there may be pressure to implement the initial visions. Thus, it may be the planners' duty to justify and validate a plan that (s)he might not feel entirely comfortable with, selecting the argumentation that supports the given vision. As was noted by Flyvbjerg (1998, 2), the possession of power unavoidably spoils the free use of reason.

The information filtering and selection process is described more in part 4.3.2. On one hand, decision-makers are expected not to influence the planning too much by giving too exact mandates or lobbying the process during the planning phase. On the other hand, they shouldn't give too general arguments either, as it may make the work of the planner harder. As was described in part 4.3.1, planners seem to hold power regarding the information that is delivered for decision-makers, as decision-makers seem to rely much on this information. However, also decision-makers have power already during the planning process, because as it came up in the interviews, some of them try to influence the solutions already during the planning phase. And also the other way around, as was presented in figure 35, there is an unofficial lobbying process going on, and activating towards the end of the decision-making process.

> *"Mainly it goes so that the decision-makers try to influence the solution. Not through the introduction and presentation, but already all the way during the planning phase."*

"If the decision-makers make indefinite decisions, it makes the work of a planner harder. If it is said that 'on one hand this, but on the other hand that', the planners will be uncertain of what they should do."

"There may be given these planning reservations. … At that point, big courses of conduct are already made. And a single perspective may be prioritized. And then city planning has to see, whether it is suitable for the area or not. But still the mandate comes from a higher level. … So then the planner can only choose the information that supports that solutions. … And then there comes the requirements for filtering. That if there is much critical data showing that it can't work, so one cannot write that down anywhere. Because then the decision-makers would see that they cannot decide something like that."

The absence of confrontation in the process

Majority of the interviewees felt that the mobility planning decision-making process in Otaniemi campus area has proceeded without any major confrontations. Main reasons for the low level of confrontation in the Otaniemi campus area was estimated in the interviews to be the stable and established actor network, and the unusually low amount of housing (especially owner-occupied housing) compared for example with the more housing intensive Tapiola. A large amount of the housing in Otaniemi area is temporally restricted (usually five years) student housing. Accordingly, the low amount of housing in the area is seen to affect the exiguity of public confrontation in the area.

"The students that live there for some time are not going to complain about the plans."

"There are a few of those owner-occupied housing corporations. But they are passive, and don't participate that much. The local enterprises are not interested in influencing the process. They have other things to take care of. So it's quite peaceful."

At the moment, the development and influencing process in the area is quite organization and expertise oriented, as the campus area comprises mostly of relatively large education and research institutes. The actual development is channeled through the two major land-owners in the area, who both tend to focus on their own property development. At the moment, major people flows in the area consist of people travelling to university or work, and the amount of people spending time in the area outside business hours is low. Accordingly, no major groups trying to influence the general development of Otaniemi campus have ridden up.

What remained unclear in the interviews was how the situation is expected to change in the future, as more development projects reach implementation phase, and as more housing is envisioned in Otaniemi area. For example, according to Flyvbjerg (1998, 140), it is a general tendency of planning and policy that it is the implementation phase, where the transformation from ideas to reality becomes concrete and has real effects on the economy, environment, and quality of life, that the most significant opposition can be mobilized.

4.3.6 Land use and mobility planning decision-making is about solving optimization problems

Perceptions of the relationship between land use and mobility planning vary a lot. Most of the interviewees pointed out that land use and mobility planning should be integrated, but then the decision-making process will become too complex, and decisions can never be made. Decision-making is about prioritizing optimization aspects, and almost anything can be rationalized when discussing complex issues. However, it seems to be easier to prioritize measurable things when solving optimization problems. Figure 48 outlines the main themes of the relationship between land use and mobility planning.

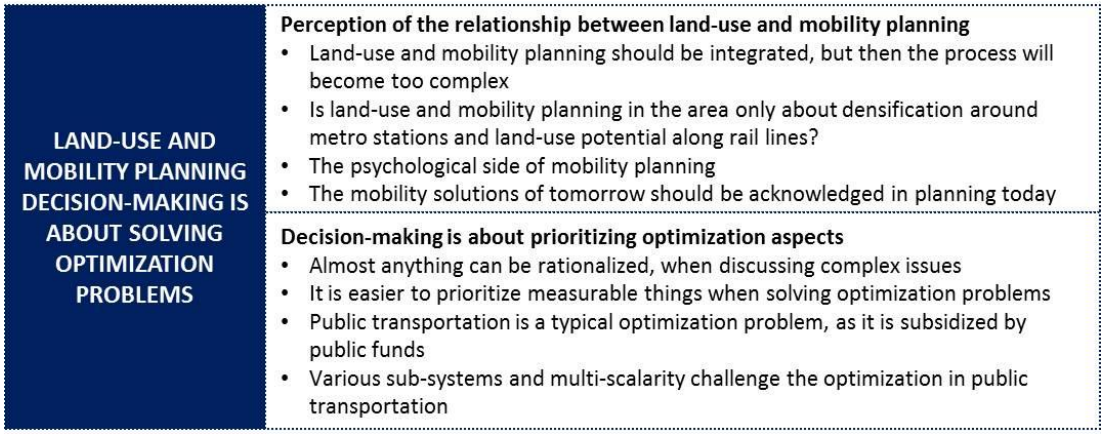

Figure 48: *Land use and mobility planning decision-making is about solving optimization problems.*

Perceptions of the relationship between land use and mobility planning

According to the interviews, it is not clear how the connection between land use and mobility planning should be perceived during the planning decision-making process. On one hand, it is said that they should be closely integrated already from the beginning. On the other hand, if all the aspects are integrated in the same plan, decisions can never be made. However, there were also opinions that mobility and land use planning are, in fact, not very connected with each other. Discussions about the relationship between land use and mobility planning were very diverse. Whereas some interviewees focused mainly on the broader lines of increasing land use potential along rail lines, others were talking about acknowledging electric car charging in the building regulations. Numerous themes seem to be integrated in the mobility and land use planning discussion. Thus, mobility and land use planning seem to be an excellent example of the systemic complexity. Figure 49 shows the complexity and variety of perspectives regarding the relationship of sustainable land use and mobility planning.

> *"Actually I'm afraid of land use planning being prioritized before mobility planning. So that traffic flows and bicycle roads are fit afterwards into the existing plans."*

"One always has to consider, how much land use planning and mobility planning should be integrated. … It is a bit complex. If one makes it extremely complex by integrating routes and land use in a wide area, the decision-making process will get so complicated, that decisions will never be done."

"Mobility planning projects don't affect land use in this area in any way. Densification would happen the same way also without the West Metro."

"Land use cannot be planned without the mobility system, and vice versa."

"Land use is to a great extent about planning the mobility networks."

Figure 49: *Complexity of sustainable land use and mobility planning discourses.*

When asked about the relationship between land use and mobility planning, many interviewees referred to the demand of densification around the metro station, and increasing land use potential along rail lines (metro and Rail-Jokeri), as the main impacts of mobility planning decisions on land use. Individual remarks were also made on the relationship between mobility planning, services, transport choices, and environmental impacts, as shown in figure 50. Even though mobility planning solutions are highly visible in the cityscape, only a few interviewees pointed out the relevance of integrating mobility solutions into the existing or planned structure.

"Metro does affect building. If we have rails and stations, then we should admit… that the main volume of new land use should be focused there. Otherwise it will be a misspent investment."

"It is quite simplified. As the metro comes, there should, according to current view, be quite much housing and services near the stations. Then the rail transport could be utilized."

"The Western Highway is a pretty depressing thing as it is there by the seaside with so many lanes. It is quite an exceptional gadget, it is so lame."

"If we are talking about CO_2 emissions, then people think that the problem is solved when cars will use renewable electricity. And they see it only that way. But it's a much broader question. Like do we want more cars? Or can we have more cars? And how it affects the cityscape?"

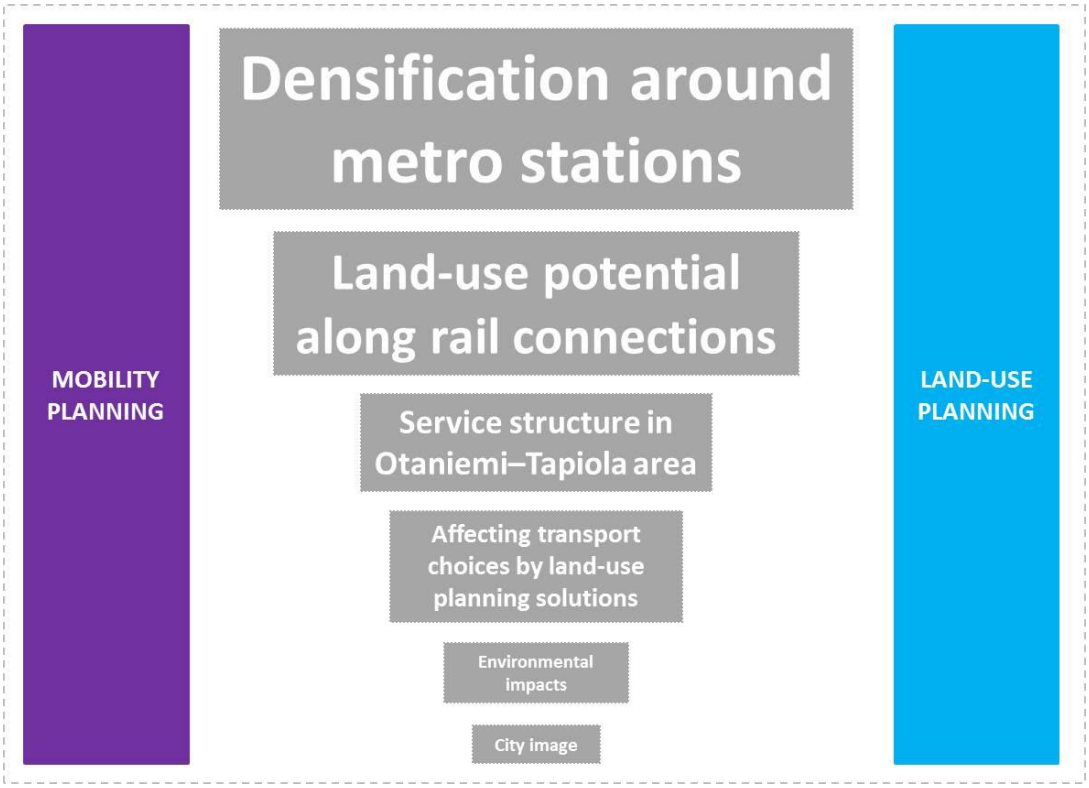

Figure 50: *The relationship between mobility planning and land use planning, according to the interviews. The larger the font size, the more often the theme was mentioned.*

Some interviewees pointed out that mobility planning is also much about acknowledging the psychological aspects. For example, the arrival of the metro line is expected to change quite much the whole mobility culture in the area of southern Espoo. Especially, the Otaniemi campus was seen as a potential place for promoting new and more sustainable mobility choices, because students and university

employees were seen as the easiest target group of changing mobility mindsets. Furthermore, the meaning of new mobility options was seen high in changing the city image more towards an attractive urban locus. But when aspiring to mindset changes by mobility planning solutions, some interviewees pointed out the importance of keeping in mind who the area is planned for. If planners and decision-makers don't know enough about the user perspective, can the envisioned objectives ever be reached? This topic was discussed more in part 4.3.2.

> *"The West Metro has now launched development projects, but it is also a mental thing. When you have metro, it changes the whole character of the city. ... It changes mobility. It is a big thing. Espoo has traditionally been sort of a rural district, that let's go to Espoo by omnibus… Now where does that one-hundred-forty-five leave again?"*

> *"It is an area, which could work for the most part on public transportation. Students are traditionally using public transportation. And employees of university and offices also, if they live along the public transport connections."*

> *"Of course we can also guide behavior by planning."*

> *"In Espoo life is based quite strongly on private car ownership. So can one area be planned car-free, when people are coming from somewhere to this area, and going back? They don't live here, and they don't necessarily live in the Keilaniemi towers or Tapiola either. And there are these huge Ring Road I and Western Highway right in the neighbor. So how to synchronize that with the idea of having a car-free urban center right there?"*

> *"Who are we planning Otaniemi mobility for? Who is the one that should use the mobility services? It is not the planner or a CEO or a principal. It is people working and living here."*

Urban and mobility planning processes take traditionally long time from first sketches to implementation. Buildings are aspired to last many decades, whereas technological advances tend to be quite rapid. According to some interviewees, the varying time perspective of building planning and technological advancements should somehow be taken into account, especially if more sustainable and innovative ways of mobility are longed for. One example of this was the need for acknowledging the electric car charging in the current building regulation. Changing regulations tends to take quite long, as well as the planning and building processes. However, the advances in e-car technology are improving rapidly. But can the e-cars be widely implemented, if their requirements are not met by the ecosystem?

