Enabling Collaborative Innovation in a Smart City

Creating Scenarios of Open Innovation Platforms

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Cities around the world are currently going through unprecedented changes. Due to these changes the public sector as a service provider is facing many challenges. There is a need for new and innovative approaches to overcome the challenges. Cities need to be able to embrace collaboration with other actors in the cities and place the customers and co-creation in the heart of innovation activities.

The purpose of this thesis was to develop alternative scenarios of open innovations platforms in a Smart City context that enable collaborative innovation between a city and external actors. External actors include companies, third sector organizations, research institutions, and citizens. Thus, the goal was to provide different approaches that cities could take to solve the challenges they are facing. To create the basis and understanding for the topic the existing theories of Smart Cities, innovation platforms and innovation intermediaries, innovation and open innovation in the public sector, as well as collaborative innovation in the public sector are explained. Research methodology chosen for the thesis consists of service design and foresight approaches. Scenarios can be used as a method in both service design and foresight practices.

The alternative scenarios were designed by utilizing a service design process including the stages of explore, envision and elaborate. The exploration stage included design brief, desk research, in-depth interviews, empirical case studies and co-creative workshops. Analysing the empirical data and envisioning the scenarios were conducted by techniques of affinity diagramming, open and selective coding, brainstorming, mindmapping, and stakeholder mapping. The elaboration stage included the scenarios, and the visualization with the help of customer journey maps and moodboards. Finally, the scenarios were tested and evaluated in the validation workshop and improvements were made based on the feedback.

This thesis has both scientific and practical value. The scientific value relates to new empirically based scenarios of open innovation platforms fostering innovation collaboration between a city and external actors. The study extends the knowledge of public sector innovation, open innovation platforms and innovation intermediaries, collaborative innovation and Smart Cities. The thesis contributes to the knowledge of service design and how it could be utilized in the projects concerning the public sector. Moreover, the thesis contributes to the knowledge of using scenario method in the public sector context. The study has practical value for cities, innovation platform operators, research institutions, companies, third sector organizations as well as citizens. Finally, this thesis also contributes to a larger two year research project on Innovation Platforms in Smart Cities in the Urban Research and Metropolitan Policy Program.

Key words: Innovation platform, open innovation, collaborative innovation, smart city, service design, public sector innovation

Heini Kauppinen

Innovaatioyhteistyö älykkäässä kaupungissa, skenaarioiden luominen avoimia innovaatioalustoja varten

Vuosi	2016	Sivumäärä	100

Kaupungit ympäri maailman käyvät parhaillaan läpi ennennäkemättömiä muutoksia. Nämä muutokset aiheuttavat monia haasteita julkiselle sektorille palveluntuottajana. Haasteiden selättämiseksi on löydettävä uusia ja innovatiivisia lähestymistapoja. Kaupunkien täytyy omaksua yhteistyö muiden toimijoiden kanssa ja olla valmiita laittamaan asiakkaat sekä yhdessä luominen innovaatiotoiminnan keskiöön.

Opinnäytetyön tavoitteena oli kehittää vaihtoehtoisia skenaarioita avoimia innovaatioalustoja varten tukemaan ja mahdollistamaan innovaatioyhteistyötä kaupungin ja ulkoisten toimijoiden välillä älykkäässä kaupungissa. Ulkoisiin toimijoihin luetaan yritykset, kolmannen sektorin organisaatiot, tutkimuslaitokset ja kaupunkilaiset. Päämääränä oli luoda erilaisia lähestymistapoja, joita kaupungit voisivat omaksua selättääkseen haasteet. Opinnäytetyössä käydään läpi aikaisempia teorioita älykkäistä kaupungeista, innovaatioalustoista ja innovaatiovälittäjistä, innovaatiosta ja avoimesta innovaatiosta julkisella sektorilla, sekä innovaatioyhteistyöstä julkisella sektorilla. Opinnäytetyön tutkimusmenetelmiksi valittiin palvelumuotoilun ja ennakoinnin lähestymistavat. Skenaarioita voidaan käyttää menetelmänä molemmissa käytänteissä.

Erilaiset skenaariot luotiin palvelumuotoilun prosessia hyödyntäen. Prosessiin kuului tutkimuksen, visioinin ja kehityksen vaiheet. Ensimmäiseen vaiheeseen sisältyi design brief, taustatutkimus, syvähaastattelut, empiiriset tapaustutkimukset ja yhteiskehittämistyöpajat. Empiirisen datan analysointivaihe ja visiointi toteutettiin seuraavien menetelmien avulla; affiniteetti kaavio, avoin ja valikoiva koodaus, aivoriihi, mindmap ja sidosryhmäkartta. Kehitysvaiheessa luotiin skenaariot ja visualisoitiin ne asiakaspolkujen ja mielialakollaasien avulla. Ennen skenaarioiden viimeistelyä pidettiin myös validointityöpaja, missä skenaariot testattiin ja arvioitiin.

Tämä opinnäytetyö tuottaa sekä tieteellistä että käytännöllistä arvoa. Tieteellinen arvo liittyy uusiin, empiiriseen tutkimukseen perustuviin skenaariohin avoimista innovaatioalustoista, jotka edistävät innovaatioyhteistyötä kaupungin ja ulkoisten toimijoiden välillä. Tutkimus laajentaa tietoa julkisen sektorin innovaatiosta, avoimista innovaatioalustoista ja innovaatiovälittäjistä, innovaatioyhteistyöstä sekä älykkäistä kaupungeista. Opinnäytetyö myös laajentaa tietoa palvelumuotoilusta ja kuinka sitä voitaisiin hyödyntää julkiseen sektoriin liittyvissä projekteissa. Lisäksi opinnäytetyö tuottaa myös lisäarvoa skenaariomenetelmien käyttöön julkisella sektorilla. Opinnäytetyö tuottaa käytännön arvoa kaupungeille, innovaatioalustojen toimijoille, tutkimuslaitoksille, yrityksille, kolmannen sektorin toimijoille sekä myös kaupunkilaisille. Opinnäytetyö on osa isompaa tutkimusta nimeltään "Palvelutuotannon ja palveluinnovaation avoin kehittämismalli älykkäässä kaupungissa" ja täten myötävaikuttaa myös tämän tutkimuksen tavoitteiden saavuttamisessa.

Avainsanat: Innovaatioalusta, avoin innovaatio, innovaatioyhteistyö, älykäs kaupunki, palvelumuotoilu, julkisen sektorin innovaatio

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1   Introduction

This thesis seeks to find answers how to enable collaborative innovation between a city and companies, third sector organizations, research institutions, as well as citizens. The focus is on finding opportunities for collaborative innovation in a Smart City context by discovering alternative scenarios of open innovation platforms. This chapter first introduces the phenomena of changing city environments, innovation landscape, and challenges and opportunities that concern the public sector in particular. Next, the background of the thesis as a part of larger research project is explained. The research objective is then laid out, followed by description of the theoretical framework and key concepts. Structure of the thesis is explained to guide the reader through the report. Finally, delimitations of this thesis are discussed.

1.1   Introduction to the phenomena

The world is going through a record-breaking phase of urbanization where the challenges are great, but so are the opportunities (World Economic Forum 2016, 53). According to Hiltunen (2012, 84) urbanization is one of the current megatrends. It is rapid, continuous and already happening at a global scale (Design Council 2015a). The world's urban population is expected reach 75 to 80 percent by 2050. People move to cities in hopes for a better life, better services and jobs. Every year there is an increase of almost 60 million people in the city population. Thus, due to this growing urbanization cities are going through transformations and need to become smarter. (Bakici et al. 2013a, 136; European Parliament 2014, 17; Caragliu et al. 2011, 65; Hiltunen 2012, 84; Design Council 2015a.)

According to Eskelinen, Garcia Robles, Lindy, Marsh and Muente-Kunigami (2015, 14) urbanization brings challenges that require increasingly sophisticated tools and solutions, also due to increased scarcity. City organizations will progressively struggle to provide even the most basic services to their rapidly growing populations (Eskelinen et al. 2015, 14). The growing population in cities puts pressure on energy, transportation, water, buildings and public space. Thus, there is a need for new and innovative, efficient and sustainable modes that create economic growth and social well-being. To obtain these kind of solutions a city's resources need to be mobilized and its actors co-ordinated by using new technologies and progressive compound policies. (European Parliament 2014, 9, 17.) On the other hand, while urbanization will bring challenges there are also positive aspects to be taken into account. For example, Eskelinen et al. (2015, 15) state urbanization enables organizing resources and scaling up of services that are more difficult to deal with in rural settings. It also enables diversity, which in turn will provide more opportunities for innovation and entrepreneurial activities (Eskelinen et al. 2015, 15). World Economic Forum (2016, 3) states in its recent report that urbanization should not be seen only as a risk but rather as a transformative source of sus-

tainable development and prosperity. This backdrop provides an opportunity for Smart Cities to emerge as an innovative approach for future urban living and also as a key strategy for tackling issues such as poverty, inequality, unemployment, and energy management (European Parliament 2014, 17). If urbanization process is thoughtfully managed there is an opportunity for disruptive innovation that provides solutions to these significant global challenges (World Economic Forum 2016, 3).

Harris and Albury (2009) claim that a crisis situation, such as economic recession, may create opportunities for innovation. At least it makes radical innovation and bold new approaches in the scope of public services necessary. Public services will have to deliver better performance with lower costs. (Harris & Albury 2009.) The public sector will need to do more with less as resources are steadily decreasing, trust in government is low in many countries and yet public sector organizations are expected to take a bigger role in driving economic growth (Gouillart & Hallet 2015, 47). The public sector needs to embrace innovative approaches to challenges it is facing as existing practices are not sufficient (Eggers & Singh 2009; Gouillart and Hallet 2015, 47). More systematic and robust approach to innovation is needed and it has to become a core discipline in the public sector (Harris & Albury 2009; Eggers & Singh 2009). Gouillart and Hallet (2015, 47) state that to overcome the challenges public sector managers have to let go of the control over government processes and public sector employees have to engage with stakeholders in new ways and take responsibility of their own future. Harris and Albury (2009) state that in order to innovatively meet the challenges in public services, rigorous experimentation encouraging and embracing local solutions is needed. Eggers and Singh (2009) emphasize that the innovation process in the public sector should not remain top-down process causing bureaucracy, but rather focus more on the concerns of citizens. In order to create successful innovations, the public sector has to be able to bring together and exploit all the sources of innovation, meaning employees, citizens, private organizations, social organizations and other governments (Harris & Albury 2009; Eggers & Singh 2009; World Economic Forum 2016, 6, 10.) Partnerships and co-production are increasingly relevant, but they require time and effort form. Trust, mutual understanding and experimentation are the element that make them function. (World Economic Forum 2016, 12.) There is also need for stronger methods by which innovations can be discovered, developed and diffused. Most importantly, customer centricity and co-creation are the aspect that should be placed at the heart of development and innovation of public services. (Harris & Albury 2009; Gouillart & Hallet 2015, 47.)

If the public sector needs renewal, there is also need for changes in the private sector. In today's world workers are mobile, there is abundance in venture capital, knowledge is widely distributed across public as well as private organizations, and product life-cycles are shorter (Vrande et al. 2009, 424, 426). Thus, Vrande et al. (2009, 424, 426) state that most business-

es can no longer afford innovating on their own and need to embrace alternative innovation practices. Businesses are challenged by a need to actively channel external innovation efforts to master open innovation (Scholten & Scholten 2012, 166).