> *"The most urgent matter is to acknowledge the e-car charging in building and building regulation. ... If we think about the life span of a building, whether they are housing or public, they are built for at least 100 years. So it would be smart to think, and know, how many parking places should be equipped with e-charging. So that at least the cable*

routings would be ready, and shouldn't be done with a diamond drill later on."

Decision-making is about prioritizing optimization aspects

According to the interviewees, negotiating complex issues, or wicked problems, is challenging, because almost any option can be rationalized by selecting suitable background material, arguments, and visualization. Arguments are usually justified from some perspective only, and opposing information is rarely offered. Accordingly, validating the given information is hard. Figure 51 presents typical examples of the optimization problems that occur in the mobility planning decision-making. The examples are compiled based on the interviews. As can be seen, neither of the arguments can usually be fully proven better than the other, so the challenge is to find the optimal solution somewhere in between the two ends. For example, the West Metro line has generally been proposed by being an efficient mode of transportation, improving the service level of public transportation. However, based on the interviews it is rather seen as locally impairing the level of public transportation.

"Metro will unfortunately affect also by impairing the service level of public transportation, as it eliminates the direct bus connections."

"And about electric cars… Buying it is expensive, but using it is cheap. And if you think about a private person, who drives about one hour per day, so what's the meaning in the investment as it never pays itself back. But what about buses? They leave at 5 am and drive till the late night. The ratio is the other way round. Already now e-buses are close to being economically feasible."

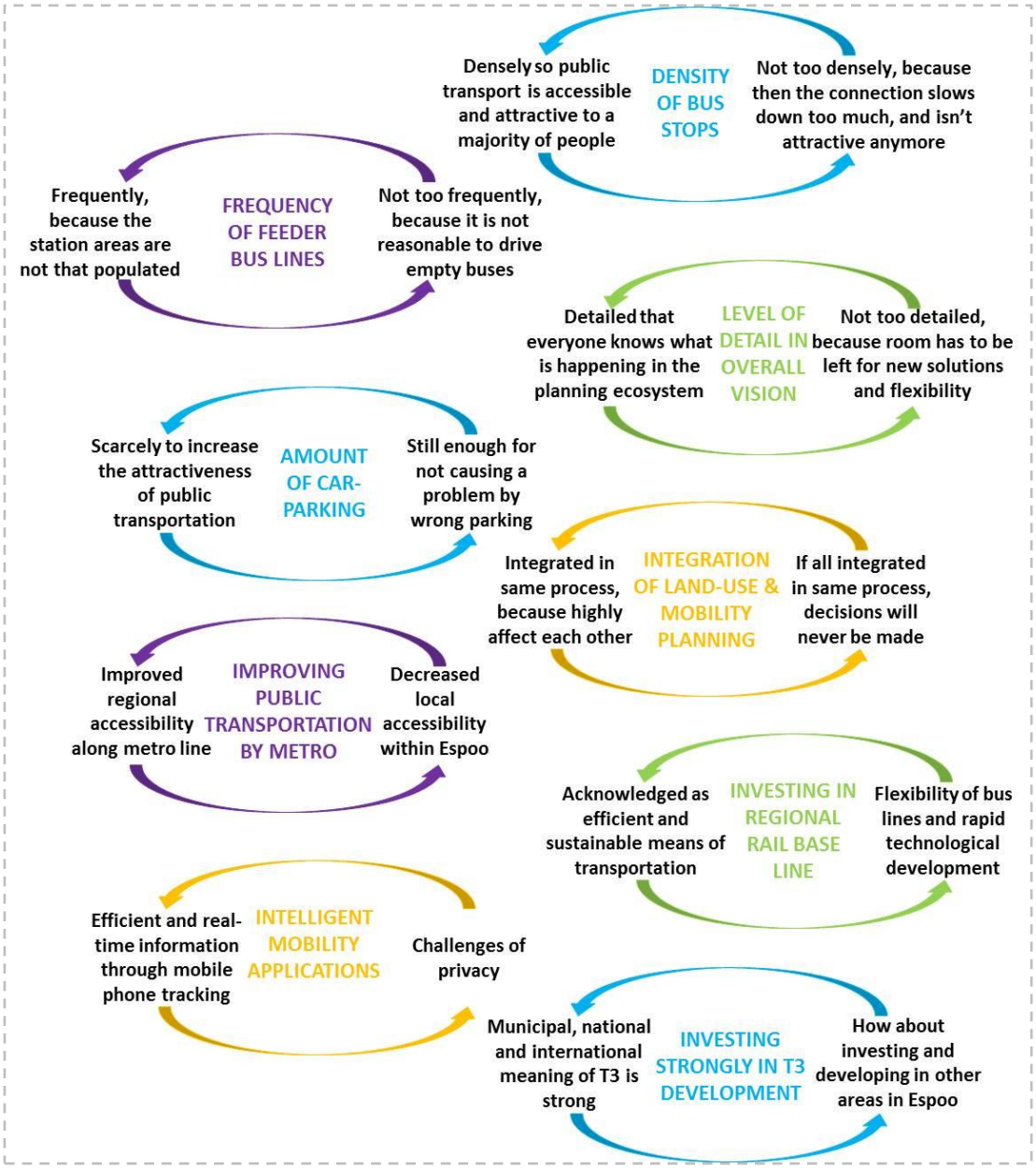

Figure 51: *Optimization problems occurring in the mobility planning argumentation.*

Prioritizing is important when solving optimization problems, as usually everything cannot be optimized simultaneously. According to the interviews, it is easier to prioritize and justify things, which can be rationalized by fact-based measurements and argumentation. Even though some actors would prioritize things, which cannot be easily measured, most of the interviewees saw that it is better to validate the argumentation by measurements and calculations, as that is what most of the other actors prioritize and understand. There are also the immeasurable things, as nature values, which can be rationalized for example on the base of nature conservation act etc. Some interviewees, however, saw that those might not be sound enough arguments, as they can still be interpreted in numerous ways, and are more value-driven than measurement-driven. Argumentation in decision-making is discussed more in part 4.3.7.

"Everything cannot be maximized simultaneously. … I think that various actors understand the aims of each other. But every actor negotiates and plans quite much according to their own principles."

"It depends much on the situation what is prioritized. And also on the arguments that the planner can identify …. All things can never be identified, but what are those that will be prioritized."

"Nature conservation act names certain species. That if there is a flying squirrel, then it has to be protected. But if one thinks about building a metro line. And if there would be flying squirrels... So I don't think it goes so that every flying squirrel could prevent building a metro line. On the other hand, there can be a fabulous forest somewhere. But if there are no protected species around, it doesn't have a legal status to be protected."

"Even though some option would be really good… some solution can functionally be the best one. But it may be so expensive, that there is not enough money. And the reality is that economic resources always dictate the final solution."

In the interviews, public transportation system seemed to be one of the most usual optimization issues as it is heavily subsidized by public funds. Even though almost everyone agrees on the importance of having high-quality and functioning public transportation for a maximum amount of users, the reality is not so simple, according to the interviews. Many of the public transportation optimization dilemmas were outlined already in figure 51, showing how the accessibility and attractiveness of public transport connections can be optimized. However, figure 52 shows another important aspect, the optimization problem of the number of people using public transportation. If the number is low, the service level decreases, but simultaneously, lower municipal investment in public transportation is required. However, if the number is high and the service level increases, as is wished by many actors, higher municipal investment is demanded.

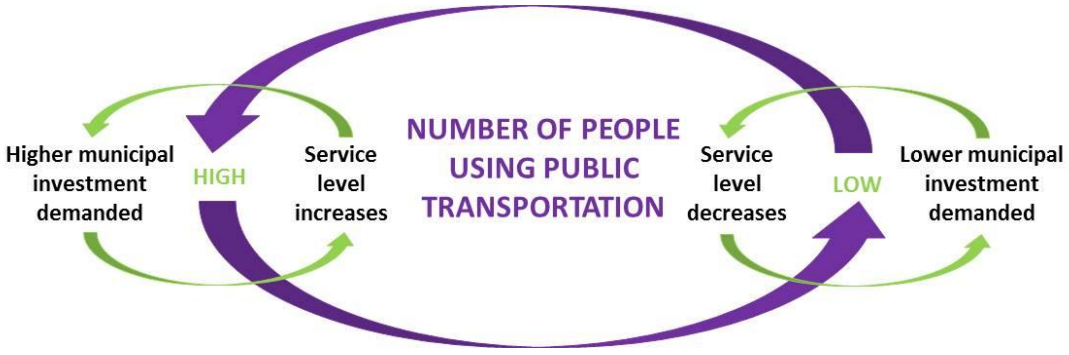

Figure 52: *Optimization problem in public transportation.*

This example shows well the multi-scalarity and multi sub-systemic nature of public transportation decision-making. Even though the overall aim of increasing the number of people using public transportation, and accordingly improving the service level, would seem eligible and well justified for example from the ecological point of

view, it may still cause optimization problems in some of the sub-systems. In this case, the optimization problem is faced in the economic sub-system, coming down all the way from the governmental incentive systems. According to the interviews, the governmental incentive system is at the moment so that the more people use public transportation, the more expensive it is for the municipality. And the more people use private cars, the less the municipalities have to subsidize it. So, actually the governmental incentive system does not reward municipalities of offering high-quality public transportation, even though it might be desirable from many other points of view.

> *"The more there are users, the better service level can be maintained. It is kind of a vicious circle. If people are not pleased with the service, the amount of users decreases, and the service level deteriorates."*

> *"It is an unbearable situation that the government thinks differently about public transportation. This is a typical subject where the government should encourage municipalities to act so that as many as possible would choose public transportation. But now the incentive system is so that the more people use public transportation, the more expensive it is for the municipality."*

> *"Espoo is making an insanely fluent car traffic network. And simultaneously building an insanely expensive public transportation investment. I'm afraid that as long as it is easy to go by private car, will enough people choose public transportation?"*

> *"Everyone agrees more or less on having good and functioning public transport connections. But the prerequisites for having that have to be reasoned time and again. Even though there will be a metro, it will be a torso without functioning feeder lines. And if buses are stuck somewhere, and are not given priorities, like bus lanes... And if actors just want to prioritize private cars… because the space available is so scarce. I think the actors would like to give everyone everything, but then, what do we want to prioritize…"*

4.3.7 Argumentation and innovative thinking in the existing framework

In the decision-making process, argumentation and ways of rationalizing and justifying matter. Quantitative reasoning seems to be strong, whereas qualitative and value-based argumentation can be seen as too subjective, or even irrelevant. The best way for successful argumentation is to lean on arguments, which support the existing framework, as in monetary cost-benefit analyses. But simultaneously, it is challenging to promote innovative thinking when schedules and budgets are already fixed. Innovative ideas are challenging, because they create a mismatch with the existing framework. Changing mindset in the planning and actor ecosystem takes time, but many interviewees see that Aalto University has the potential to be the innovation engine in the area. Figure 53 outlines the main themes of argumentation and innovative thinking in the existing framework.