Hielkama and Hongisto (2013, 190) state that the importance of regions as centers of knowledge and innovation is growing in the current global economy. The proximity of actors within a certain sector favours cluster formation. Due to the importance of metropolitan are-as there is a need for local, regional, and national government to support initiatives focusing on city regions as clusters of innovation. (Hielkama & Hongisto 2013, 190-191.)

Considering this background of changing city environments, the public sector's need for a change, the private sector's need to embrace alternative innovation practices, and the cur-rent challenging situation there is a need for fresh views how a city could overcome the chal-lenges by enhancing innovation collaboration athmosphere. This thesis seeks to create alter-native scenarios of open innovation platforms that would enable innovation collaboration in a Smart City context and, thus, also provide different approaches that cities could take to solve the challenges they are facing. By all accounts, the thesis topic and area of research are very current and relevant.

1.2   Background of the thesis

This thesis is part of a larger two year research project on Innovation Platforms in Smart Cit-ies in the Urban Research and Metropolitan Policy Program that commenced in the beginning of 2015. The project is called "Open Service Innovation and Production in a Smart City, Con-cept and Model for Public Government Decision Making." The main purpose of the project is to develop a generic concept for open service production and innovation in public sector as well as to develop a model for supporting related decision making in public administration. Four Metropolitan Region Cities of Finland are taking part in this project that lasts until the end of 2016. The cities are Helsinki, Espoo, Vantaa and Lahti. Empirical research for the project started in the spring 2015 and it has included case studies, in-depth interviews as well as co-creation workshops. This research project is needed as experiences from successful Smart City regions suggest that development of service production and innovation in the Smart City context provides significant opportunities for sustainable development. So far, no suitable concepts exist for open development of service production and innovation platforms. Fur-thermore, models for public decision making in this context are lacking. Thus, there is a clear need for further research and development of the subject area. This thesis focuses on finding anwers that concern open innovation platforms and collaborative innovation in Smart Cities.

There are several reasons why this thesis topic was chosen and why it is current in nature in addition to the issues mentioned in the beginning of this chapter. Firstly, despite the rapid

increase of Public Private People Partnership (PPPP) programs at global scale the scientific knowledge of innovation collaboration between a city and external actors is still scarce. Secondly, all Smart City initiatives emphasize innovation collaboration for better services and products needed by cities. Furthermore, there is a need for both scientific and practical knowledge of innovation collaboration between a city and external actors.

1.3   Research objective

The purpose of this thesis is to develop alternative scenarios of open innovations platforms in a Smart City context that enable collaborative innovation between a city and external actors. External actors in this case are defined to include companies, third sector organizations, research institutions, and citizens.

The thesis aims to discover answers to the following research questions:
- What kind of scenarios of open innovation platforms enable collaborative innovation in a Smart City context?
- What are the opportunities and benefits of collaborative innovation in this context?
- What are the typical challenges when attempting to create innovation between a city and external actors?

The creation of scenarios in this thesis is conducted by using service design and foresight approach. Polaine, Loevlie and Reason (2013, 187) state that service design can provide valuable approaches when rethinking public services. These approaches can enable designers to shift from an industrial way of thinking and allow for dealing with the complexity as well as multiple stakeholders. The opportunities that service design provides are such as using insights research to identify the motivations of stakeholders and to understand the nature of the relationships, and to discover new ways for different parties to achieve their goals. (Polaine et al. 2013, 187.) Ojasalo, Koskelo and Nousiainen (2015) add that service design and foresight methods complement each other in an innovation process. Foresight enables imagination and creation of alternative futures while service design enables bringing stakeholders and their needs into these future contexts. Service design also has the potential to ideate and visualize plausible solutions when creating desired futures. (Ojasalo et al. 2015.)

Furthermore, Stojanović, Mitković and Mitković (2014, 81) point out the public sector lacks an effective future oriented approach that would enable dealing with complexity, anticipation of future changes and preparation for their consequences. Scenarios technique is one tool that can be used to respond to these challenges. Scenarios are increasingly used also in the public sector and can help in reducing uncertainty by identifying and creating alternative futures for urban development. The public sector needs to change their thinking and acting about the

future of cities and embrace more innovative and imaginable approaches. Scenario method enables understanding of an uncertain and complex future as well as the factors shaping the environment. It can also help in overcoming the thinking limitations in urban planning processes. (Stojanović et al. 2014 81, 82.)

1.4   Theoretical framework and key concepts

Theoretical framework for this thesis consists of open innovation, open innovation platforms and innovation intermediaries, service design, futures thinking, smart city, and finally in the center of it all innovation collaboration. Framework is laid out in Figure 1 below. Existing theories of innovation in Smart Cities are discussed in chapter two. Research methodology, discussed in chapter three, mainly consists of service design approach but additionally foresight and futures thinking have to be considered since the main results of the thesis are laid out in the form of scenarios. Scenarios can be used as a method in both service design and foresight practices.
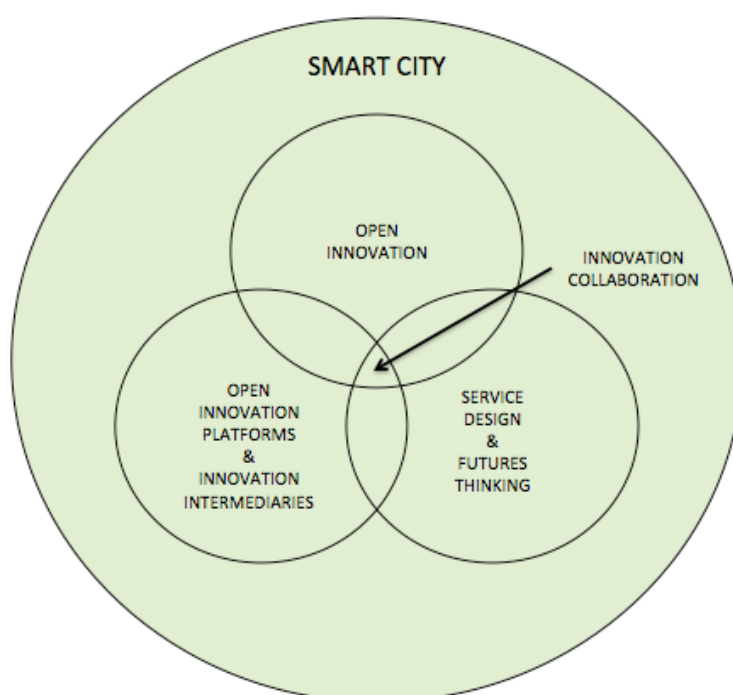

Figure 1. Theoretical framework of the thesis.

Key concepts considered in the thesis are open innovation, innovation platforms and innovation intermediaries, smart cities, public sector, service design, foresight, co-creation and scenarios. Next, all of these are shortly explained to give the reader a good understanding of the overall subject area.

Open innovation

Open innovation concept is often considered to be rather broad and complex. Chesbrough et al. (2006, 1) define open innovation as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively." Open innovation is further described and discussed in subchapter 2.3. as are some of its benefits and drawbacks. Also innovation and open innovation in the context of public sector is explored in the same subchapter.

Innovation platform and innovation intermediary

Concepts of innovation platform and innovation intermediary are very similar (Ojasalo 2016). Ojasalo (2015a) defines innovation platform as "an approach that systematically facilitates external actors' innovation with a purpose to develop solutions to the platform owner's problems and needs – it is an approach for attracting, facilitating, and orchestrating other organizations' innovation to solve platform owners' problems." The platform owner in the larger research project, that this thesis is a part of, is considered to be a city and the external actors are companies, third sector organizations, citizens and research institutions.

An innovation intermediary is a third party, a firm or a person that acts as a mediator and offers intermediation services between two other parties. An innovation intermediary is an organization that acts as an agent or broker in any aspect of the innovation process between two or more parties. (Lichtenthaler & Ernst, 2008; Tran et al. 2011.) Both innovation platforms and innovation intermediaries are discussed in subchapter 2.2. Innovation platforms and interdmediaries are further explored in the findings of the thesis in a form of scenarios.

Smart City

The Smart City concept is still quite ambiguous and there are several ways to define a Smart City. Dameri (2013, 2549), for instance, defines a Smart City as "a well defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well being, inclusion and participation, environmental quality, intelligent development; it is governed by a well defined pool of subjects, able to state the rules and policy for the city government and development." Six main axes or dimensions have been identified to describe Smart Cities; smart economy, smart mobility, smart environment, smart people, smart living, and smart governance. These dimensions relate to traditional regional and neoclassical theories of urban growth and development. (Caragliu et al. 2011, 70; European Parliament 2014, 18; Schaffers 2015, 365-366; Zygiaris 2013, 217-218.) Smart City as a context is a basis for the whole research project that my the-

sis is a part of. Therefore, Smart Cities are discussed in more detail in the next chapter, especially in subchapter 2.1.

Public Sector

According to Potts and Kastelle (2010, 124) "public sector refers to co-ordination, production and delivery of goods and services by publically owned and accountable organizations." Public sector entails the civil services and public administration funded by public revenues with a task to co-ordinate and deliver policy mandates such as legacy policies (Potts & Kastelle 2010; Ojasalo 2015a). As the thesis is based on the context of collaborative innovation in a Smart City, the public sector is naturally one of the main concepts throughout the thesis. This has been also taken into consideration in the theoretical framework in chapter two.

Service Design

According to Stickdorn and Schneider (2012, 22) there is no common definition of service design and, thus, they define it as "an interdisciplinary approach that combines different methods and tools from various disciplines". Moritz (2005, 4) adds that service design is a holistic, multi-disciplinary, and integrative field, which helps to either innovate or improve services. It can be used to re-design an existing service or to develop an entirely new service (Design Council 2015b, 4). Polaine et al. (2013, 40) state that service design and innovation go hand in hand. Segelström (2013, 27) defines service design as "the use of a designerly way of working when improving or developing people-intensive service systems through the engagement of stakeholders". The thesis uses service design approach a research methodology, thus, the concept will be discussed in more detail in chapter three. Service design tools and methods used for the purposes of this thesis are described in chapter four.

Foresight

Turturean (2011, 114) defines foresight as "the discipline dealing with the management and marketing of the future, in all aspects, from the generation process to its implementation." According to Kuosa (2012, 5) foresight can be created by understanding the past and the present, and it enables estimation of relevant patterns to forecast potential future events. Kuosa (2011, 3) states that strategic foresight is based on strategic thinking that has been utilized in politics, military and business management. It aims at producing analyses of possible futures and alternative strategies that is based on available intelligence and foreknowledge (Kuosa 2011, 3). Wayland (2015, 445) states that the practice of strategic foresight enables applying and expanding what we know. Strategic foresight has the capacity of envisioning better futures by anticipating and planning for ontological as well as epistemological change (Wayland 2015, 457). Foresight and futures thinking are discussed in subchapter 3.4.

Co-creation

Often, when the concept of co-creation is discussed, value co-creation as well as customer co-creation come up. According to Ramaswamy and Gouillart (2010, 102) the purpose of co-creation approach is to serve the interests of all stakeholders. The basis of co-creation is that all parties involved will gain a deeper understanding of each other by sharing experiences. It also enables the parties to contemplate an enhanced and new experience for both sides. In the end co-creation is about placing the human experience at the core of a business' design. (Ramaswamy & Gouillart 2010, 103, 109.) Gouillart and Hallet (2015, 42) state that in essence co-creation forms new relationships. The process of co-creation often leads to redefinition of roles as service recipients become service providers and vice versa. Hence, parties usually create special platforms for stakeholders engagement to develop and sustain these new interaction modes. (Gouillart & Hallet 2015, 42.)