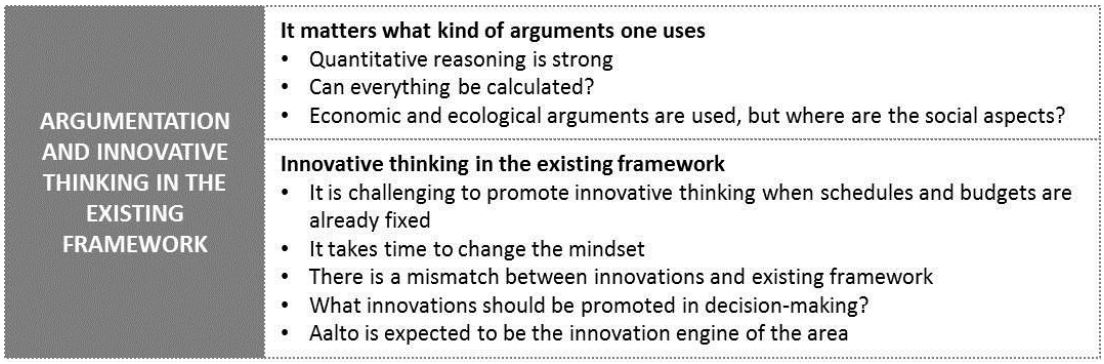

Figure 53: *Argumentation and innovative thinking in the existing framework.*

It matters what kind of arguments one uses

According to the interviews, quantitative reasoning is strong in negotiation and decision-making. In mobility planning traffic flows, numerical estimates and extrapolations, monetary values etc. are traditional ways of rationalizing plans and visions. Accordingly, monetary values add greater weight to argumentation, and are understood by many interviewees as one of the strongest facts and rationalizations that can be referred to. However, some of the interviewees felt that monetary issues should not be brought into the argumentation process too early, as they usually restrict thinking. Solutions and decisions can always be cut down to meet the monetary resources, but innovative thinking will never be achieved by beginning all thinking from monetary arguments, according to some interviewees.

> *"Facts. When you present the facts, nobody can mumble. Of course there are all those ethical questions. Like having that Natura area there. And some want to refer to that one. But those are not… well, they are somehow rational opposing arguments, but they are not based on this kind of clinical mathematics at all. That kind of emotionally charged arguments are completely pointless."*

> *"It easily goes to euros. And when the euro comes in, nobody can plan anything, and everything gets stuck."*

According to some interviewees, it is hard to bring other than monetary and quantitative arguments to the discussion. Qualitative and value-based arguments are seen as highly subjective, and sometimes even irrational. Even though numerical calculations and monetary values are perhaps an easy way of defining the impacts of various alternatives, many interviewees felt that they are not all that matters, and the economic viewpoint easily treats everything as commodities and resources. However, as a way of rationalizing also more qualitative arguments, some interviewees saw that the methods of utilizing user information should be further developed.

> *"It is purely… mobility reports should be based on the financial analysis of the transportation system."*

> *"Simple indicators are easy, and the simplest one is money."*

"Luckily it is now put in the strategy of Espoo. Citizens told that the most important value in Espoo is nature. Nature is the reason for moving in Espoo, and that is what is valued here. Now the preservation of nature nearby is a strategic focus, giving more power for speaking of it."

"One always has to find like… that kind of facts that the others understand. Always if one can find cost savings or benefits or something like that."

As Flyvbjerg (1998, 31) states, the documentation not produced is just as interesting as that which is produced. When thinking about the argumentation in mobility planning decision-making, economic arguments are strong. Also ecological arguments, even though not always completely agreed on, can usually be rationalized by laws and reports. But what about the social side, which seems to be missing from the argumentation? By rationalizing the decisions solely by economic and ecological arguments, other aspects like social, cultural and human, are left for minor attention.

Innovative thinking in the existing framework

As Väyrynen (2010, 287) noticed in her study, innovative ideas often do not reach implementation phase in the urban development process. Processes tend to be performed through routinized practices embedded in powerful social relations that seem to hold them in place despite the efforts to change them, as Healey (2007, 21) describes. According to the interviews, it seems that the willingness for innovative thinking in the area varies, partly because some actors are not willing to resist the existing implementation and investment decisions. Innovative thinking and decision-making is mostly about individuals; their preparedness for innovative thinking, their relations with other decision-makers and actors, and their networking skills. However, by many interviewees, the potential of utilizing the T3 vision and the expertise of Aalto University and the other local actors is seen as too great for missing the opportunity to innovate. Accordingly, the will and the possibility for innovative thinking and solutions seem to be high in the Otaniemi campus area.

The length of planning decision-making processes has been a traditional topic in urban planning discussion. Planning decision-making processes last long. According to some interviewees, they have to last long, because the change in mindset does not happen overnight, but takes a long time. In urban and mobility planning settings, it is not enough if one actor is ready for innovative thinking, as the will should go through the whole system. Geels (2002, 1257) has studied innovations and technological transitions, noticing that technological transitions are not only about technological changes, but also about changes in user practices, regulations, networks, symbolic meanings etc. The system is not closed, but open to sudden impacts and needs. Innovations don't happen in a vacuum, but need other simultaneous transitions as well. Accordingly, for achieving lasting impacts by innovative thinking in mobility planning, the will has to surpass the whole, or at least the majority of the, mobility planning decision-making network.

"When one thinks about what sustainability means, it means extremely radical changes in the system. … And changing the mindset takes years.

That one accepts the new mindset. There are some actors that want to hold on to their own plans, even though those might be based on decades-old information."

"It is a generational thing. Every generation allows a little more densification. In 500 years' time, Otaniemi is very densely built environment. There will be only small parks in between. Every generation accepts the present situation as a status quo, and after a long negotiation process, they'll accept a bit more densification. This is how the city planning proceeds."

"Thinking about values, it is quite a difficult thing that Otaniemi was formerly thought about… It was important that it was a bit separate area of its own. It was highly valued back then. And now it has turned completely upside-down."

According to the interviews, the Otaniemi campus is expected to be an innovation test-bed for various new ideas, also concerning the mobility solutions. Innovations usually don't happen all of a sudden, but go through various phases of adoption. Geels (2002, 1258) discusses this view by saying that radically new technologies and innovations may have hard time breaking through as they usually face a mismatch with the established socio-institutional framework, because regulations, infrastructure, maintenance networks and user practices are aligned to the existing technologies. As Geels (2002, 1261) describes, radical innovations are generated in niches acting as incubation rooms for radical novelties; and through experimentation, learning, adjusting, reconfiguring and niche cumulation innovations may have the chance to reach meaning also at regime and sociotechnical landscape levels.

"When these large and exemplary projects are done, also the decision-making systems should be integrated in them. … I think that is a flaw."

"HSL is responsible for operating the public transportation. If one thinks about offering public transportation that is subject to a charge, it should go through HSL. There cannot be put up any separate systems. But as long as the alternative transportation is free of cost, it can be done."

Decision-makers have quite much power in deciding which alternatives to promote and which not. On a larger scale they can set directions for research and innovation practices through policy-making, funding, taxation etc. New technologies can be fostered through political decisions, and financial support creates chances for some technologies at the same time hindering the development of some other alternatives. So how should it be decided, which innovations and technologies to carry forward? And who is expected to be the initiator in this all?

"The municipal planning organization… it doesn't do any innovative initiatives. And it would be strange if it would. … As the need has to come from the user side."

"But if one places a bet on a wrong horse, it's quite a big deal. And nobody knows…"

According to the interviews, there seems to be pressure for Aalto University to be the innovative signpost and initiator in the area. Many actors feel that the Aalto campus decision was one of the main reasons to initiate the broad and active development in the whole T3 area. As Aalto University is educating the experts of tomorrow, many interviewees saw that it cannot stick to the old practices, but has to reach for something new. And given the actor ecosystem of the other research institutions and various size enterprises, Otaniemi campus is seen as a good place for trying the new ideas in practice. But Aalto University is not able to make the change alone, because as was noticed by Geels (2002), innovations need a larger systemic approval for being put into practice.

"Otaniemi has come to life, all the development projects have absolutely exploded. Mainly it is because Aalto University is locating its campus here, and investments are done at a gallop. That was the trigger."

"I would be pleased to see Otaniemi as an innovation platform. For example the students and researchers of the university could think how to operate the campus transportation in a future oriented way. … And it could be this kind of a test-bed for studying user experience."

"The role of the universities is to be a pioneer of various things. And that is one thing that is coming up in the decision-making situations. There are all the calculations and models of how for example the use of private cars is going to increase, extrapolated from what has happened in the history. And then there is the more innovative thinking. And it's quite a discussion of whether the actors want to support the trend that has been extrapolated, or whether we want to reach for new alternatives."

"It is kind of the task of the university to change the world."

"The university campus could be a living lab, as they have the extensive research knowledge. And they can be in in the front line of development. The development does not have to be based solely on history-based calculations. But they can look into the future."

4.4 Case descriptions

Whereas the interview analysis was more a broader level description of the themes coming up in the interviews when discussing the various aspects of situation awareness in urban planning, the meaning of this chapter is to outline in case examples how the various topics are seen in the on-going decision-making processes and practices.

4.4.1 Rail-Jokeri route alignment under scrutiny for the final time

In addition to the West Metro line, Rail-Jokeri is an example of a mobility planning project, which has been in a preparation phase already for decades. A lot has changed in the planning ecosystem since the first drafts of the project, which makes it an interesting example of the meanings of a long-lasting mobility planning decision-making process. In the case examination, five previously described perspectives came up: time perspective, locally driven actor network, information quality, transparency and openness of the process, and the meaning of integrating land use and mobility planning.

Long time frame of the planning decision-making

First visions concerning the Rail-Jokeri route were done already back in the 1990's. Since then, the project has been slowly moving on, and will reach the project planning phase in 2014. In 2012, local actors of Otaniemi sent an open letter for the municipal decision-makers of Espoo requesting a possibility to prepare an analysis considering the option of aligning the Rail-Jokeri route through Otaniemi instead of the route alignment through Laajalahti in the preliminary general plan, marked for example in the master plan of 2008. Figure 54 shows the route alignment, and a draft of the possible route alignment trough Otaniemi.

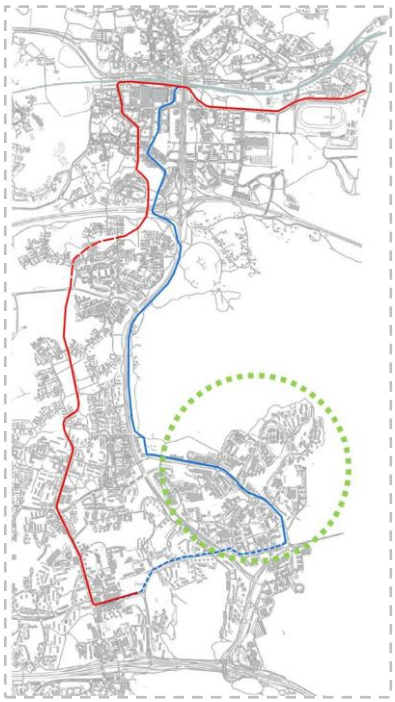

Figure 54: *The current route alignment, and a draft of the possible route alignment through Otaniemi[58]. Red: alignment in the preliminary general plan (current option). Blue: draft of the possible alignment going through Otaniemi (marked with green circle).*

[58] Picture reference: City of Espoo, City Board. 2013. § 189 Selvitys Otaniemen liittämisestä Raide-Jokerin piiriin. Minutes 3.6.2013. Issue nr. 4619/08.01.00/2012. Accessed: 15.10.2013. Available: http://espoo04.hosting.documenta.fi/kokous/2013270864-10-1.PPTX.

Decision-making in urban and mobility planning settings takes usually a long time. Accordingly, the surrounding ecosystem tends to change from what it was during the first phases of the planning decision-making process. The Rail-Jokeri process has gone through various phases during the years, beginning as Bus-Jokeri with the aim of habituating passengers to a quicker cross traffic connection between the east (Itäkeskus) and the west (Westend). Ever since, the initial plans have been drafted, assessed and discussed with the public. Rail-Jokeri has been pointed out in various municipal and regional transport plans, and has been discussed in media from various points of view. Figure 55 outlines the Rail-Jokeri process from 2006 onwards. A larger version of the figure can be found in appendix 3. Finally in 2011, the decision of Aalto University to locate its campus in Otaniemi set pressure for reviewing the possibility of aligning the route through Otaniemi.