Gouillart and Hallet (2015, 42) continue that in the public sector adoption of co-creation has only recently started to develop. However, they (ibid.) also state the there is evidence that co-creation has great potential as a way to facilitate innovation in the public sector. Co-creation can, indeed, help the public sector to transfer from a process-centric operating model to a people-centric model. This would help public sector face the challenges of doing more with less and the requirement to profoundly transform its role. (Gouillart & Hallet 2015, 47.)

In service design co-creation has a central role. Stickdorn and Schneider (2012, 26) state that co-creation is one of the five principles of service design. Also, throughout this thesis co-creation has a central role as the thesis uses service design approach as methodology and the goal is to create scenarios that enable innovative collaboration. The service design tools and methods used for the thesis are also, in essence, co-creative.

Scenarios

Scenarios, scenario analysis or design scenarios can be defined in various ways. Scenarios are usually described as overviews of possible futures or hypotethical events, while not describing comprehensive pictures of the future nor claiming to be complete or correct. Scenarios allow for better understanding of future uncertanties and help in the decision making process. (Amer et al. 2013; Durance & Goret 2010; Pillkahn 2008; Schoemaker 1993.) Tourki, Keisler and Linkov (2013,4) state that most often scenario analysis is defined "not as a simple prediction about the future, but a description of a set of possible eventualities describing what the world may look like over a certain time horizon. It is designed to raise decisions makers' awareness and help frame alternative futures to support current decision-making needs."

In service design scenarios are often referred to as design scenarios. Design scenarios are hypothetical stories of a future service or situation detailed enough to meaningfully explore a

certain aspect of a service or situation (Design Council 2015b, 22; Stickdorn & Schneider 2012, 178). The goal of design scenarios is to create common understanding of a potential future service or situation while making the ideas explicit and concrete. They can also help to support decision making. (Design Council 2015b, 22; Martin & Hanington 2012, 152.)

The purpose of the thesis is to create alternative scenarios for open innovation platforms in a Smart City context and, thus, scenario is one of the key concepts. Scenarios are described in more detail in subchapter 4.4.1. The same subchapter also includes the three different scenarios that are the main result of this thesis.

1.5   Structure of the thesis

The thesis is based on a theoretical and empirical part. The thesis uses a service design and foresight approach as a methodology. A combination of different service design process approaches has been used. Therefore, a new service design process suitable for the purposes of this thesis was created. This approach is illustrated in Figure 2 below.
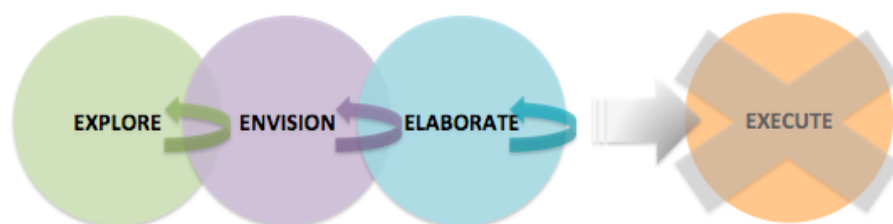

Figure 2. Overview of the 4Es service design process for the thesis.

In this interpretation of the service design process the stages have been named as explore, envision, elaborate and execute. The process has been named as 4Es as all stages begin with a letter E. The thesis excludes the last, execute, stage that would include the actual implementation of the created scenarios. Hence, the service design process for the purposes of this thesis comprises only 3Es. Execute stage is excluded due to time, resourcing and scoping considerations baring in mind the larger scale research project the thesis is a part of, as well as the complexity of the topic. Thus, in the service design process model above the execute stage has been visualized as a separate, consequent stage that might take place in the future.

The first chapter of the thesis introduces readers to the topic. Introduction to phenomena and background of the thesis is discussed explaining why this area needs to be researched. Research objective as well as theoretical framework together with key concepts are ex-

plained. Additionally, the structure of the thesis is laid out and delimitations of the thesis are discussed.

The second chapter of the thesis consists of the existing theories regarding the topic of innovation in Smart Cities. It starts with explaining the Smart City concept. Next, it discusses innovation platforms and innovation intermediaries, as well as innovation and open innovation in the public sector. Finally, collaborative innovation in the public sector is explained.

In the third chapter service design theory as well as foresight and future thinking are explained as the thesis uses a service design and foresight approach as a research methodology. First, the third chapter shortly explains what service design is and then moves on to discover different service design processes. Next, service design tools and methods are shortly discussed but they are further explained in the fourth chapter. In the end, foresight and futures thinking is explored.

The next chapter includes the empricial results of the thesis. In this part the service design process together with used methods and tools are explained in more detail. The service design process is often iterative in nature, also in this case. However, in order to explain the process and the methods in easy to follow way, it is presented in linear order in the thesis report. The fifth, and last, chapter of the thesis consist of conclusions. The conclusions include summary of the results, reflections of the contributions the thesis makes as well as prospects for future research.

1.6 Delimitations of the thesis

The thesis is focusing on creation of alternative scenarios of open innovation platforms that enable collaborative innovation between a city and external actors. Thus, it does not take into consideration some of the other issues that are in scope of the larger research project that the thesis is a part of. The thesis does not consider, for instance, governance and management model of the platforms nor the innovation process in the platforms, although these subjects are slightly touched upon.

As the thesis is based on qualitative research, it has to be taken into account that the findings are subject to researcher's subjective interpretation and, therefore, not generalizable. The thesis includes the service design process stages of explore, envision and elaborate, leaving out the final stage of executing the results. The final stage, where the actual implemenation would happen is excluded due to limited time and resources allocated for this thesis project. Thus, the findings of the thesis do not comment how the actual implementation would happen. However, to compensate the missing execution stage, the scenarios were tested and

evaluated in a validation workshop. Additionally, the thesis can be used as a basis for further research and discussion.

The goal is not to develop and test a generalizable scenario that would work in every situation, but instead offer alternative scenarios, which also offer a wider view to the complexity of the topic. The scenarios of open innovation platforms created in this thesis are hypotethical future situations and do not describe an extensive view of the future or claim to be complete or correct. The findings of the thesis can be used for the purposes of helping to understand what kind of open innovation platforms a Smart City could adopt and what are the opportunities and challenges included. They can also assist in making decisions regarding the innovation collaboration between a city and external actors.

While the scenarios created as a result of this thesis might only scratch the surface of increasingly important concept of open innovaton platforms in Smart Cities, the thesis clearly increases the knowledge and suggests novel approaches by bringing elements of service design and innovation into areas where they are much needed. Thus, the thesis contributes also to the knowledge of service design and extends the knowledge of public sector innovation, innovation collaboration, as well as Smart Cities.

2   Existing Theories: Innovation in Smart Cities

Citizens and businesses have new expectations about what their municipalities can offer them (Kuk & Janssen 2011, 39). Chambers (2014) states that Smart Cities have the potential to both empower citizens and to establish control with private interests and governments. With increasing amounts of people moving to cities every day, cities must innovate and keep up with the change or they will be left behind. There is also a pressure on infrastructure and resources. Smart Cities that respond to the needs of their citizens, where everything is connected and can adapt to the way people live, are already being built around the world. Internet of Everything is making all of this possible. These changes are valuable as they cut costs, increase efficiency and improve citizen experiences. Internet of Everything can, indeed, create an estimated $4,6 trillion in value for the public sector. Increased connectivity will also lead to safer and healthier lifes. (Chambers 2014.)

Kuk and Janssen (2011, 49) discuss how local governments are now encountered with a need to transform themselves into Smart Cities. Local governments need to adopt new business models as well as to combine their business rationale and information architecture (Kuk & Janssen 2011, 49). Information and communication technology (ICT) is affecting the way in which cities organise policymaking and urban growth (Bakici et al. 2013a, 135). In order to be internationally competitive in today's world cities must embrace innovativeness. Thus, cities

are currently in progress of transforming fundamentally and smaller towns change into metropolis areas. These cities then provide new locations for businesses and clusters. (Bakici et al. 2013a, 135.) Bakici et al. (2013a, 136) add that Smart Cities enable generation of smart ideas in an open environment by encouraging clusters, open data, or creating living labs. This also includes citizen participation in the co-creation process of products or services. Deakin and Al Waer (2011, 135) state that Smart Cities have a role as a nexus for open innovation. According to Ojasalo (2015a) there is a need to increase knowledge and to suggest new approaches for open innovation platforms that would permit businesses and third sector organizations to develop solutions to challenges that cities face. Also according to Zygiaris (2013, 218) analytical tools are needed to enlighten a Smart City's planning processes.

This chapter includes the theoretical framework for the thesis considering the existing theories in the field. It explains what Smart Cities, innovation platforms and innovations intermediaries are. Then, open innovation concept as well as innovation and open innovation in public sector are discussed. Finally, the last chapter discusses strategies, advantages, as well as obstacles and risks of collaborative innovation in the public sector.

2.1   Smart Cities

The term "Smart City" has been widely used lately and has clearly become a buzzword. Many cities around the world have adopted the term "smart" to be able to present themselves as forward-looking, well endowed and flourishing (Deakin & Al Waer 2011, 134). Smart cities have affected the discussions about the future of urban development especially in Western countries (Hollands 2008, 303). However, what exactly is a Smart City is still a bit unclear. There are several definitios of a Smart City that are not always consistent with each other. Often the term "smart" is also confused with intelligent, innovative, digital, wired, creative, cultural, green, or open (Hollands 2008, 305; Tranos & Gertner 2012, 176; Zygiaris 2013, 218). Murray, Minevich and Abdoullaev (2011, 20) suggest that the confusion over the term is due to focusing on different outcomes. Murray et al. (2011, 20) desribe three varieties of smart cities; knowledge cities, digital or cyber cities, and eco cities. Knowledge cities revolve around education, lifelong learning, innovation, personal growth and intellectual capital development. Digital or cyber cities on the other hand concentrate on investments from large ICT businesses enabling interconnectedness via high-speed networks, servers and data warehouses. The last variety, eco cities, focuses on environmental sustainability with the help of renewable resources. Nonetheless, to be truly smart, cities have to be able to systematically and holistically adopt all of these three varieties. (Murray et al. 2011, 20.) The term smart city is still developing and the whole concept itself is very vast. Furthermore, every city has its unique history, characteristics and future prospects and smart cities also differ from each other considerably. Thus, implementing a smart city concept is a different process for each

city depending on their policies, objectives, funding and scope (European Parliament 2014, 21). As Ojasalo (2015a) states, in the end it seems to be up to the speaker or the audience to decide how smart the city in question actually is.

Bakici, Almirall and Wareham (2013a, 137) describe Smart Cities as those that can make use of information and communication technologies (ICT) in order to enhance citizens' quality of life in a sustainable manner. As a result of utilising ICT in their services, cities can manage their resources more wisely as well as create new business opportunities and research hubs. This in turn will make them more attractive to businesses and research institutes (Bakici 2013a, 137). Thus, a city is smart when it aims to solve public issues with ICT-based solutions based on several stakeholders and municipal partnerships (Eskelinen et al. 2015, 18; European Parliament 2014, 9). According to Dameri (2013, p. 2549) a Smart City is "a well defined geo-graphical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well being, inclusion and participation, environmental quality, intelligent development; it is governed by a well defined pool of sub-jects, able to state the rules and policy for the city government and development."