> *"It is in the realization plans only in the 2020's. But it comes quickly, so one should proceed with the planning now."*

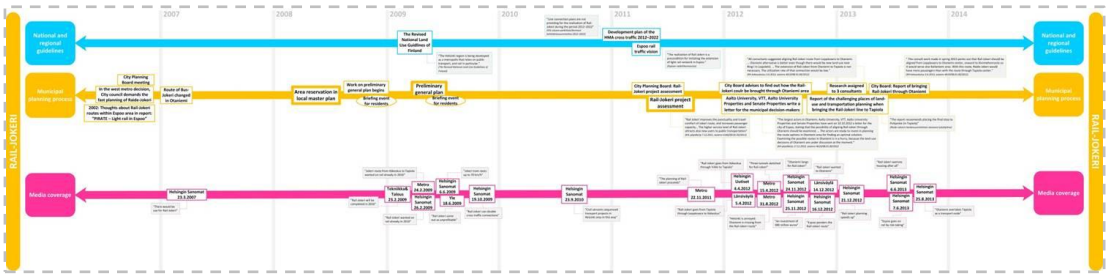

Figure 55: *Rail-Jokeri process from 2006 onwards.*

Otaniemi actor network is locally driven, and development ideas are frequently initiated within the area

The decision of situating Aalto University's main campus in Otaniemi brought up the need for reconsidering the Rail-Jokeri route. The need for the reconsideration was pointed out by local actors in Otaniemi, sending an open letter for the municipal decision-makers to open the route alignment for final inspection before entering the project planning phase. For convincing the decision-makers, visions of the future situation and needs in Otaniemi area were presented as a baseline for which to prepare.

In spring 2013, three consultants finished their work on comparing the potential between the routes of Leppävaara–Laajalahti–Tapiola, and Leppävaara–Otaniemi(–Tapiola). All of these reports concluded that the route through Otaniemi would have greater passenger potential and economic feasibility, even if the route would end in Otaniemi, and not go toward Tapiola. Based on those three analyses, further investigation of aligning the route through Otaniemi was initiated, and will be completed by the end of 2013. Even though the final decision has not been made, there is a vivid discussion and speculation process going on about the route alignment.

> *"The old route was going through North Tapiola. Many people thought it was silly. But at that time it was proven to be more economical than a*

route through Otaniemi. I guess there was something strange in those calculations."

"The actors in Otaniemi woke up with this thing. Rail-Jokeri was going to go through Laajalahti, and passengers travelling to Otaniemi would have an extra change in Leppävaara. There would be already at least one change, as Jokeri is collecting passengers from other lines. Then, if one should do another change in Leppävaara,(s)he would start to think that it's easier to take the crappy old car."

"The significance of Otaniemi area has increased clearly during the last years, as Aalto University is planning its main campus to be located in Otaniemi. And the significance of Otaniemi has increased also in the municipal strategies."

Transparency and openness of the process. What are the real intentions behind the process?

The decision of the route selection is very topical, and many interviewees had something to say about the process. Some of the interviewees pointed out that the transparency and openness of the decision-making process so far has not succeeded optimally. The background information used during the process has not been opened up in adequate detail, leaving room for suspicion. Questions of how the result of the analysis can be so different from the previous ones, and what kind of background information was offered for the consultants in order to reach so different results, are arising. When background information is not opened up in enough detail, some of the interviewees feel that it is harder to trust the decision-making process, and the correctness of the result of the final analysis, which will be completed in the end of 2013. There has also been speculations of why the three preliminary analyses have not been published anywhere. Thus, it seems that there is a need for discussing the baselines and rationalizations in more detail within the local actor network.

"The process was somehow weird. … Who instructed the consultants? Because all the options were exaggerated when compared with the master plan or the Natura area."

According to the interviews, some actors felt that the background information for the alternative route alignment planning has not been explicit and transparent, but more or less purpose-oriented, as it revealed such a clear conclusion in favor of the route through Otaniemi. As the background information was not openly accessible for evaluation, some interviewees felt that there were some deeper intentions behind the given information, for example the meaning of the land use potential along the Otaniemi route in comparison with the Laajalahti route, or the difficulty of fitting the rail line in Tapiola center, where it has not been covered in a detailed way early enough in the planning. This resembles Flyvbjerg's (1998) notion of the planning decision-making process in Aalborg, stating that reports and publicity were used skillfully for reaching the aim, which was decided already in advance (Lapintie 2003, 21).

As the explicity and transparency of the background information were not covered during the first phases of the on-going analysis process, according to some interviewees, it seems that speculations and suspicions are going on about the validity of the analyses and decisions. Thus, as was outlined in part 4.3.2, there are apparent challenges with the general level information use, caused for example by the difficulty of validating the selected information in a situation, where no opposing argumentation is offered, and where the used information is not opened up for discussion.

> *"Then there are those three consultant works, which were not even published. … And there was a fuss that it cannot go this way. That it doesn't make any sense. And that the decision-making in Espoo seems quite weird again."*

> *"The situation in Tapiola kind of shows the problem that when everything else is already planned in advance, and then the Rail-Jokeri is tried to fit in the existing plans, it just won't work."*

> *"In Otaniemi there are employees and students, who are easier to attract to use public transportation than the occasional shoppers in Tapiola."*

Integrating land use and mobility planning; Rail-Jokeri route alignment as an optimization problem

As was discussed in part 4.3.6, there is no agreement on how much land use and mobility planning should be integrated in the planning decision-making processes. Whereas most of the interviewees saw that they are fundamentally integrated, some interviewees said that it is better not to integrate them too much, because then the decision-making will become too complex and decisions will never be made. The same discussion is going on also about the Rail-Jokeri route alignment, which is also partly described as an optimization problem, as outlined in figure 56. Even though the alignment through Otaniemi would set land use pressure along the rail line, some interviewees felt that it would be easier to first make a decision only about the route alignment, and only after that open up the discussion about the land use potential.

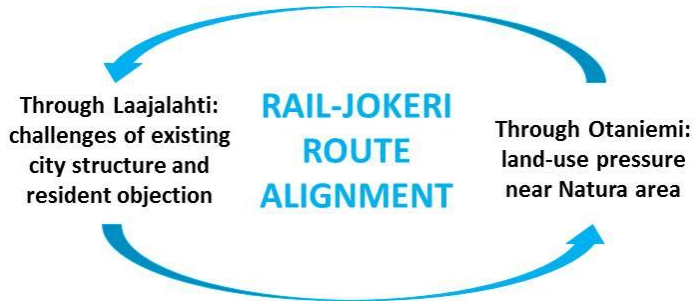

Figure 56: *An example of an optimization problem in the Rail-Jokeri case.*

Speculations of how much the larger land use potential along the alternative route option is affecting the possible alignment through Otaniemi are going on. Many interviewees said that rail-lines are causing land use pressure, but simultaneously it

was said that the Otaniemi option would be better also with the existing land use. However, there seems to be speculations and suspicions of this, partly because the used calculations and background information have not been opened up for discussion. Also, there is suspicion about whether the Jokeri route should be put on rail at all, as then it would, in addition to the increasing land use pressure, loose its flexibility.

> *"When one does an investment like that, it has to be utilized maximally. ... One has to get as much land use as possible. ... But one has to come up with other arguments as well."*

> *"Now the conclusion is that even with the current land use situation the route is better to align through Otaniemi. And not take it to Tapiola at all. But then one has to think how much land use discussion should be integrated into this discussion."*

> *"It is difficult to see the benefits of a rail connection, because bus transportation is much more flexible. We can find out where people are actually going, and change the routes two times a year for matching with the reality."*

4.4.2 Ring Road I renewal

The Ring Road I renewal was not selected as a case example in advance, but as it continuously came up in the key person interviews, a short case description of its relation with the analysis themes is provided. In the Ring Road I renewal case, three main themes come up: the meaning of psychological distance in mobility and land use planning, the importance of documenting the process in an easily understandable way, and the question of who is it actually planned for.

Psychological distance in mobility and land use planning

In the interview analysis, it was noted than even though the physical distances between Otaniemi, Keilaniemi and Tapiola, and even within the Otaniemi campus, are rather short, the psychological distances are far longer. According to the interviews, a main reason for the long psychological distances is the divisional impact of the Ring Road I, which has affected land use planning along the road to a great extent. The West Metro is seen as a way to bring the three areas closer to each other, when measured in time. However, it does not cut down the psychological distance for pedestrians and bicyclers, who are more concerned about the urban structure between these areas. Revitalizing the areas between Tapiola-Otaniemi and Otaniemi-Keilaniemi are seen as main reasons for the Ring Road I renewal projects.

> *"The aim is to reduce the divisional impact of Ring Road I."*

> *"Physical distances can be seen on a map. And when one knows the area, one knows also the psychological distances. Always when there is this kind of a motor-traffic way, it causes a strong psychological boundary. And now those ways are harmfully fragmenting this area. ...*

On the other hand, the actual physical distances cannot be shortened by the renewal."

Documenting the process in an easily understandable way

The meaning of visualizations, feasibility studies and understanding of the overall realization process seem to be important in this case. In the interview analysis, the importance of clearly articulating the conclusions and most relevant arguments was pointed out. As decision-makers and other actors face a constant overflow of information, they are challenged with forming a clear picture of the most important details in case they are not clearly and explicitly told in the documentation or discussions. Some interviewees saw, that in the Ring Road I renewal case, at least two important themes have not been covered in enough detail, and are not acknowledged by most of the actors, even though they are important for the whole planning decision-making process.

"It is not actually described in the decision documents, how the Ring Road I renewal should be proceeded with. There is only a clause that the money spent should be retrieved. But it actually means that a contract of every tower should be done at once. ... I think many people don't conceive this. So, one cannot build just one tower and see what happens. It is not possible."

"Quite a few actors are aware of the fact that the towers cannot be what they are in the illustrations. Because the diameter is 30 meters, and there would be too many apartments opening only to the north. And that is not possible. But the illustrations are for sales purposes anyways."

Who is it actually planned for?

In the interviews, also the importance and power of visualizations as a means of communication was pointed out. Some interviewees felt that the projects are rationalized for the public by talking about the meaning of creating comfortable and attractive walking environment, parks, cafés etc. However, the visualizations and videos are told to show mainly the cars driving into the tunnel. Thus, some actors feel that the contradiction of the rationalization and the visualizations is affecting the credibility of the project. Is it only about creating new land use potential and selling the land, or is it truly about creating an attractive mobility environment for others than private car users also, is a question that was raised up by some of the interviewees. Is it a project for people or for the vehicles?

"There is that deck with housing between Otaniemi and Keilaniemi. ... When it is advertised somewhere, or described how great it is, the videos only show the cars driving into the tunnel. Instead of describing what is on the top of the deck, and how people move around there. That there are parks and cafés. But the most important thing is showing the car driving into the tunnel. ... And the idea should be about how to

make the connection to Keilaniemi as pleasant and attractive as possible."

"Ring Road I renewal is important also in the sense of housing, although it is strongly perceived as a mobility project. But it is a housing project also."

4.4.3 Car-parking norm in Otaniemi

In addition to the West Metro, Rail-Jokeri, and Ring Road I renewal projects, the car-parking in Otaniemi was rated among the most important mobility projects going on in the Otaniemi campus area. Three main themes of the car-parking discussion were: the long time perspective of planning decision-making, the need to find common solutions and a will that surpasses the whole decision-making system, and the meaning of using car-parking as a means for guiding people towards more sustainable means of mobility.

How to prepare for the unknown future?

In the interviews it was pointed out that planning decision-making processes take such a long time, that one should prepare for the future conditions already today. One example highlighted in the interviews was the need to acknowledge the need for the electric car charging systems in the building codes. Another theme was the amount of car-parking needed in Otaniemi. As there is no way of knowing how the development of private cars will go on in the future, how should the amount of car-parking be decided?

According to some interviews, the development of automatically or remotely controlled cars, as well as the expected increase in the use rates of public transportation (especially West Metro and Rail-Jokeri), will decrease the amount of car-parking needed in the Otaniemi campus. On the other hand, some interviewees saw that models and calculations show that the use of private cars is still going to increase, and the area should be prepared for that increase in order to prevent the car-parking from turning into the "wild west".