Six main axes or dimensions have been identified to describe Smart Cities (Figure 3). These dimensions are; smart economy, smart mobility, smart environment, smart people, smart liv-ing, and smart governance. These dimensions relate to traditional regional and neoclassical theories of urban growth and development. (Caragliu et al. 2011, 70; European Parliament 2014, 18; Schaffers 2015, 365-366; Zygiaris 2013, 217-218.) Schaffers (2015, 365-366) adds that although these dimensions are relevant for benchmarking or prioritizing development needs, they are mainly based on technology-led views. Therefore, there is a demand for ef-fective strategies that are bottom-up, citizen-supported while taking into consideration socio-economic context and urban development goals. Additionally, approaches that take into ac-count mobilizing the participation and intelligence of citizens, businesses, and societal organ-izations are needed. (Schaffers 2015, 365-366.) On the other hand, Tranos and Gertner (2012, 178) point out that global perspective is often missing in a Smart City concept, although strong interdependencies exist at a global scale. The concept needs to include a world city perspective as cities compete to attract monetary and human capital at a global level. Col-laboration between cities should be utilized and cities should work together to share ideas, knowledge and experiences. Furthermore, a global urban network perspective should be comprised in the local smart city policy. However, some of the elements still need to be dealt with at local scale. (Tranos & Gertner 2012, 185, 186-187.)
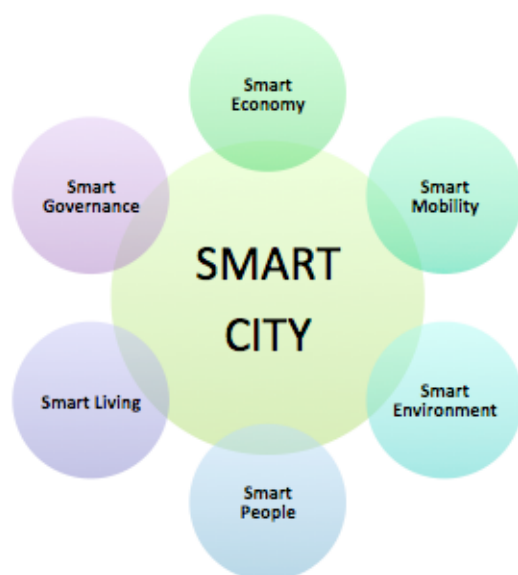
Figure 3. Six Smart City dimensions (European Parliament 2014, 18).

To successfully compete in the global knowledge economy, a Smart City must be economically viable. To achieve, and to sustain, high performance a Smart City must possess a deep-rooted culture of innovating, learning, collaborating and partnering. Additionally, a Smart City must be able to attract and retain a diverse population of knowledge workers and entrepreneurs. Also a robust ICT infrastructure enables connection with other Smart Cities at a global level. (Murray et al. 2011, 20.) Other good practices such as a clear vision, involvement of citizens, representatives and local businesses, as well as efficient processes have been identified as success factors for smart cities (European Parliament 2014, 11). Hollands (2008, 315) emphasizes that human centered approach should be the starting point for creating Smart Cities rather than just relying on technology. Thus, Smart Cities should be able to combine the best of both physical and virtual environments (Deakin & Al Waer 2011, 137). The main concept of a Smart City is based on the creation and connection of human capital, social capital and ICT infastructure enabling generation of more sustainable economic development, and a better quality of life while wisely managing natural resources through participatory governance (Caragliu et al. 2011, 70; European Parliament 2014, 18).

There are many challenges and risks a Smart City could face. Murray et al. (2011, 20) state that a major challenge is a lack of financing. There a also plenty of governmental issues and, for example, regulatory and organizational structures are often outdated. Not enough attention is paid to enabling the knowledge flow and the potential of social networks has not been fully utilised. Additionally, there is always a threath of cyber-attack. Hyperautomation trend could also lead to a situation where the "master switch" is controlled by a single agent, whether human or not. Automation could also result in vulnerability to a catastrophic failure,

which could bring down the entire system. (Murray et al. 2011, 20.) According to Kuk and Janssen (2011, 39) a Smart City creation faces challenges such as how to decide which new services to develop and which business models to adopt, and how these change the already established ones. Furthermore, it needs to be considered how the new services and business models will affect the existing information architecture and how can the sustainability of changes be estimated (Kuk & Janssen 2011, 39). Hollands (2008, 316) states that for cities to keep a noble title of a Smart City, they will have to take greater risks with technology, transfer power, tackle inequalities, and finally also redefine what they actually mean by smart.

In the end, Schaffers (2015, 370-371) claims it seems obvious that a Smart City is actually more a strategy than it is a reality. It is more than just technology or infrastructure, it is a realm of smart applications and platforms that enable citizens to innovate. Thus, many cities have started to empower users by embracing more proactiveness and co-creation in urban innovation ecosystems. The fundamental elements of a Smart City strategy include, for instance, open innovation, focus on user-driven practices, and formation of innovation districts, neighbourhoods and clusters offering an opportunity for exchanging good practices and solutions between cities. (Schaffers 2015, 370-371.) Bakici et al. (2013a, 146) suggest that cities should base their Smart City models on three main pillars, which are infrastructure, human capital and information. The Smart City initiative should include various organizations and departments. The implementation of the Smart City should not only concern public administration but it should also involve citizens, innovation centres, companies and entrepreneurs (Bakici et al. 2013a, 140). Zygiaris (2013, 218-219) claims that an orchestrator with executive and policy planning authority is needed. Thus, leadership is required, but the top-down approach should be balanced with engaging local stakeholders into a hybrid model that consists of central city monitoring with bottom-up community involvement (Zygiaris 2013). Murray et al. (2011, 22) conclude that looking beyond governance issues, the creation and improvement of social cohesion could be the essence of building a peaceful and prosperous Smart City as well as society.

2.2 Innovation platforms and innovation intermediaries

Innovation platform, or open innovation platform, and innovation intermediary are both strategies for promoting collaborative innovation (Consoli & Patrucco 2008; Patrucco 2011; Ojasalo 2015a; Ojasalo 2015b; Ojasalo 2016; Ojasalo & Kauppinen 2016). Hielkama and Hongisto (2013, 191) state that for a region to gain effective smart services, it has to provide innovation platforms that are open for all municipal and regional parties that are interested in developing new products and services. Huizing (2011, 6) adds that establishing partnerships in open innovation is important but time consuming. Thus, innovation intermediaries can be exploited for this purpose.

Innovation platform

An open service, or product, platform infers to a context where various services, systems or products are jointly used or reused through implementation (Ojasalo 2015a; Boudreau 2010; Katz & Shapiro 1994; Marschak 1962). Ojasalo (2015a, 2015b) defines an open innovation platform as an "approach that systematically facilitates external actors' innovation with purpose to develop solutions to the platform owners' own problems and needs." The goal is to attract, facilitate and orchestrate other organization's innovation in order to solve platform owner's challenges. The platform is mainly a means to organize and not just a physical or virtual space. (Ojasalo 2015a.)

A platform can have elements such as physical components, tools, and rules that enable development and interoperability can be supported by different technical standards. It can also entail any combination of the mentioned elements. (Boudreau 2010; Jacobides et al. 2006; Ojasalo 2015a.) Open platform technologies with various contributing stakeholders are often supported by extraordinary institutional systems in order to foster successful co-ordination, accumulation and consolidation of those contributions (Boudreau 2010, 1854). Boudreau (2010, 1851) adds that it is the platform owner's righ to imply restrictions on the use, development or commercialization of the platform. However, it is also the owner's right to open or remove restrictions on the use, development, or commercialization of the platform or any specific component within it. By giving up some control over platform, the owner enables the incentive of external parties to invest in collaborative innovation. (Boudreau 2010, 1853.) Scholten and Scholten (2012, 166, 175) also mention that the platform owner has to constantly develop the offered value proposition and needs to develop a coherent vision of the platform's evolution.

In the context of a Smart City, innovation platform can also be called a participation platform meaning a platform in which governments, businesses and citizens can co-operate, communicate and monitor the development of the city. Often these type of platforms are driven by the local municipalities for the platform users. They also reflect a diverse range of actors in a city such as citizens, civil society groups, as well as smaller and larger businesses. (European Parliament 2014; Ojasalo 2015a.)

Ojasalo (2015a) has constructed a framework of open innovation platform in a Smart City. This is presented in Figure 4 below. The framework has three zones, which are a city, private/third sector, and open innovation platform in between them. Innovation process itself may involve several different stakeholders such as citizens or users, and suppliers. Innovation platform is described as open platform here, however each innovation project that take place may be either open, semi-open, or closed. (Ojasalo 2015a.)
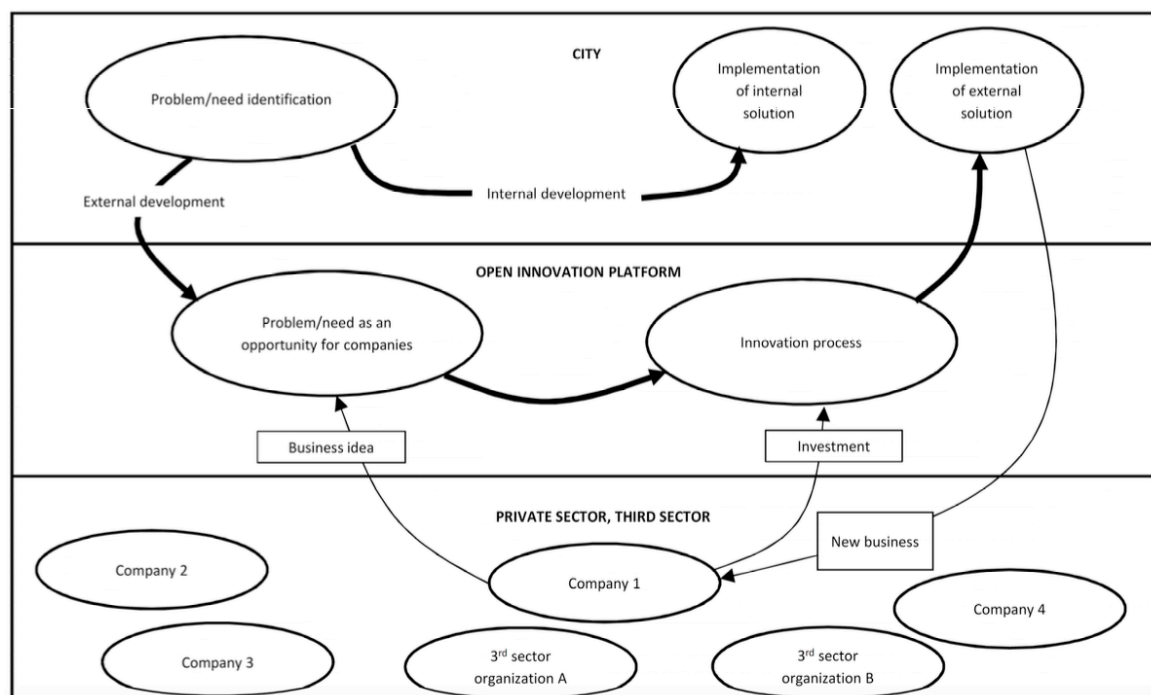
Figure 4. Open innovation platform between a Smart City, private sector and third sector by Ojasalo (2015a).