"Within 30 years, there will be a revolution in private car transportation, as some of the cars will be remotely or automatically controlled. That will change extremely the mobility behavior and demands, and hopefully also decrease the demand of car-parking."

"If parking is restricted, there should be parking places in reserve. If the demand changes in the future, there should be plots where parking could be built."

"The solutions are in a hurry. As metro is coming, car-parking solutions should be implemented fast. So that when metro is ready, there won't be a situation where there are no users for the metro."

Does the will to try new solutions surpass the whole decision-making system?

In the interviews, there was a lot of discussion about who should be the one to decide how much parking is needed. Is it the user-organization, the land or property owner, the planner, or who? Based on the interviewees, the possibility of using a lower car-parking norm in the Otaniemi campus was first brought up by a project of planning a new building for Tekes, Finnvera and Finpro. However, there soon came up a need to broaden the parking norm for the whole Otaniemi campus area so that it would be coherent in the whole campus and the car-parking expenses could not be externalized to other actors by not building enough parking space in individual projects. According to the interviews, there are many overlapping but uncoordinated projects in the Otaniemi campus area, for example concerning the availability and use of meeting rooms and conference spaces. As incoordination leads to inefficient use of spaces, developing an overall solution for car-parking was suggested to be a pilot project for developing a well-coordinated project within the whole local actor network.

However, in a systemic world, decisions are seldom so simple. Even though there is a will from a majority of actors to create a lower parking norm, there are some external regulations preventing the pure implementation of the idea. For example, the planner still has to make sure there is enough parking available, according to the planning norms. According to the interviews, in this case the car-parking negotiation ended up in a compromise solution of lowering the car-parking norm, but leaving a possibility for building a parking garage nearby in case it is needed later on.

> *”The interest of a land-owner may be to say that they can cope with fewer parking places. But it may be only because then they won't have to pay for those. … A parking place is quite expensive, especially if it is underground. So then it should be made sure that finally it is not the municipality who has to build and pay for the parking places if the parking situation gets worse. So it is not simple in any way.”*

> *”If car-parking is restricted somewhere, or if it is more expensive, one should also consider the whole. It cannot gush. That people would park wildly in parks. Or curbsides would be full of cars.”*

> *”Maybe the planning of car-parking should be shared. Not so that every building would have their own. But to think about the overall situation and need.”*

The importance of guiding people towards more sustainable means of mobility

In the interviews, the amount of car-parking needed was discussed from various points of view. On one hand, if enough parking is built for everyone, will the expansive West Metro investment be pointless? On the other hand, if too little parking is built, and people still come by private cars, will there be a chaos all around Otaniemi as cars will be parked wherever possible? Thus, regulating the amount of car-parking can also be used as a way of guiding people towards more sustainable means of mobility, according to the interviews. When there is a minimum amount of

car-parking available, or when the price of car-parking is high, people are more likely to search for alternative means of transportation whenever possible.

Moreover, the amount of car-parking affects the cityscape and image of the whole area. According to some interviewees, the current amount of car-parking is not supporting the visions of creating a sustainable, vivid, and livable urban campus area for the local innovation ecosystem. Instead, it was described, it looks currently like a car factory.

> *"The regulation of car-parking is influential. If there is much free-of-charge or cheap parking space available, people are more likely to choose private car."*

> *"Car-parking is not a land use requirement; it is a traffic political requirement."*

> *"Finland is kind of a car-oriented culture. Turning that trend into thinking of what is the price of this all..."*

> *"If one looks at Otaniemi... If one comes by a helicopter or by an airplane, it looks mostly like a car factory. There are low red-brick buildings, and extremely much cars around them. It is not kind of a living urban campus, when it is dedicated to cars."*

5 RESULTS: ASSISTING THE GENERATION OF SITUATION AWARENESS IN A COMPLEX PLANNING ECOSYSTEM

5.1 The challenges of situation awareness in urban planning decision-making

As was seen in this study, decision-making is much more than just utilizing one's own knowledge in the decision-making situation. Instead, the process begins already in the first negotiations of a need for an issue or a problem to be solved. From as early on, decisions of varying importance are made on what issues to highlight and what to downgrade, what to communicate further in the planning decision-making process and what not to communicate. The final and official decision is only a tip of the iceberg in the process with an enormous amount of decisions made and things locked up already beforehand. Official decisions in the municipal decision-making are public, but what about all of the decisions leading to it along the decision-making process? How to verify the rationalization behind the decisions made during the process?

Transparency and openness of the process become important already from the earliest phases onwards. Figure 57 outlines the evolution of situation awareness during a mobility planning decision-making process in municipal decision-making. In the first phases of the decision process, situation awareness is highly individual and personal for every participating actor, generated by the information use, education, professional background, experiences, values etc. of each individual. When the actual intra-organizational and inter-organizational negotiations and decision-making begin, relevant factors of situation awareness have to be exposed for the other actors in the planning ecosystem for reaching a mutual decision. Finally, the main factors of the shared situation awareness are reported in the public decision documentation. Situation awareness evolves all the time, as time goes on during the process, but is also exposed to other perspectives in negotiations and discussions. Still, the overall picture of the whole development process varies a lot from actor to actor.

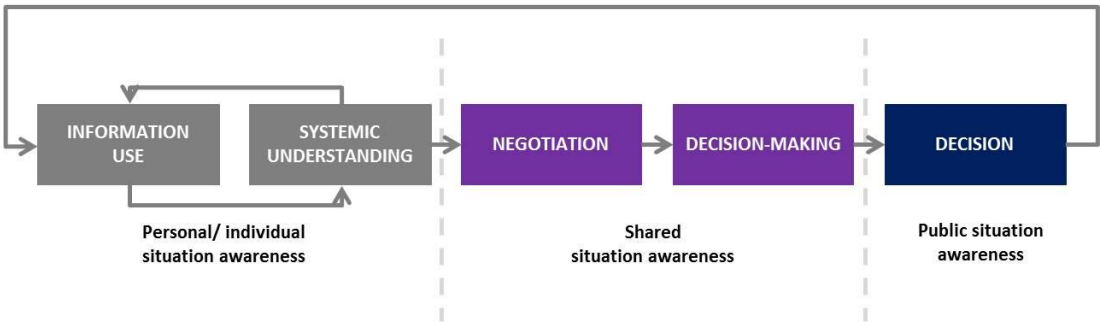

Figure 57: *The evolution of situation awareness during a mobility planning decision-making process in municipal decision-making.*

One of the main obstacles of situation awareness in mobility planning decision-making is the use of information. Information use and scale of conceptualization vary

a lot among the actors. The number of information sources varies, and the importance of co-created documents is high in the selection of background information. Long decision-making chains cause the information to be selected and filtered several times before reaching the final phase of decision-making, if ever ending up so far. Person- and organization-related factors influence the use of information, and it is common to rationalize the decisions and visions only by arguments that support the selected view. The lack of opposing arguments and the information filtering process challenge the validation of the information, as well as the internal and external transparency and openness of the decision-making process. Additionally, the scale of conceptualization seems to vary from small-scale local to global perspectives, altering the view of what is perceived as essential and important information.

At the moment, the role of municipal planners as information collectors and sharers seems to be strong. Many municipal decision-makers rely heavily on the information offered by the municipal planning process, even though some unofficial lobbying may take place as well. Thus, the municipal planner has power in deciding, what information is distributed to the municipal decision-makers. The decisions made during the decision-making process before the final decision are not documented in a detailed enough way, making the validation of the information in the final phases of decision-making harder. As was pointed out in the interview analysis, current information use and documentation practices pose challenges for the whole decision-making process. Accordingly, **process documentation should be developed for improving the possibility of validating the decisions made and information used**.

The overall picture of such a complex and dynamic planning ecosystem is not clear. Based on the various uses of information and scales of conceptualization, the mental models of the area vary a lot from one actor to another. There seems to be no shared overall picture of the whole development process within the area. Even though the high-level strategy is acknowledged by most of the actors as striving for an internationally accepted high-tech area by acknowledging the importance of science, art and business, the overall picture of the methods of reaching the aim vary a lot. In the multi-actor environment, actors are not completely aware of each other's projects and aims, even though the area is seen as quite a limited one. The awareness of the overall situation is said to be comparable with how much each actor has been participating in the whole development process. Accordingly, **the methods for round-table meetings as a way of facilitating the discussion and interaction, and the generation of systemic understanding within the planning ecosystem, should be developed**.

Mobility planning is traditionally described as a field, where the importance of models and calculations is high. However, based on the interviews it seems that the use of experiential information seems to outweigh calculated models, and there is a will for moving from utilizing generalized models towards understanding individual experiences. Still, there is a lack of know-how in using experiential user information. Even though it is collected, there are no methods for utilizing it as a part of the decision-making process, influencing its relevance and power as a base for argumentation, and creating a question of who the area is actually planned for. Accordingly, **there is a need for improving the understanding of qualitative**

information and user experience by creating methods for utilizing user information.

Land use and mobility planning are not perceived as dynamic and hectic as for example aviation, where the theories of situation awareness were originally developed. Instead, urban development processes and decisions take time, even several decades. This poses a challenge for the situation awareness in urban planning, as processes can be rather slow for decades, and accelerate suddenly. So how should planning decision-making be done in an environment, which changes constantly, as the impacts of the plans and decisions are built to last?

Three main development needs for assisting the generation of shared situation awareness in a complex planning ecosystem were found in this study, as outlined in figure 58: a need for developing process documentation for improving the possibility of validating the decisions made and information used, a need for developing round-table working methods in order to facilitate the creation of systemic understanding, and a need for developing the methods of utilizing user information in order to improve the status of qualitative information and user experience in decision-making argumentation and rationalization.

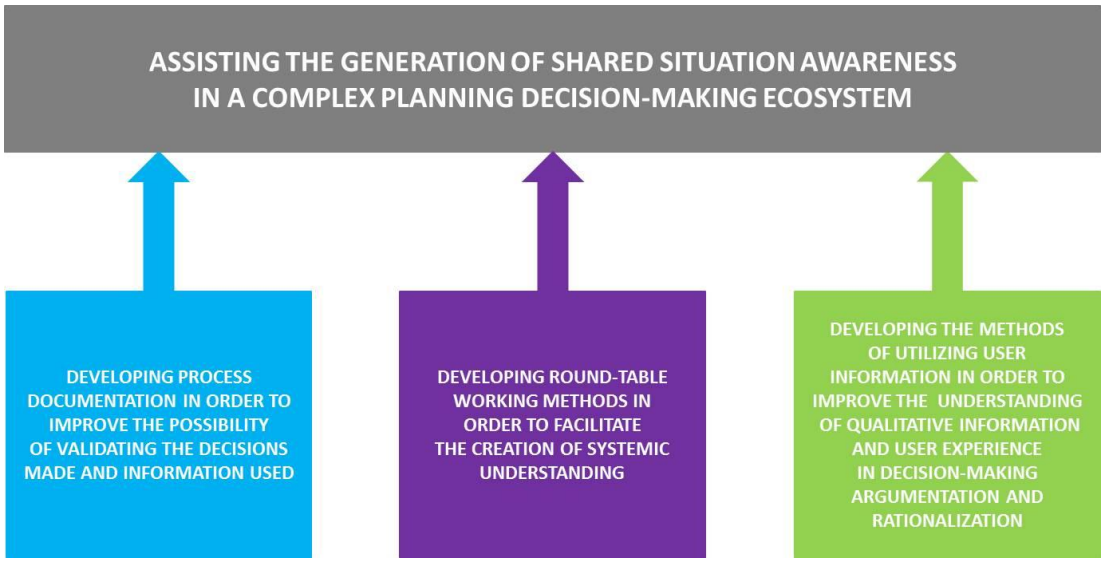

Figure 58: *Main development needs for assisting the generation of shared situation awareness in a complex planning ecosystem.*

5.2 Developing process documentation for eliminating information use dilemmas

Various actors use various kinds of information in the decision-making process. They select and filter the available information in diverse ways for example according to their own background, interests and objectives. As was described in part 4.3.1, actors have differences in what kind of material they can easily understand and absorb. In a multi-actor environment, like the Otaniemi campus mobility planning ecosystem, ways of facilitating the understanding and comparison of various kinds of information formats is important.