In this framework approach Ojasalo (2015a) describes that the city is the initiator of the process by allowing the companies or third sector to innovate solutions to the city's challenges. Or the city may decide to solve the challenges itself via internal development. If the decision is to proceed to external development then the challenges are brought to open innovation platform for external actors to solve. The potential business opportunities have to be communicated by the city and the platform. Companies and third sector may also collaborate when developing a solution. In the long term, companies and third sector may initiate the projects themselves for the needs of the city and there can be an ecosystem for actively developing solutions, for instance, to a certain theme. (Ojasalo 2015a.)

Innovation intermediary

An innovation intermediary is a third party, a firm or a person, that acts as a mediator and provides intermediation services between the other parties. An intermediary can be a private organization, individual, expert or advisor. It may have the role of retailer, distributor, wholesaler, platform, media companie, agency or financial institution. (Aoki 2001; Howells 2006; Ojasalo & Kauppinen 2016.) Hielkama and Hongisto (2013, 201-202) mention Living Labs as an example of an innovation intermediary that can orchestrate the operations, enable developers' collaboration with users, and provide support as well as feedback to parties involved.

The role of innovation intermediaries as a strategy for collaborative public innovation has been highlighted by several researchers (Fung &Weil 2010; Bakici et al. 2013b; Braun 1993; Stewart & Hyysalo 2008).

According to Bakici et al. (2013a, 146) intermediaries can be used to facilitate the collaboration due to challenges in interorganizational co-operation and definition of roles and responsibilities. An intermediary can organize a network and build trust between different members (Lee et al. 2010; Huizing 2011). An innovation network can be seen as an open innovation framework enabling users to find parties with specific experience or expertise (Innovation in the Crowd 2015). Fung and Weil (2010) state that through collaboration with public and other organizations both internal and external parties can provide innovative solutions and ideas to challenges that government and city halls are facing. The external knowledge space can be assisted by public open innovation intermediaries (Bakici et al. 2013b; Ojasalo 2015a). Both small and large organizations can benefit from using innovation intermediaries, but it also creates new management challenges (Gwyne 2007; Sieg et al. 2010; Huizing 2011). Schaffers (2015, 372) adds that there is a clear need for a key actor that has no vested interest to control and stimulate the development of innovation platform. The importance of creating effective innovation platforms is recognized at European level as is the fact that these platforms are in continuous change. Therefore, neither top-down nor bottom-up approaches alone are enough to solve some of the identified gaps, for instance, lack of entrepreneurship and business creation, or lack of impact on societal innovation. (Schaffers 2015, 372.)

2.3   Innovation and open innovation in the public sector

Open innovation
Open innovation has recently become a trending topic in the field of innovation management (Chesbrough et al. 2006; Huizing 2011; Scholten & Scholten 2012). It is still a relatively new concept with a purpose to investigate the value creation by the transmission of innovation from external parties (Chesbrough 2003; Carroll & Helfert 2015; Huizing 2011). It is an emerging paradigm exposing organizations to networked capabilities and competencies through collaboration (Carroll & Helfert 2015, 275). The openness encourages the flow of knowledge and information between organizations (Huang & Rice 2013, 86). According to Chesbrough et al. (2006, 286) open innovation is "both a set of practices for profiting from innovation, and also a cognitive model for creating, interpreting and researching those practices." Dahlander and Gann (2010, 705) point out that this definition includes various different practices to be considered open. On the other hand, open innovation as a concept is not evident but rather broad including various dimensions (Huizing 2011; Vrande et al. 2009).

The starting point of open innovation is opening up the innovation process (Huizing 2011, 2). Chesbrough (2003, 20) discusses inbound open innovation process where purposive inflows and

outflows of knowledge advance internal innovation, as well as outbound open innovation process in which the markets for external use of innovation are expanded. Open innovation is often seen as the opposite of closed innovation in which organizations produce their own ideas and develop, market, distribute, service, finance, and support them internally (Chesrbrough 2003). In today's world open innovation is perhaps taking different forms than in the past as the availability of new information and communications technologies and infrastuctures support innovation. Thus, they enable rapid idea development, exchange and dissemination while decreasing transmission costs and allowing for a larger range of potential as well as number of participants. (Dodgson et al. 2005; Dahlander & Gann 2010.) Caroll and Helfert (2015, 276) claim that one of the key drivers of open innovation are the cost savings. Hence, today's organizations often opt for joint venture or licence agreements rather than spending all in the internal research and development teams (Caroll & Helfert 2015).

Huizing (2011, 3) groups open innovation practices by separating between innovation process and outcome, which can both be either closed or open. Table 1 below illustrates this matrix. There are also several other open innovation frameworks or practices (Dahlander & Gann 2010; Gassmann & Enkel 2004; Lichtenthaler & Lichtenthaler 2009; in Huizing 2011, 3).

Innovation Process:	Innovation Outcome:	
	Closed	Open
Closed	1. Closed innovation	3. Public Innovation
Open	2. Private Open Innovation	4. Open Source Innovation

Table 1. Open Innovation practices grouped by distinguishing between process and outcome (Huizingh 2011, 3).

In Table 1 the closed innovation describes a situation where patented innovation is developed internally in the organization (Chesbrough 2003). In this case both the innovation process and innovation outcome are closed. In the second case, private open innovation, the outcome is closed but the innovation process itself is opened up by using external partners' input or by externally utilizing an innovation developed internally. In the second dimension the innovation process can be either closed or open. Thus, public innovation outcome may be open but the innovation process remains closed. Finally, in open source innovation both the process and outcome are open. Example of this category is open source software. (Huizing 2011, 3-4.) Vrande et al. (2009, 425) point out that compared to closed innovation model, open innova-

tion model means more complex management and organization of innovation processes. This is because open innovation consists of various activities, more than just those traditionally handled in internal R&D departments (Vrande et al. 2009).

According to Huang and Rice (2013, 87) open innovation leads to two main advantages in comparison to closed innovation model. Firstly, it facilitates the transmission of complementary and synergistic knowledge, expertise and resources throughout an organization (Chesbrough 2005; Arora & Gambardella 1990). Secondly, it allows sustaining competitive advantage over time by creating complex, differentiated and even incomparable capabilities, when externally sourced knowledge has been successfully integrated with inhouse resources (Cassiman & Veugelers 2006; Lichtenthaler 2008; Huang & Rice 2013). The study by Huang and Rice (2013, 105) suggests that, generally, regional clusters' close geographical proximity enables positive and significant improvements to open innovation practices. Furthermore, Chesbrough (2010, 23) state that open innovation helps to share the risks and rewards, as well as to reduce the costs of innovation. It also speeds up the time required for delivering innovations to the market and can help in turning a business into a platform for others to build on (Chesbrough 2010).

On the other hand, some drawbacks include the possibility of high co-ordination costs due to involving external parties as well as transaction costs from contractual negotiations and information accessibility (Christensen et al. 2005). Simard and West (2006) add that there are also indirect costs and risks involved if the knowledge inflows are less valuable than the outflows. Thus, organizations are more likely to benefit from open innovation when the potential returns can outbalance the potential drawbacks (Schmidt 2006; Huang & Rice 2013). However, Huang and Rice (2013, 106) state that regional clusters can offset the drawbacks of open innovation and overcome potential disadvantages. Regional clusters can enable an environment where costs associated with open innovation strategies, uncertainty of collaborative relationships and potential conflicts between inbound and outbound knowledge flows can be minimised. In these clusters unrestricted knowledge transfers can occur, supported by mutual benefits and smaller-scale transaction and other costs. (Huang & Rice 2013, 108.)

An area of importance regarding open innovation is external networking (Chesbrough et al. 2006). According to several researchers (Gassmann 2006; Vrande et al. 2009; Von Hippel 2005; Hennala et al. 2011) customer involvement is growing in importance. Customers can be used to inform internal innovation processes and it has been recognised they can be the source of new innovations that producers can emulate rather than being just passive adopters. Innovation networks that consist of individuals and organizations may have a central role especially in product and market innovation (Ojasalo 2003; Ojasalo et al. 2008; Ojasalo 2015a).

In the end, Huizing (2011, 7) predicts that the term open innovation will vanish in the near future. This is not because it would lose its usefulness, but rather because it will be a logical development to fully integrate it in innovation management practices. Organizations will come to realize that they can not afford to assume they have nothing to learn or gain from others. When this time comes it will be hard to imagine that we ever lived without open innovation. (Huizing 2011.)

Innovation and open innovation in public sector

According to Eggers and Singh (2009) innovation in public sector often happens by either in response to a crisis situation, or when an individual or a small group come up with a specific innovation. In both of these cases the innovation benefits are restricted as an organization has no lasting capacity for ongoing innovation due to crisis passing or individuals moving on (Eggers and Singh 2009).

Potts and Kastelle (2010) discuss some differences in innovation in public and private sector. Firstly, in the private sector the motivation to innovate rises from emergence of new profit opportunities by enabling new ways to create value for the customers. On the contrary, the public sector is distinguished from the private sector by incentive structure of motivation and accountability. In public sector organizations incentives to innovation often rise from internal career politics and the development in management within the hierarchical structure. Secondly, the motivation to develop new ideas to seed innovation and co-operation through leadership is weak. The main incentive in public sector innovation is to show intelligence and leadership skills in order to play an internal promotion game focusing on the organizational head of department instead of focusing on the customer value creation. The next difference is that the grounds for experimentation and failure vary between public and private sector. Innovation process is fundamentally about experimentation and learning and, thus, failures can not be avoided. In private sector failure is an accepted cost of doing business taking into account that new opportunities can be derived from the learning process. In public sector experimentation culture is not encouraged as failure may turn out to be expensive due to competitive media and opposition monitoring. Indeed, avoiding failure is an organizational priority. (Potts & Kastelle 2010; Ojasalo 2015a.) Thus, success in innovation is less valued as there is a chance that master politicians will claim the honour, but avoidance of failure is highly valued due to accountability (Potts 2009; Altschuler 1997).

On the other hand, Osborne and Brown (2005) state that the public sector has also endorsed ideas of open innovation. A study by Hennala et al. (2011), for instance, describes concrete cases where innovation has been facilitated by involving citizens in the co-creation process of public and/or third sector services (Ojasalo 2015a). Additionally, Lee et al. (2012) researched how open innovation is conveyed in the public sector in countries such as USA, Denmark, Can-

ada, Netherlands, Japan and New Zealand. The research found several open innovation cases, which were defined either government-led or community-led (Nambisan 2008; Ojasalo 2015a).

Schaffers et al. (2011) point out that a promising strategy to encourage innovation ecosystems in cities is to enable open access to innovation resources. Schaffers (2015) adds that these resources are such as testbeds, living labs, access to user communities, technologies and know-how, and open data. The resources can be shared in open innovation environments and there is evidence that collaboration models for sharing resources is growing in urban areas. On the other hand, further examination, development and piloting is still needed to discover the potential types and structures of the collaboration models and what issues there are to be resolved. Issues to be solved are, for instance, ownership, governance, access, transferability and interoperability. (Shcaffers 2015, 371.)

2.4   Collaborative innovation in the public sector

Innovation collaboration strategies
Eggers and Singh (2009) have identified five strategies for collaborative innovation in the public sector. These are namely cultivate, replicate, partner, network, and open source. The focus of the strategies varies from yielding internal innovation within the organization to external orientation that gathers the ideas from elsewhere. The strategies can be placed on a continuum (Figure 5) in which cultivate is the most internally oriented while open source is the most externally oriented. (Eggers & Singh 2009; Ojasalo & Kauppinen 2016.)
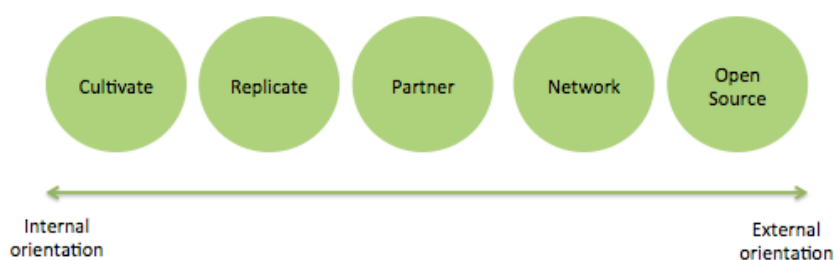

Figure 5. The strategy continuum adapted from Eggers and Singh (2009, 11).

In cultivate strategy the purpose is to engage public organization's employees at all levels in order to exchange, develop and test ideas in co-operation. The replicate strategy has the goal of improving innovation collaboration with other public organizations and adapt existing solutions to a new context. The partner strategy enables innovation collaboration between public and external actors. External actors can be private companies and nonprofit organizations. The network strategy's purpose is to discover, develop and implement ideas in an out of organizational boundaries while enhancing capturing customer response to services and creating

learnign organizations. This strategy is based on multi-actor network utilizing innovation interests of different organizations and individuals. Finally, the open source strategy utilizes the internet to attract and enable external and unknown actors to develop ideas and solutions to the public sector's needs. First three strategies are better known in the public sector while network and open source are still areas to be better discovered. Cultivate, replicate and partner strategies have often failed to meet the expectations and, thus, public sector has been scourged by high rates of failure, slow diffusion and crisis-driven change. (Eggers & Singh 2009; Ojasalo & Kauppinen 2016.)

Harris and Albury (2009) discuss various strategies for opening up innovation in public services to external actors. Public sector has to engange a wider set of organizations, entrepreneurs, innovators and users. Harris and Albury (2009) believe that needed innovation will arise from, for instance, social enterprises, which are often more agile than the public sector in their response to rising needs, resources and solutions. Furthermore, citizen involvement in co-creation and delivery of public services is important. Partnering with civil society and empowering communities will enable public service programmes to be more effective. (Harris and Albury 2009.)

To open up the innovation to wider set of actors Harris and Albury (2009) propose a strategy of developing new markets for public service delivery. Developing stronger, more diverse markets based on a better understanding of user needs would encourage a wider set of actors to participate. Placing citizens at the heart of services is another strategy that is related to the aspect of better understanding of their needs and involving them in co-creation of services. Third strategy is creation and support of local Social Innovation Zones. The zones would be supported by devolved budgets enabling communities to design integrated and creative solutions while drawing together employment, training, education, social enterprise, business creation, culture and regeneration. Finally, strengthening intermediary organizations is a strategy where the emphasis is put on local innovation, connecting a wider set of actors, and enabling a greater capacity to learn in a robust and disciplined manner. Innovation intermediaries also allow for spreading of innovations faster and more widely. (Harris & Albury 2009; Ojasalo & Kauppinen 2016.)

Advantages, risks and obstacles of innovation collaboration
Some of the advantages, obstacles and risks in collaborative innovation in public sector according to Bommert (2010), Hennala, Parjanen and Uotila (2011), as well as Sørensen and Torfig (2011) are gathered in the Table 2 presented below. Bommert (2010) states that collaborative innovation includes tha advantage of improving the elements of innovation cycle in various ways when the innovation process is opened up. Idea generation is strenghtened as public sector can use a wider range of knowledge, creativity and expertise both locally and

globally. Actors participating in idea generation and selection process are more likely to embrace innovations due to having ownership and responsibility. Thus, implementation and diffusion of ideas is supported. Collaborative innovation can influende the broader socio-political environment leading to possible changes in public sector's risk taking culture and enabling leadership, funding and experimentation. It enables overcoming organizational and cultural limitations of the innovation cycle. (Bommert 2010; Ojasalo & Kauppinen 2016.) In their study of multi-actor involvement in public sector front-end innovation process Hennala et al. (2011) found the advantage of potentially crossing the borders and distances in an innovation network with expertise, motivation, and creative thinking skills. Finally, Sørensen and Torfing (2011) describe several advantages after developing an analytical model for studying collaborative innovation in public sector. Firstly, the idea generation is stimulated when different experiences and ideas are circulated, challenged, transformed, and expanded through multiactor collaboration that also facilitates mutual learning. Secondly, the idea selection is enhanced when actors with different views and knowledge take part in a shared assessment of content, potential gains, and risks of competing ideas. Additionally, interactive collaboration enables the formation of compromise and agreement while preventing deadlocks and mitigating the role of veto players. Thirdly, the idea implementation is improved and implementation resistance reduced when collaboration creates joint ownership to bold and new ideas. Collaboration in the implementation stage also mobilizes resources, ensures flexible corrections and compensates potential losses. Finally, the emergence of social and professional networks convey the dissemination of innovative practices in public sector. (Sørensen and Torfing 2011; Ojasalo & Kauppinen 2016.)

COLLABORATIVE INNOVATION IN THE PUBLIC SECTOR		
AUTHOR	ADVANTAGES	OBSTACLES AND RISKS
Bommert (2010)	• Idea generation is strengthened • Idea implementation is facilitated • Idea diffusion is facilitated • May influence the broader socio-political environment • Helps to overcome organizational and cultural restrictions of the innovation cycle	• Potential of one party imposing their own interest and undermining the pursuit of public value • Distribution and unclarity of accountability for public value
Hennala, Parjanen and Uotila. (2011)	• Crossing the borders and distances in an innovation network with expertise, motivation, and creative thinking skills	• Securing the commitment of network collaborators • Creating a situation in which all parties perceive to benefit from the collaboration • Use of brokers in the innovation process
Sørensen and Torfing (2011)	• Generation of ideas is spurred • Selection of ideas is im-	• Cultural barriers • Institutional barriers • Interorganizational barriers

	proved • Implementation of the se- lected ideas is enhanced and im- plementation resistance re- duced • Dissemination of innovative practices in the public sector is propelled	• Organizational barriers • Identity-related barriers

Table 2. Advantages, obstacles and risks in collaborative innovation in the public sector (adapted from Ojasalo & Kauppinen 2016).

On the contrary, Bommert (2010) states that there are risks such as innovation collaboration participants hijacking the decision making process and imposing their own interests or hidden agendas while weakening the aspiration to gain public value. Furthermore, it has to be taken into account who is responsible for the production of public value if the production is collaborative. The transfer of authority and responsibility produces constitutional issues in a democracy where commonly elected officials have the authority and are, hence, held accountable for their actions. (Bommert 2010; Ojasalo & Kauppinen 2016.) Hennala et al. (2011) found some challenges in their study. They (ibid.) state that there are issues of securing the commitment of parties, creating a situation where all parties can discover benefits from the collaboration, as well as the utilization and role of brokers in the innovation process. Sørensen and Torfing (2011) discuss the following obstacles of collaborative innovation. Prevailing legalistic culture that allows zero errors and predominance of paternalistic professional norms is a clear obstacle. Strong separation of politics and administration, as well as use of inappropriate designs for dialogue with users cause institutional barriers. There are also interorganizational barriers caused by the predominance of bureaucratic silos, territory wars and groupthink. Lack of focus on innovation and absence of procedures for exploration causes organizational barriers. Furthermore, there are barriers related to identity when the identities of key stakeholders prevent collaborative innovation. (Sørensen & Torfing 2011; Ojasalo & Kauppinen 2016.)

3   Research Methodology: Service Design and Foresight Approach

This chapter introduces what service design is and what kind of different ways to describe service design process there are. Several different service design processes are explained and compared also including the foresight and futures thinking perspective. Service design methods and tools are touched upon but are explained in more detail in chapter four. In the end of the chapter foresight and futures thinking are discussed as well as their implications for innovation and the public sector.

3.1   What is service design?

According to Moritz (2005, 4) service design is a holistic, multi-disciplinary, and integrative field, which helps to either innovate or improve services. It can be used to re-design an existing service or to develop an entirely new service (Design Council 2015b, 4). Polaine et al. (2013, 40) state that service design and innovation go hand in hand. Segelström (2013, 27) defines service design as "the use of a designerly way of working when improving or developing people-intensive service systems through the engagement of stakeholders". According to Stickdorn and Schneider (2012, 22) there is no common definition of service design and they define it as "an interdisciplinary approach that combines different methods and tools from various disciplines".

Moritz (2005, 39) continues that while service design is the design of the overall service experience, it is also the design of the process and strategy that are needed to provide that service. Polaine et al. (2013, 34) point out that many organizations are still organized in ways that prevent them from delivering good service experiences and therefore a challenge to re-design organizational cultures also exists. Design Council (2015b, 4) further states that service design is the process of creating touchpoints and interactions while enabling making services usable, easy and desirable. Stickdorn and Schneider (2012, 26) define five principles of service design as follows; (1) it is user centered, (2) it is co-creative, (3) it has a sequence of interrelated actions, (4) includes evidencing by visualization, and (5) it holistically considers the whole environment of a service.

Service design provides possibilities for continuous evolution and it is included in the ongoing life-cycle of services. It enables understanding customers, organizations and markets as well as helps in developing ideas, translating them into solutions and finally implementing them. (Moritz, 2005, 39). Service design is not just about designing services for people, but rather designing the services with people, including customers using the service and employees providing the service (Polaine et al. 2013, 41).

3.2   Service design process

Stickdorn and Schneider (2012, 22) point out that there are several ways to describe a service design process. The naming of the process and the amount of stages may vary, but the basic mindset used to design new services stays the same. Also Moritz (2005, 149) reminds that service design projects are often different and therefore there are no absolute rules about the process order. The process stages can overlap and interlink with each other. Overall, it is a complex and iterative process. Polaine et al. (2013, 48) state that it is unlikely that there is an ideal process to be fully executed. The answer to a question "where to start" is "it depends", as in the end a service design process depends on the project and can vary each time

(Polaine et al. 2013, 48; Stickdorn & Schneider 2012, 117). This subchapter describes different service design process approaches and will give an overall view of what can be included in a service design project.