Information becomes meaningful when it has gone through the process of comprehension. When information is given in a report, actors participating in the decision-making process don't necessarily have time to delve into the information and its meaning. According to the interviews, it is easier to absorb information when it is provided and visualized in a way that supports the understanding of the relations between various pieces of information.

Some interviewees described the decision-making process to seem as non-linear, and sometimes even irrational, for the outsiders. Usually this does not cause a straight challenge for the individual decisions happening during the way, as the participating actors themselves know the course of the decision-making process, and the reasoning behind the decisions made during the way. However, when the decision-making material is presented for new actors, such as the City Board or City Council, who might not be aware of the earlier phases of the decision-making process, it may cause a challenge. Or if some actor retires from the decision-making process. There has also been discussion about the internal and external transparency and openness of the process in the interviews. How the process, and not only the final decision, should be documented so that it would be easier to follow the chain of decisions and reasonings during the whole decision-making process?

According to the interviews it is evident that the overall picture and vision of the Otaniemi campus or T3 development processes are not fully comprehended and shared by the various actors in the area. As Healey (2007, 30) says, strategizing implies the calling-up of a frame of meaning, synthesizing and highlighting some relations and issues, and neglecting others, assisting the shared understanding to evolve. A strategic vision can be utilized as an orienting device to inspire multiple actors, translating into a framework within which development projects and development regulations can be located (Healey 2007, 179). According to van Hoek & Wigmans (2011, 57), sustainable urban development cannot even exist without an integrated and cohesive development vision.

An inspirational vision is more about creating interactive processes for imagining futures and mobilizing attentions than about defining physical structures through morphological analysis (Healey 2007, 180). The more people contribute to the process of creating a vision, the more people devote themselves to the vision, and the active participation of the related parties is vital for being able to go beyond just an intention or a dream which is hard to realize (Dogan 2011, 86). However, creating an inspirational vision is not about coming to an agreement about everything. Instead, it is about setting a frame and emphasis on the decision-making and planning phases to follow. According to the interviews, a project for documenting and visualizing the overall vision of Otaniemi campus development plans, called Otaniemi Master Plan, is in its beginning in autumn 2013.

Thus, it seems that there is a need to develop the decision-making process documentation in the beginning of the process (for creating a shared overall picture and vision of the desired development path), during the process (documenting and visualizing the rationalization of the decisions made during the way), and in the end of the process (documenting and visualizing the process knowledge so that it is easy for decision-makers to comprehend).

5.3 Creating systemic understanding with round-table meetings

In theory, interviews, and mobility planning decision-making materials, the need for a wider cooperation between the actors was pointed out several times. When making decisions in a complex planning ecosystem, there is a need for co-operation among the various actors. Some interviewees saw that it is important to clearly divide the roles between the various actors, and many interviewees agreed on that the development work cannot be done alone. Land use and mobility planning decision-making is to a great extent about discussion and negotiation, rationalizing and argumenting. Thus, various working groups are considered important as a discussion platform and information-sharing method. What is noteworthy in the round-table information-sharing is that it enables open discussion between various perspectives and arguments, testing the justification and rationalization behind the arguments and decisions. As was pointed out in the interviews, this kind of opposing argumentation is rarely seen in reports or project documents, as they are compiled mostly by rationalizing the selected view only.

In addition to the importance of working groups and round-table meetings, many interviewees mentioned as the most useful or prioritized those documents that they were actively developing together with the other actors. Accordingly, there seems to be a need for developing round-table and co-creation methods in order to facilitate the generation of shared situation awareness and overall view, and reducing the amount of uncoordinated and unconsciously overlapping projects in the overall development process of the area. Urban areas and mobility systems are not built only of physical structures, but also of strategies, values, visions and dreams. When the strategies and visions of various actors are enough in line, the overall development process becomes easier.

As was pointed out in the planning decision-making documents, as well as in the interviews, land use and mobility planning projects are a typical example of a system, where various actors, various scales of decision-making, and various sub-systems have to be all aligned for the envisioned development to take place, and for example the will to try new solutions has to surpass the whole decision-making system. Thus, co-creation tools and practices, as well as methods for bringing in various types of background information and arguments, have to be developed for reaching new innovations and solutions to the complex challenges of land use and mobility planning.

Bringing actors, arguments and information together into the same space, exposing the materials and reasoning for review and discussion process, can assist understanding. Finding new ways of presenting information by simultaneously wrapping up various perspectives of planning decision-making becomes important. Examples of bringing together various information sources were outlined already in part 2.3.5. According to the findings of this study, it is not solely information systems that are enough to support information acquisition, systemic understanding and situation awareness. Instead, possibilities for human interaction and discussion are needed as well.

Interaction and discussion are important means of supporting information comprehension. A situation where one not only selects the layers of information one wants to see and compare, but where one can discuss and ask about the meaning and relationships of the information given, can assist the decision-making process. For coherent systems understanding and overall picture, meetings between various actors should be encouraged and facilitated.

Meetings don't, however, mean that everyone involved in the development process of the Otaniemi campus or T3 area should be involved all the time. Instead, discussions of various themes and at various levels of the development process can be organized as well. As was pointed out in many interviews, not everyone needs to be aware of everything. But people at the same level of the decision-making ladder should be aware of what happens in the other organizations at the same level, and be able to share information with the right contacts within their own organizations to the extent needed. Currently, the actor network in the Otaniemi campus area is described to be quite stable and established. However, there seems to be a lack, and according to many interviewees a need, to integrate the local enterprises, especially the growing start-up sector, more tightly into the development process as well.

It seems reasonable to involve various stakeholders in the process for addressing the multiplicity of expectations and needs directed to the area. As Deetz (2007, 276) points out in the case of corporate decision-making, the presence of diverse values can aid creativity, commitment and coordination. Opposition and difference are important in creating new practices and innovations. Thus, getting wider values into the decision process is more effective than trying to direct from the outside, given the complexity of decision-making processes. In complex urban settings, decisions, which would be optimal for all actors can rarely be made. Accordingly, the value of co-creation is in understanding and considering the various views and making well-argumented and well-reasoned decisions, which everyone can understand. Over-intellectualization and inaccessibility of validated information can distance actors from the planning decision-making reality creating more resistance against the decisions as things and their backgrounds are not understood. The same can be applied to the public openness, transparency and participation process as well.

According to van Hoek & Wigmans (2011, 27), co-operation should take place in a context that invites actors to address their differing opinions in a constructive manner. This calls for a process facilitator able to assist and manage the co-creation process. Urban development process management becomes relations management. As Franzen (2011, 124) states, in urban area development the parties are not always equal, and various networks and alliances exist, affecting the power relations. As was pointed out in the interviews also, decision-making is much affected by the individuals and their personal networks.

There are, however, several challenges in this kind of urban development process management. As was pointed out in the interviews, one of the greatest dilemmas to solve is deciding who should be involved in the process meetings. According to the interviews, most of the on-going working groups are quite small. However, there seems to be a need for a larger round-table meeting group as well, consisting not only of the actors who are in contact with each other in every case, but creating an

interface between the other actors as well. As was pointed out in the interviews, there are a lot of projects and mobility know-how, in Otaniemi campus area that many of the key actors are more or less unaware of.

Second, even if it was clear for the manager who to invite in the meetings, what kind of role should the process manager have in the meetings? Is the role more about facilitating the situation, making sure that actors are invited, and taking care of the technical facilitation? Or should the role be more of a discussion leader pointing out discussion topics based on the interests of the various actors, and making sure every actor has a chance to be heard, given the stable and established actor network and power relations in the area? According to Deetz (2007, 273), the role of the process manager should be the coordination of the conflicting interests of stakeholders rather than the managing or controlling of them. As van Hoek & Wigmans (2011, 73) say, the actors don't necessarily need to strive for the exactly same goals in order to jointly develop and realize an urban development project, but they should more cooperate on the basis that everybody profits from each other's resources and capacities. Round-table meetings would create a platform for discussing the various objectives and development plans of the local actors, as well as their impacts on the objectives and plans of the other actors.

Assisting the facilitation and co-creation becomes important. Providing a space with adequate and functioning means for presenting various materials in order to assist the negotiation and decision-making process is important. Land use and mobility planning seems to entail perspectives from at least urban design, planning, transportation planning, traffic engineering, real estate theory, management and organization theory, economics, law, policy studies etc. Not to forget the user aspect. All of these use various kinds of visualizations and information. A platform for bringing together various types of information and facilitating discussion about them should, therefore, be developed.

5.4 Improving the understanding of qualitative information and user experience by creating methods for utilizing user information

The functionality, livability and sustainability of an area are, to a great extent, relative to the behavior and experience of the users. According to the interviews, the user information gathering seems to happen usually at the lower stages of the decision-making ladder (figure 41). So how to ensure the information flow through the filtering process and decision-making steps? Many interviewees pointed out that user information is, indeed, collected. But the methods for utilizing the information are rare. As there is no know-how in utilizing the collected information in the decision-making process, the meaning and value of the information become downgraded.

Accordingly, developing the methods of utilizing user information for example in the traditionally more calculation and quantitative data based mobility planning could bring new perspectives. In autumn 2013, there were at least two user surveys carried out in the Otaniemi campus area, as shown in figure 59. First, the mobility in the

Otaniemi campus[59] softGIS survey was carried through by Aalto University Properties ltd. The meaning of the survey was to find out where, why, how, and when people move around in the Otaniemi campus area by asking for certain places and routes. Second, Aalto University Properties ltd made a service and market potential survey[60] of the Otaniemi campus area. In addition, in spring 2013, HSL was asking for opinions about the feeder line needs in the southern Espoo area[61].

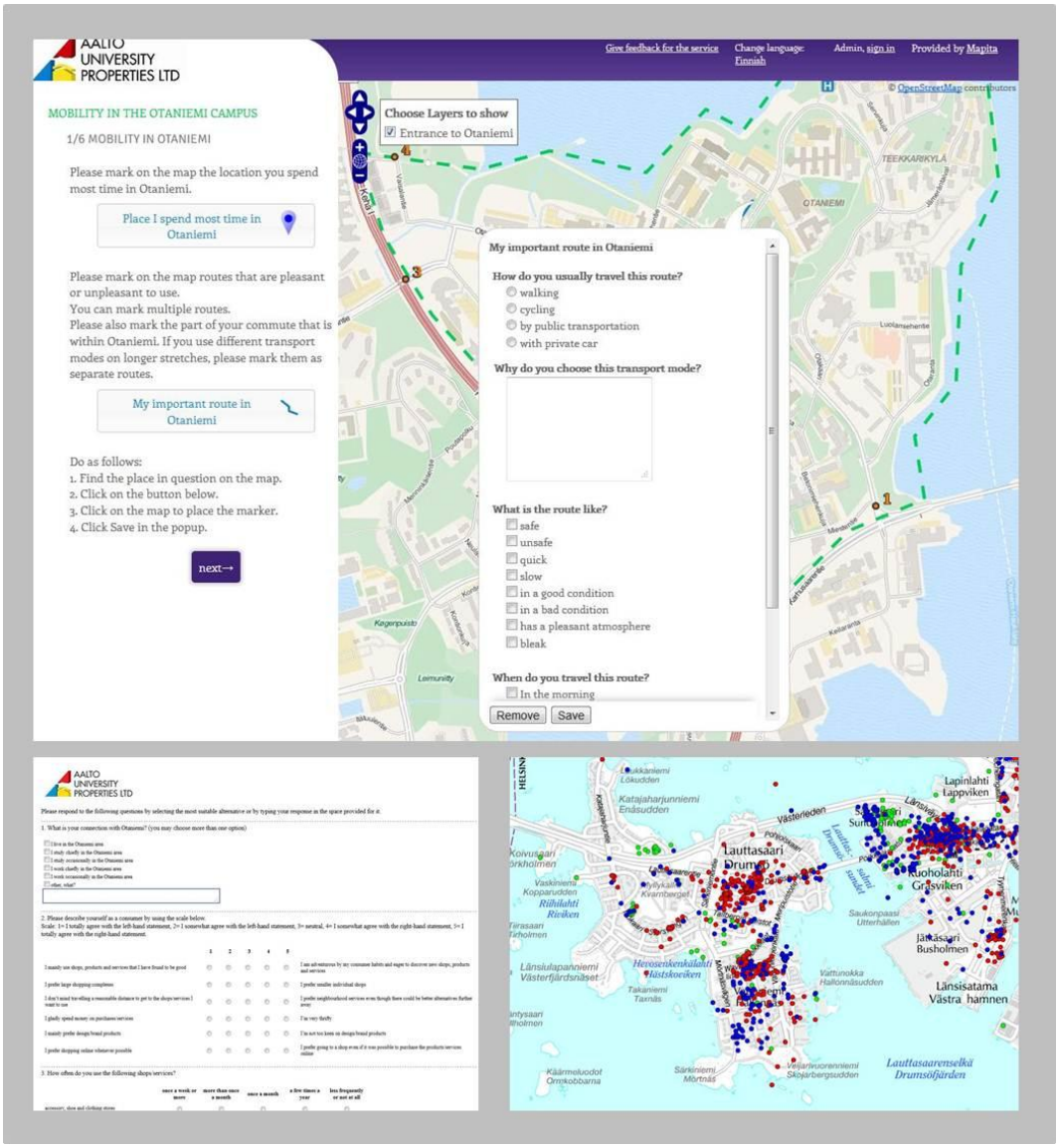

Figure 59: *User surveys in the Otaniemi campus area in 2013. Up: Mobility in Otaniemi Campus[62]. Down left: Otaniemi market potential survey[63]. Down right: West Metro feeder line needs in southern Espoo and Lauttasaari[64].*