The Design Council has developed commonly known and used model of service design process called the Double Diamond model. The Design Council's (2015b, 6) model is divided into four phases: Discover, Define, Develop and Deliver. It describes how the design process passes from stages where thinking and possibilities are as broad as possible to stages where they are deliberately narrowed down and focused on distinct objectives. According to Brown (2009, 67) this process of creating choices and then making choices is also called diverging and converging. In the divergent thinking phase the goal is to create choices by multiplying options, whereas in the convergent phase choices have to be made in order to find solutions (Brown 2009, 67). Figure below is an illustration of this model and what is included in each of the stages.
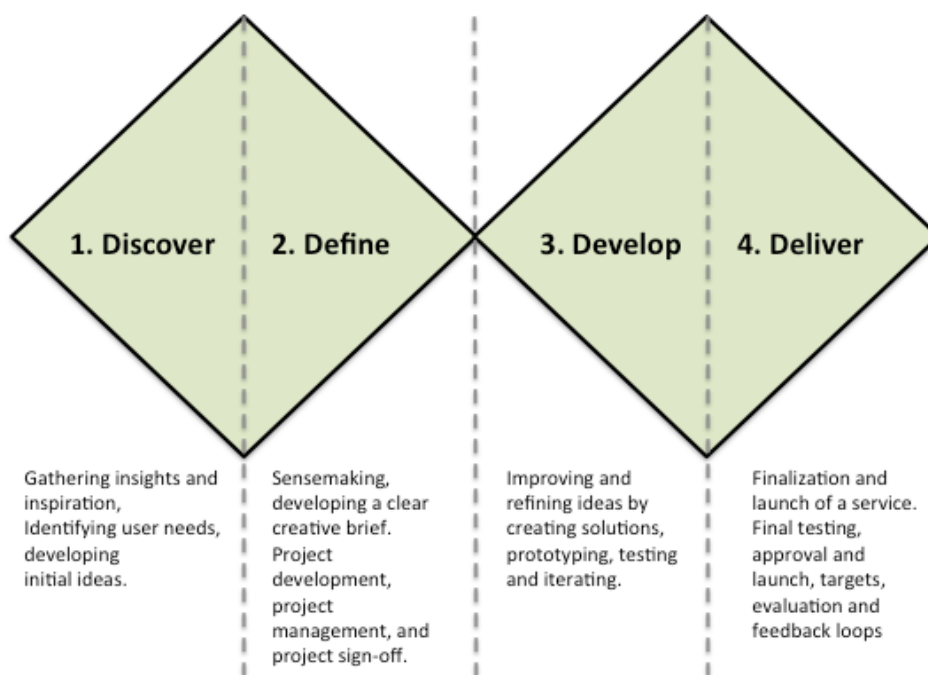

Figure 6. Double Diamond design process by Design Council (adapted from Design Council 2015b, 7).

Stickdorn and Schneider (2012, 117) also present a service design process that includes four stages like Design Council's Double Diamond model. However, they have named the stages exploration, creation, reflection, and implementation. Stickdorn and Schneider (2012, 117) add that the Service Design process is iterative in nature, also within each of the stages, and it is important to learn from every iteration.

Moritz (2005, 123) has grouped service design process into six categories, which are: (1) Understanding, (2) Thinking, (3) Generating, (4) Filtering, (5) Explaining, and (6) Realising. Moritz (2005, 172) explains that it is important to describe in detail what exactly service design does and how it works. Therefore, it is necessary to make a process diagram available showing how the different elements of service design are interlinked with each other. Figure below illustrates this process. It is a map of the complex and interactive process. Taking into consideration that in service design people from different backgrounds have to work together, illustrating the service design process like this also helps in creating a shared understanding in a project. Furthermore, it is an important tool explaining and profiling the whole field. The service design process can be used in parts, as a whole or in several iterations depending on the size of a project. It can also be used to innovate new services as well as to enhance existing services. (Moritz 2005, 156, 172.)
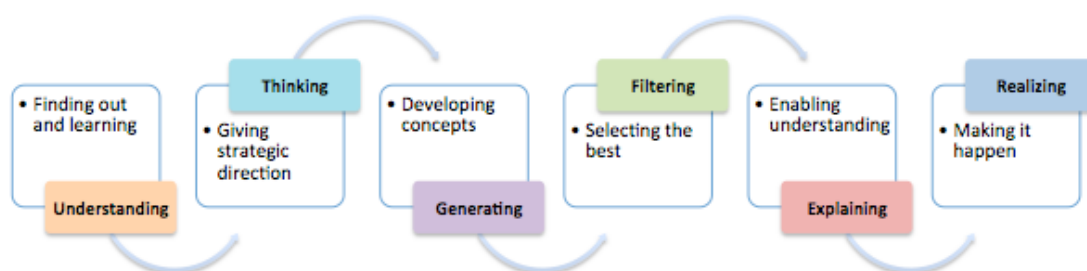

Figure 7. Service Design process by Moritz (adapted from Moritz 2005, 123).

Polaine et. al (2013) go through the service design process with the following stages; Understanding people and relationships; Turning research into insights and action; Describing the service ecology; Developing the service proposition; Prototyping service experiences, and; Measuring services.

Ojasalo, Koskelo and Nousiainen (2015) provide a conceptual framework for service innovation that is based on both foresight and service design. They (ibid.) suggest that by combining the tools and methods of foresight and service design to service innovation process can lead to being successful in the future. This future-oriented new framework includes four stages, which are; map and understand, forecast and ideate, model and evaluate, and conceptualize and influence. The stages might overlap or be iterative in nature. (Ojasalo et al. 2015.)

Design Council's (2015b, 7) Double Diamond model starts from the discovery phase, where inspiration and insights are gathered, user needs identified and initial ideas developed. This is a start of a project where fresh perspectives and inspiration are sought, as well as decisions

made of what is deemed to be new and interesting (Design Council 2015b, 7). Very similarly Stickdorn and Schneider (2012, 120) describe their exploration stage to be about discovering. It includes understanding of the culture and objectives of the service provider. Secondly the goal is to find the problem that should be worked on by understanding the situation from current and potential customer point of view. Finally, the findings and the underlying service structures should be visualized if possible. (Stickdorn & Schneider, 2012, 120-121.) On the other hand, Moritz (2005, 124) has clearly divided this stage into two separate steps; understanding and thinking. Understanding is about researching customers' latent and conscious needs. Different possibilities are explored and context, constraints and resources need to be understood. In Thinking -stage criteria is identified, strategic frameworks developed, specifications and scopes made, and data is turned into insights. (Moritz 2005, 124). In addition to understanding Ojasalo et al. (2015) also take into consideration mapping the future changes in business environments and anticipating future needs and desires when building sensing capability for service innovation purposes.

The second phase in the Double Diamond model represents the definition phase, in which sensemaking of all the possibilities identified in the discover phase happens. The goal is to develop a clear creative brief that frames the fundamental design challenge to the organisation. Then on the third phase, named develop, solutions are created, prototyped, tested and iterated. This process of trial and error helps designers to improve and refine their ideas. (Design Council 2015b, 7.) Ojasalo et al. (2015) again consider the future aspect in their second phase called forecast and ideate, where findings from the previous phase give inspiration for ideation and forecasting alternative futures. In Stickdorn's and Schneider's (2012, 122) process model creation stage is the second step and it includes visualization of a concept design and is related to the next stage, which is reflection. Similarly to Double Diamond model's develop stage, during creation and reflection stages most of the iteration should happen as ideas and concepts are tested. It is recommendable to explore and make as many mistakes as possible during these stages. During the creation stage the purpose is to develop solutions in an agile and co-creative way. It is important to include all the main stakeholders and work in interdisciplinary teams in this co-creative stage of developing. (Stickdorn & Schneider, 2012, 122-123.) Ojasalo et al. (2015) also emphasize agile, iterative and creative testing of new ideas in the third phase of model and evaluate. In this phase the service innovation process moves from sensing to seizing new opportunities (Ojasalo et al. 2015). Moritz (2005, 124) describes the stage of developing service ideas, solutions and concepts as generating stage. The following fourth stage is called filtering where best ideas are chosen, concepts combined, results and solutions are evaluated, and clusters and segments identified. Next, before the final step, is the explaining –stage where ideas and concepts are visualized, processes are mapped out and scenarios illustrated. This stage provides an overview and shows future possibilities. (Moritz 2005, 124-125.)

The final quarter of the double diamond model is the deliver phase, where the resulting product or service is finalised and launched. The key activities and objectives during this stage are final testing, approval and launch, targets, evaluation and feedback loops. (Design Council 2015b, 7.) Stickdorn and Schneider (2012, 124) have included testing and prototyping of the ideas and concepts in their third stage, which is called reflection. It would be recommendable to test the service concepts in reality or at least in circumstances that are close to reality. However, as it is not always possible to test the services in the real environment, the service scenery has to be constructed. (Stickdorn & Schneider, 2012, 124-125.) Finally, implementation stage of new service concept requires change management. It is vital to communicate the concept clearly and include the emotional aspect of the customer experience as well as take into account employees and their motivation and engagement in the implementation process. (Stickdorn & Schneider, 2012, 126.) Moritz (2005, 125) describes the final stage of the process as realizing. At this final stage solutions, prototypes and processes are developed and implemented. Furthermore, business plans are written and guidelines drawn as well as training conducted (Moritz 2005, 125). In Ojasalo's et al. (2015) service innovation process the final phase is conceptualize and influence, where the objective is at transformation and the future is therefore narrowed down towards the preferred.

3.3 Service design tools and methods

There is no right or wrong way to use service design tools and methods. They can be used in almost any combination and are not necessarily tied to any specific stage of the service design process. Merely it is all about finding a workable combination of tools and methods. The list of tools and methods is endless and can have been adopted for service design from the fields of related expertise or can be new as well. (Stickdorn & Schneider 2012, 140; Moritz 2005, 185.)

Polaine et al. (2013) state that different approaches can always be explored if it seems that the current approach is not providing right kind of insights. Sometimes it might turn out that the "wrong" tool borrowed from another discipline works really well. Basically, any method that helps in understanding people's motivations and behavior in more detail will be beneficial in a service design project. (Polaine et al. 2013, 69, 50.)

As there is a vast amount of tools and methods only some of them have been used and presented in this thesis. During the thesis process tools and methods such as desk research, interviews, co-creation workshops, affinity diagraming, brainstorming, scenarios, customer journey maps and moodboards were used. Service design tools and methods used for the purposes of this thesis are presented and described both in theory and practice in the next chapter.

3.4   Foresight and futures thinking

As scenarios are an often used method to understand and shape the future it is necessary to clarify what foresight and futures thinking concepts mean. In addition to foresight and futures thinking there are also several other terms such as futures studies, futures research, futures field, futurology and forecasting when considering the inquieries into possible futures (Ojasalo et al. 2015,; van der Duin and den Hartigh 2009; Bell 2004). In this chapter foresight and futures thinking terms are used to describe them all.

Kuosa (2011, 9) states that the guiding principle for foresight and future studies is that, generally, the future can not be predicted. However, despite the complexity of forecasting the future, it is possible to create alternative futures and the future can also be created with actions of today and be systematically studied (Kuosa 2011, 9). Foresight and futures thinking allow an opportunity to be proactive in forming the future and they can be helpful in making decisions regarding innovation and strategy issues (van Alstyne 2010; van der Duin and den Hartigh 2009). Additionally, they aim at helping individuals or organizations to better understand the change processes in order to create preferred futures and influence the future (Inayatullah 2008, 5; HIltunen 2013, 161). Foresight and futures thinking uncover, study, assess and propose possible, probable, as well as preferable futures (Ojasalo et al. 2015; Bell 2004). Thus, there can be alternative futures instead of just one (Inayatullah 2008, 5). Considering multiple alternative futures helps in conducting futures planning in a holistic manner and substantially improves dealing with uncertainty as well as the overall decision making process (Amer et al. 2013; Varum & Melo 2010; Jetter 2003; Burt & van der Heijden 2003).

As van der Duin and den Hartigh (2009) state, there is a strong linkage between innovation and the future. Future changes in technological, economical and/or societal environments can support a promising innovation idea based on an envisioned future. Some of the future expectations may prove to be false and can be replaced by others. On the other hand, unexpected future developments can lead to realization of an innovative idea. Therefore, innovators and innovation processes should consider future and future changes. Furthermore, innovation includes dealing with future uncertainty as an innovation will be marketed in the future where new developments might have changed the situation in the market. (van der Duin and den Hartigh 2009.) Hiltunen (2013, 176) states that innovation is related to creating a future, or even creating a better future. Furthermore, foresight methods and tools can be used in innovation process, or used together with service design tools in service innovation process (Hiltunen 2013, 176; Ojasalo et al. 2015).