[59] Aalto University Properties ltd. 2013. Mobility in the Otaniemi Campus. Accessed: 3.10.2013. Available: https://ayk.asiatkartalle.fi/.

[60] Aalto University Properties ltd. 2013. Market potential survey 2013. Accessed: 3.10.2013. Available: https://research.innolink.fi/tutkimus/aaltonet/131/.

[61] HSL. 2013. Mobility survey in southern Espoo and Lauttasaari about West Metro feeder lines. Accessed: 3.10.2013. Available: https://hsl.asiatkartalle.fi/.

[62] Picture reference: Aalto University Properties ltd. 2013. Mobility in the Otaniemi Campus. Accessed: 3.10.2013. Available: https://ayk.asiatkartalle.fi/.

All of these user surveys offer valuable information concerning for example the mobility needs and experiences in the Otaniemi campus area, and could be used as a base for mobility service design and information visualization, once the methods for doing this are developed further.

5.5 Future research topics

As the study was about decision-making in a complex planning ecosystem, it was expected that many themes would come up during the research process. Many of the themes were outlined already in this study, but many more are waiting for a moment to be further analyzed and discussed. Three main development needs were pointed out, which are waiting for future research and development in order to assist the generation of situation awareness in a complex planning decision-making ecosystem:

1. Developing process documentation in order to improve the possibility of validating the decisions made and information used;
2. Developing round-table working methods in order to facilitate the creation of systemic understanding; and
3. Developing the methods of utilizing user information in order to improve the understanding of qualitative information and user experience in decision-making argumentation and rationalization.

In addition, during the interview analysis phase characteristics of power discourse (e.g. Flyvbjerg 1998) began to show up. Within the limits of this thesis it was not possible to cover these themes. However, opening up the theme of power discourse in urban planning decision-making is obviously a possibility for future research.

[63] Picture reference: Aalto University Properties ltd. 2013. Market potential survey 2013. Accessed: 3.10.2013. Available: https://research.innolink.fi/tutkimus/aaltonet/131/.

[64] Picture reference: HSL. 2013. Liikkumiskyselyn satoa ja kesäkuun työpajan kuulumisia. Accessed: 3.10.2013. Available: http://1.bp.blogspot.com/-UPlG1OC-VFs/UgSy03GoKfI/AAAAAAAAAIk/LadjPcsclho/s1600/lauttasaari_liikkumiskysely.jpg

6 CONCLUSIONS

As was seen in the study, the mobility planning ecosystem is complex, even though it would be precisely defined and limited. Accordingly, the amount of information that the decision-makers meet is vast. Reports keep coming in, and only a part of the information can be absorbed. Also, various actors use various types and sources of information, according to their own professional background, education, interests, experiences, and so on. One key finding of the study is that the process knowledge documentation, as well as reports and visualizations, should be developed to better meet the needs of the decision-makers, who constantly face an overflow of information.

In such a complex and multi-scalar system, forming an overall picture of the whole development process is challenging. As was seen during the study, even the process of developing a single, quite clearly defined, area is divided into a number of separate, fragmented and overlapping projects from a number of actors. However, developing the steps leading to the desired future, decision-makers should have an awareness of what the overall situation in the area is, and how their own projects and objectives fit into the overall picture. As unless a decision-maker is conscious of the prevailing situation and the social complexity, also benign planning decisions may have undesired and surprising outcomes. As was pointed out in the interviews, the lack of overall picture and challenges of systemic understanding can be alleviated by interaction and discussion. A second key finding of the study was that the methods for round-table meetings as a way of facilitating the discussion and interaction, and the generation of systemic understanding within the planning ecosystem, should be developed.

Mobility planning is traditionally conceived as a discipline utilizing large quantitative data, calculations, models, and extrapolations. However, as the interviews show, recently also user information concerning mobility needs and experiences has become more popular. Traditional and softGIS surveys about the mobility environment have been done. Still, there is a difficulty in using the collected information as a solid base for argumentation in the decision-making process, as the methods of utilizing the collected information are not adequate. A third key finding of the study was that there is a need for improving the understanding and use of qualitative information and user experience in the decision-making process by creating methods for utilizing user information

When writing the conclusions, Campus2015[65] competition was solved in the Otaniemi campus area. The competition was a two-phase international architectural design competition for developing the Otaniemi central campus of Aalto University. Campus 2015 competition is an interesting and topical example of the challenges of integrating land use and mobility planning solutions in a constantly changing planning ecosystem. During the course of the competition, the Rail-Jokeri project was opened up for analyzing the possibility of aligning the route through/to Otaniemi, adding a new rail line coming to the center of the Otaniemi campus. However, the competition was already underway, and accordingly the reservation for the possible

[65] Aalto University. 2013. Campus 2015. Accessed: 3.10.2013. Available: http://campus2015.aalto.fi/en/.

route alignment of Rail-Jokeri through Otaniemi was not studied in the final phase entries.

Approximately at the same time with the deadline of the final phase, three preliminary consultant analyses were made, all stating that the route through Otaniemi would be the best alternative for the route alignment. Thus, the alignment of Rail-Jokeri route is only referred to in the jury's recommendations for further development: *"Detailed planning of the routes of the Jokeri and Science tramlines across the main square has to be studied further before finalizing the building plans"*[66]. When comparing the situation with the Rail-Jokeri case description (part 4.4.1), similarities with the challenges in planning Rail-Jokeri route in Tapiola can be seen. How to fit this kind of a large scale over ground rail line into the urban structure well and functionally, if it is not taken into consideration early enough in the planning? The challenge of integrating land use and mobility planning is real, and this study shows possibilities for developing the methods of assisting the planning decision-making process in a complex environment.

The mobility planning decision-making process goes on at political, institutional, and inter-personal levels. What makes it interesting is that it affects the living environment around all of us. So, even though the decision-making process might sometimes feel distant and vague when observed from outside, it affects the sustainability, livability, functionality, and accessibility of our living environments. Thus, it is interesting and important to have an overview of how the decisions are made, and what kind of information is used in the decision-making process. However, the meaning of this study was not only to point out possible challenges in the decision-making process, but also to highlight the process development needs, mentioned for example in the key person interviews during the study.

[66] Aalto University. 2013. Campus 2015. Jury report. Page 205.

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APPENDICES

Appendix 1. Research material

T3 mobility planning and decision making material

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Hahl, Tuomo. Senior Expert at Senate Properties. 11.6.2013.

Hokkanen, Torsti. Director of City Planning at City of Espoo. 20.6.2013.

Immonen, Vesa. CEO at LocalTapiola Real Estate Asset Management Ltd. 14.8.2013.

Kokkinen, Matti. CEO at Länsimetro Oy. 18.6.2013.

Kontturi, Kari. Managing Director at Aalto University Properties Ltd. 18.6.2013.

Kuosmanen, Piia. President of the Board at Aalto University Student Union. 15.8.2013.

Markkula, Markku. Chairman of Espoo City Planning Board. 23.8.2013.

Mäkelä, Jukka. Mayor at City of Espoo. 11.9.2013.

Mäkinen, Antti. Project manager of the Renewal project of Tapiola centre at City of Espoo. 13.6.2013.

Nylund, Nils-Olof. Research Professor at VTT Technical Research Centre of Finland. 13.6.2013.

Penttilä, Matti. Senior Research Scientist at VTT Technical Research Centre of Finland. 15.8.2013.

Pihlajamaa, Olli. Senior Scientist at VTT Technical Research Centre of Finland. 15.8.2013.

Sistonen, Markku (SDP, The Social Democratic Party of Finland). II Vice-Chairman of Espoo City Board. 12.6.2013.

Sundell, Laura. Public transportation planner at HSL Helsinki Region Transport. 7.8.2013.

Särkijärvi, Jouni J. (Kokoomus, National Coalition Party). Member of Espoo City Board. 6.8.2013.

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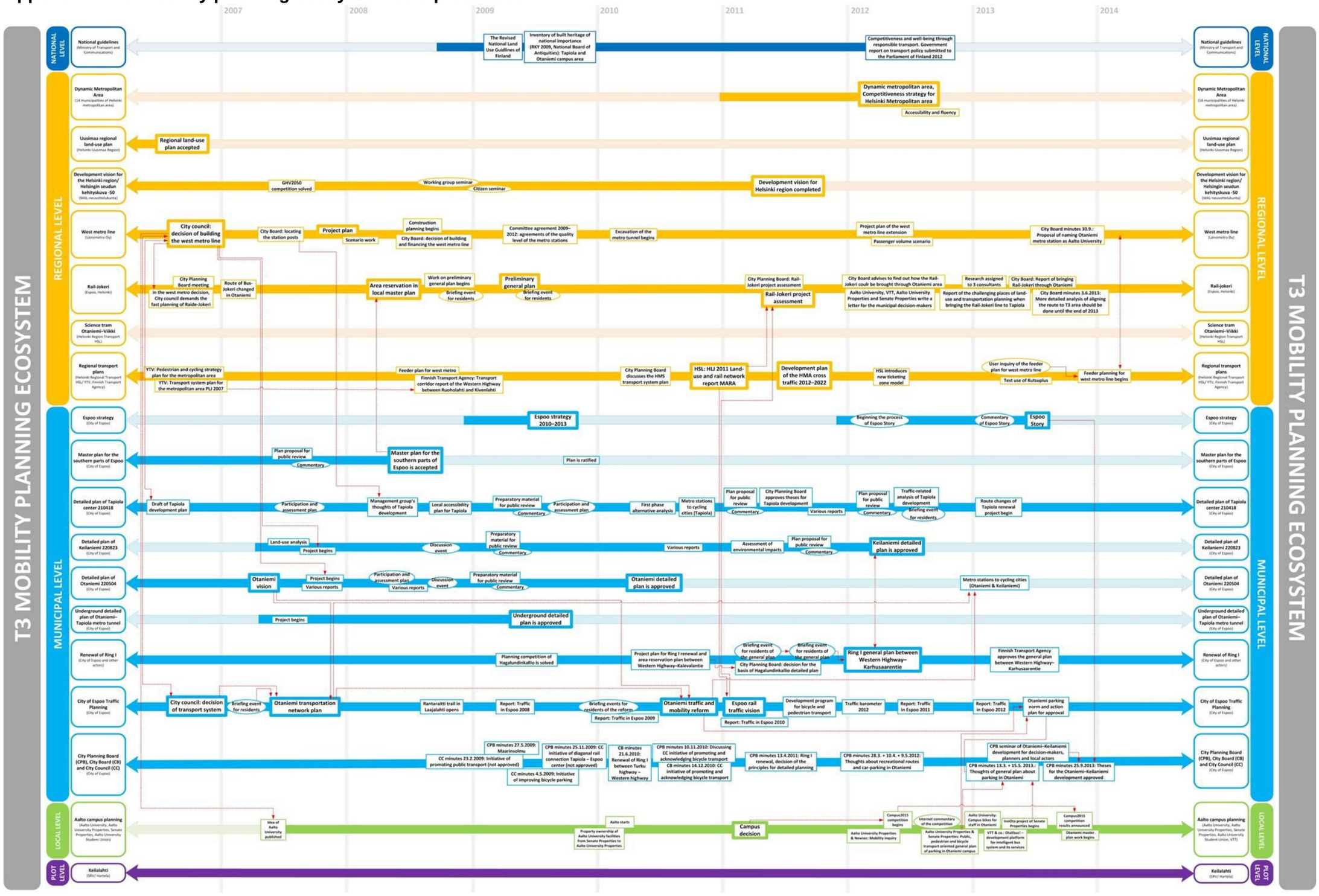
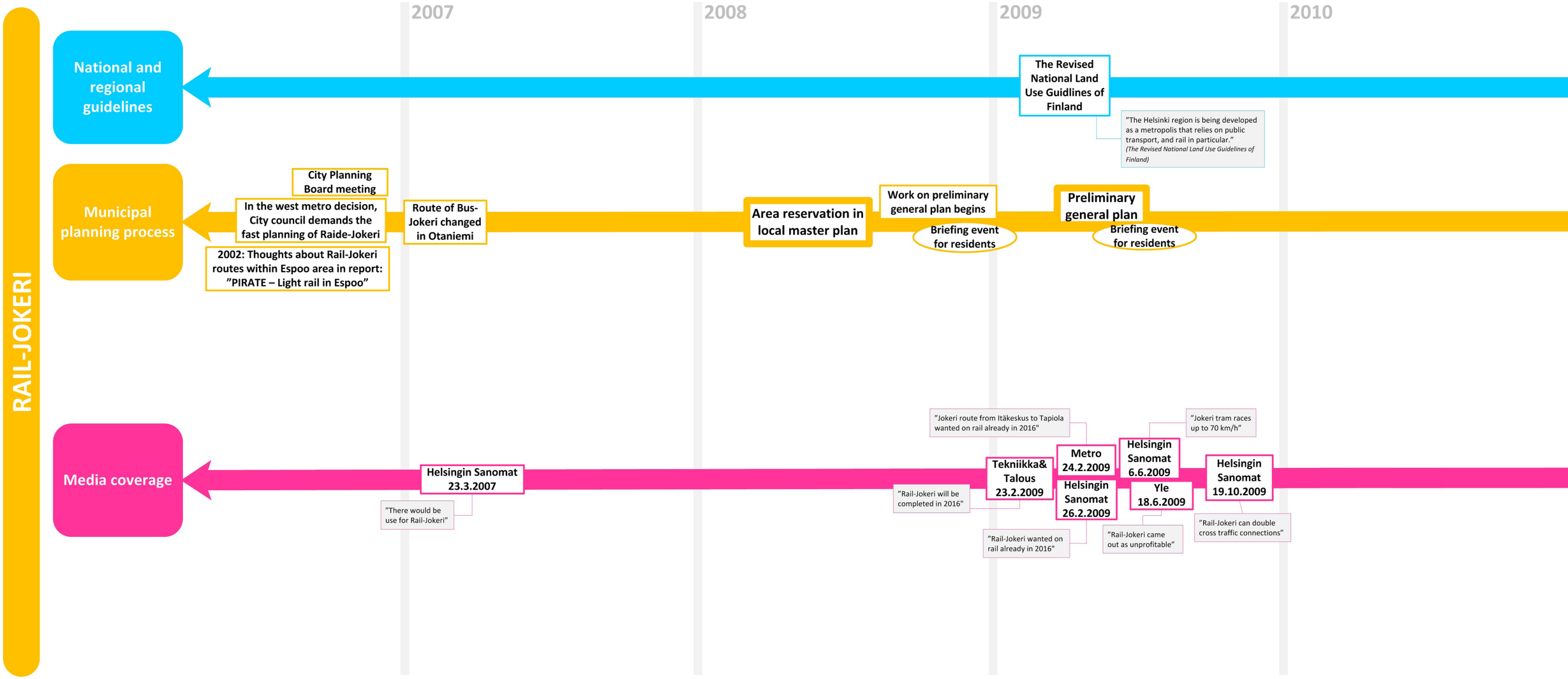
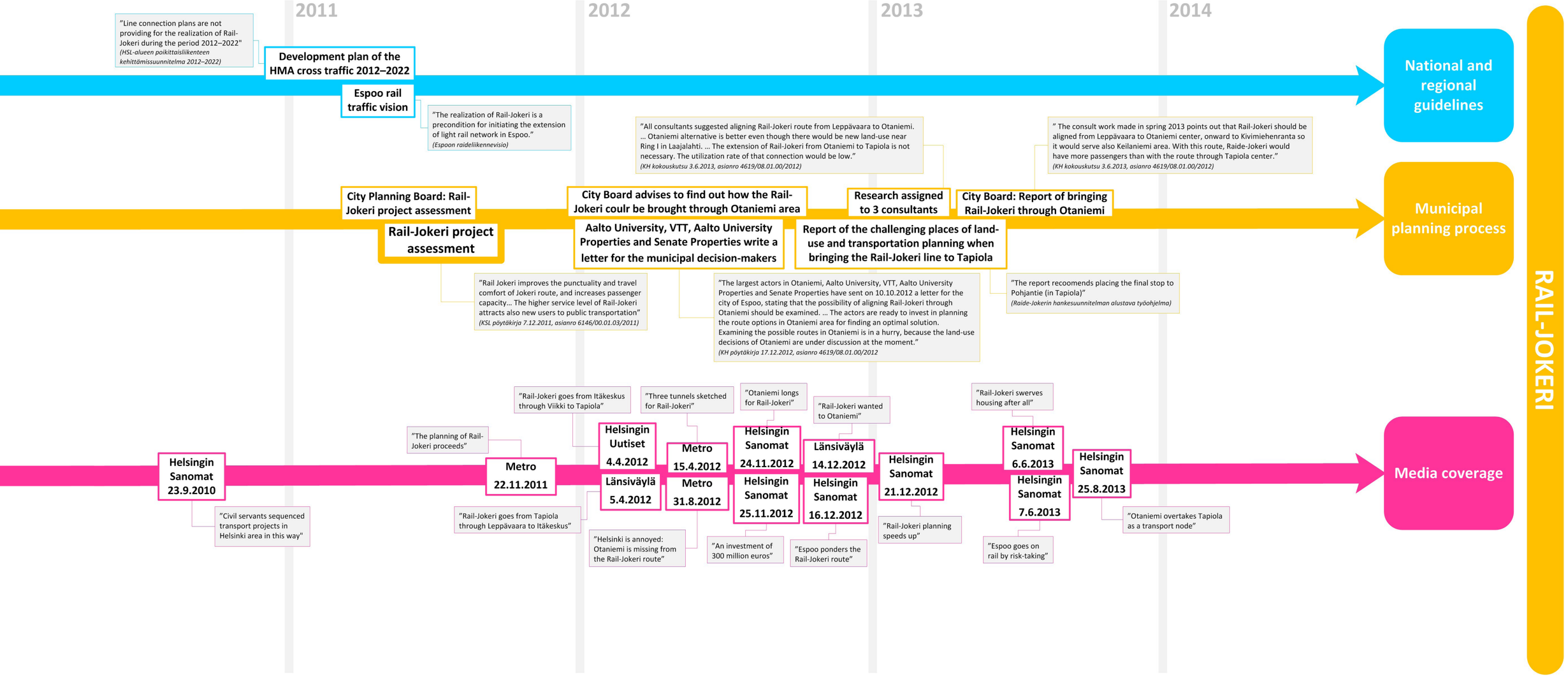
Appendix 2. T3 mobility planning ecosystem sub-processes



Appendix 3. Rail-Jokeri process from 2006 onwards




2011
2012
2013
2014
"Line connection plans are not providing for the realization of Rail-Jokeri during the period 2012–2022" (HSL-alueen poikittaisliikenteen kehittämissuunnitelma 2012–2022)
Development plan of the HMA cross traffic 2012–2022
Espoo rail traffic vision
"The realization of Rail-Jokeri is a precondition for initiating the extension of light rail network in Espoo." (Espoon raideliikennevisio)
National and regional guidelines
"All consultants suggested aligning Rail-Jokeri route from Leppävaara to Otaniemi. ... Otaniemi alternative is better even though there would be new land-use near Ring I in Laajalahti. ... The extension of Rail-Jokeri from Otaniemi to Tapiola is not necessary. The utilization rate of that connection would be low." (KH kokouskutsu 3.6.2013, asianro 4619/08.01.00/2012)
" The consult work made in spring 2013 points out that Rail-Jokeri should be aligned from Leppävaara to Otaniemi center, onward to Kivimiehenranta so it would serve also Keilaniemi area. With this route, Raide-Jokeri would have more passengers than with the route through Tapiola center." (KH kokouskutsu 3.6.2013, asianro 4619/08.01.00/2012)
City Planning Board: Rail-Jokeri project assessment
City Board advises to find out how the Rail-Jokeri coulr be brought through Otaniemi area
Research assigned to 3 consultants
City Board: Report of bringing Rail-Jokeri through Otaniemi
Municipal planning process
Rail-Jokeri project assessment
Aalto University, VTT, Aalto University Properties and Senate Properties write a letter for the municipal decision-makers
Report of the challenging places of land-use and transportation planning when bringing the Rail-Jokeri line to Tapiola
"Rail Jokeri improves the punctuality and travel comfort of Jokeri route, and increases passenger capacity... The higher service level of Rail-Jokeri attracts also new users to public transportation" (KSL pöytäkirja 7.12.2011, asianro 6146/00.01.03/2011)
"The largest actors in Otaniemi, Aalto University, VTT, Aalto University Properties and Senate Properties have sent on 10.10.2012 a letter for the city of Espoo, stating that the possibility of aligning Rail-Jokeri through Otaniemi should be examined. ... The actors are ready to invest in planning the route options in Otaniemi area for finding an optimal solution. Examining the possible routes in Otaniemi is in a hurry, because the land-use decisions of Otaniemi are under discussion at the moment." (KH pöytäkirja 17.12.2012, asianro 4619/08.01.00/2012
"The report recoomends placing the final stop to Pohjantie (in Tapiola)" (Raide-Jokerin hankesuunnitelman alustava työohjelma)
RAIL-JOKERI
"The planning of Rail-Jokeri proceeds"
"Rail-Jokeri goes from Itäkeskus through Viikki to Tapiola"
"Three tunnels sketched for Rail-Jokeri"
"Otaniemi longs for Rail-Jokeri"
"Rail-Jokeri wanted to Otaniemi"
"Rail-Jokeri swerves housing after all"
Helsingin Sanomat 23.9.2010
Metro 22.11.2011
Helsingin Uutiset 4.4.2012
Metro 15.4.2012
Helsingin Sanomat 24.11.2012
Länsiväylä 14.12.2012
Helsingin Sanomat 21.12.2012
Helsingin Sanomat 6.6.2013
Helsingin Sanomat 25.8.2013
Media coverage
"Civil servants sequenced transport projects in Helsinki area in this way"
"Rail-Jokeri goes from Tapiola through Leppävaara to Itäkeskus"
Länsiväylä 5.4.2012
Metro 31.8.2012
Helsingin Sanomat 25.11.2012
Helsingin Sanomat 16.12.2012
Helsingin Sanomat 7.6.2013
"Helsinki is annoyed: Otaniemi is missing from the Rail-Jokeri route"
"An investment of 300 million euros"
"Espoo ponders the Rail-Jokeri route"
"Rail-Jokeri planning speeds up"
"Espoo goes on rail by risk-taking"
"Otaniemi overtakes Tapiola as a transport node"