According to Schmidt (2015, 494) public sector organizations too often use foresight to just attempt to get an accurate, narrow prediction of what is going to happen. Instead, public sector needs foresight and futures thinking capabilities to help in understanding and challeng-

ing their own assumptions, anticipating likely futures including the expected and unexpected outcomes of current decisions, and in observing key indicators. Schmidt (2015) continues that these capabilities can be helpful in offsetting negative drivers or mending their effects and making decisions about contingent strategies. They enable being sensitive to weak signals, trends, or emergence of disruptive wild cards. Furthermore, foresight can help the public sector to respond faster and integrate to change processes, and perform better in fulfilling their mandates or meeting their goals. However, public sector executives are still unsure how these capabilities could be implemented in their organizations or are hesitant to do so if they don't have a clear understanding of the consequent cost benefits. (Schmidt 2015, 494.) In to-day's rapidly changing world with increased complexity and uncertainty, adopting future planning methods can provide a precise, comprehensive and integrated approach to urban management invoking more intuition, participation and flexibility (Stojanović et al. 2014, 83).

4   Emprical Study: Creating Open Innovation Platform Scenarios

A design process based on combination of different service design processes was created for the purposes of this thesis. First, the thesis design process is visualized in order for the reader to quickly comprehend the whole process. Next, the design process including the stages of explore, envision and elaborate is explained step by step in linear order. However, it has to be kept in mind that the process has been iterative. The service design tools and methods used in this design process are explained both in theory and practice in this chapter. Thus, enabling the reader to understand the methods better and how they were related to each step of the process. Some of the tools and methods have been used at several stages of the process but are explained here in the chronological order for the sake of clarity.

4.1   Visualization of the design process

The thesis service design process together with tools, methods and timeline is illustrated in Figure 8 below. The first stage, explore, is all about mapping and understanding the current situation as well as discovering and gathering insights and inspiration. In the second stage, envision, is where the sensemaking and data analysis happen. Furthermore, ideation and vis-ualization take place here as well. The third stage, and in this case the final stage, is the elaboration stage where creation and development of solutions and modeling takes place. In this stage the purpose is also to reflect and evaluate, as well as make iterations. This is where the process shifts from sensing to seizing new opportunities as Ojasalo et al. (2015) describe it.
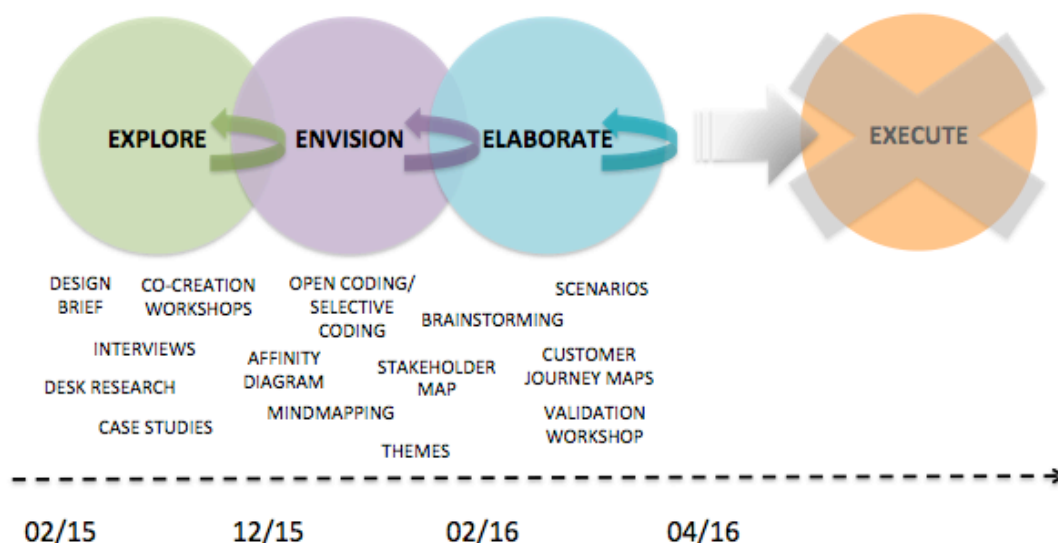
Figure 8. Master's Thesis service design process with tools, methods and timeline.

4.2   Explore

The first stage of the thesis design process is the exploring stage, which includes mapping and understanding the current situation as well as discovering and gathering insights and inspiration. The explore-stage included design brief, desk research, in-depth expert interviews, case studies, and co-creation workshops. These are now discussed in more detail in this chapter both in theory and practice.

4.2.1   Project kick-off: Design brief

A design brief is a critical part of the design process and it is in essence a written explanation that includes the objectives, constraints, budgets and milestones of a project. It enables development of trust and understanding and serves as a reference point for all parties. (Clear Design 2016; Design Council 2015b, 18.) As described in the introduction chapter this thesis contributes to a larger research project. Project kick-off for the entire Smart City research project was held in the end of February 2015. The design brief was presented to the research team by the project lead. It included explanation of the project background, purpose, research methods, as well as expected results and impact. During the kick-off meeting we also agreed upon our individual areas of research regarding the thesis, and our roles and responsibilites considering the whole research project.

4.2.2   Desk research

According to Martin and Hanington (2012, 154) desk research, also known as secondary research, collects and analyzes information from existing data such as books, research papers, journal articles, case studies, government statistics, or a any other sources or archives. Desk research can be time consuming but it is relatively low in cost. The internet has made the process much easier and there are plenty of databases accessible online. However, caution should be taken when considering the credibility of the sources. As part of exploratory research, desk research will provide essential groundwork components to help understanding the design challenge. (Martin & Hanington 2012, 154.) Ojasalo, Moilanen and Rilalahti (2010, 28) mention that before starting to design a development process, it is important to get to know the development focus as thoroughly as possible.

For the purposes of this thesis 15 innovation platforms described below in Table 3 were researched during exploration stage of the process and revisited while elaborating results and constructing scenarios. The purpose of the desk research was to get to know the functions and characteristics that an innovation platform might include. Additionally, the goal was to get an overview and understanding of the research area. Desk research was done simultaneously with the interviews. Some of the innovation platforms were mentioned by the interviewees and included in desk research based on that. The table below provides short description of each platform as well as links to their websites, where more information can be found.

Innovation Platform	Website	Description
Innokylä	https://www.innokyla.fi/	Web-based free-of-charge open innovation community platform, where public and private sector actors can collaborate to manage the procurement cycle. Public procurement project can be planned in collaboration. Offers also practices and service models and provides development tools as well as partners. It enables the sharing of models, information and examples of already implemented innovations. The platform is for health and welfare sector.
Turbiini	http://turbiini.net/	A startup accelerator based in Vantaa. It helps companies to explore new ideas and test new innovations in an agile manner. It also offers workspaces, shared co-working space, telecommunications and workshops in co-operation with their network partners for startups.
Lahen D (Ladec Oy)	http://www.ladec.fi/yrityksille/kasvua-uudistumista-hakevalle/erotu-	Lahen D is an R&D panel managed by Ladec (Lahti Region Development). It consists of the citizens of Lahti region who are interested in developing products and services or their residential environment. Ladec then helps the region's companies or entre-

	muotoilul-la!/lahen-d	preneurs for free and can, for instance, create questionnaires for Lahen D citizens and invite them for testing new services.
Lahticity.fi	http://www.lahticity.fi/	Association established in 1996 to develop Lahti city center as a place of business where companies, real estates and city can collaborate in development activities. Number of member companies and communities was 110 in the end of 2015. There is a small membership fee depending on the size of the company or real estate.
Waag Society	https://www.waag.org/en	A Dutch institute for art, science and technology pioneering in digital media located. Art and culture have a central role in the designing of new applications. It is a platform for artistic research and experimentation, as well as a catalyst for events and a breeding ground for cultural and social innovation. Waag Society offers services where knowledge and facilities can be shared, for instance, courses, workshops, expert meetings or multifunctional spaces also for third parties to host their own events.
iMinds	https://www.iminds.be/en	Digital research and entrepreneurship hub based in Flanders, Belgium driving digital innovation for society and economy. Over 900 researchers and 5 universities collaborate with industry and SMEs in co-operative research projects. It also helps entrepreneurs to start and grow their digital businesses in local and global markets.
Vancouver City Studio	http://citystudiovancouver.com/	City of Vancouver's experimentation and innovation hub in the City Hall where students, staff and community members co-create, design and launch projects. The projects improve and enrich the city making it more livable, joyful and sustainable. It gathers the stakeholders, defines problems and creates solutions while aiming at creating culture change at City Hall and giving the students the possibility to learn in real life projects. It also aims at talent retention in the city.
SCOPE	http://www.bu.edu/hic/research/scope/	A smart city cloud-based open platform and ecosystem being developed in Boston. The platform enables innovators to develop smart city services. Technology allows many partners to compete and co-operate on the same infrastructure creating a multi-sided cloud marketplace. SCOPE utilizes current Boston University projects that use sensor networking as well as decision and control capabilities. The goals are to enable stakeolders to collectively harness, learn, innovate and monetize unused 'big data assets', stimulate new public and commercial goods, innovate with state-of-the-art technology, and ultimately create new spaces for public policy debate, and enhance quality of services as well as innovate new services.
Open Alps	http://www.open-alps.eu/	Open innovation platform where nine partners from five different European countries are involved in the project with the overall goal to support SMEs in their innovation processes with external partners. OpenAlps is part of EU's Alpine Space Programme and is funded by the European Regional Development Fund

		and the participating states. The project had a budget of 2.6 million € and a duration of 3 years (July 2011 - June 2014).
Darpa	http://www.darpa.mil/	Defense Advanced Research Project Agency. Mission is to create breakthrough technologies for USA's national security. It works within an innovation ecosystem that includes academic, corporate and governmental partners, with a constant focus on the USA's military services, which work with DARPA to create new strategic opportunities and novel tactical options.
SLL Innovation	http://sllinnovation.se/	SLL Innovation is a development environment operating in health and welfare sector and it consists of a number of hospitals located in the region of Stockholm. The mission is to contribute to development of medical devices, enhance the connection between medical device industry and health care sector, support new entrepreneurs/companies in the field, and enhance healthcare with new products, services and methods. SLL Innovation offers services to companies who want to get in contact with healthcare sector to develop their products. They also set up a system within the healthcare sector that utilizes the ideas for new innovative products and services from the healthcare staff. They also have innovation ambassadors spreading the word in the hospitals.
Allianz Digital Accelerator	https://digital-accelerator.com/	Digital Accelerator is operating in the field of insurance, asset management and assistance services. The goal is to identify and transform promising ideas into successful businesses as well as to develop outstanding business ideas that can have an impact on a global scale and ultimately better serve and improve the lives of insurance customers worldwide. Lean innovation methodologies are applied in an open environment and in collaboration with entrepreneurs, specialists, and industry experts. Entrepreneurs or those wanting to be one can apply for Entrepreneur in Residence program, where new business concepts are developed and validated. The participant of the program get the support of experienced team, know-how, time, office space, and financial support.
Espoo Innovation Garden	http://www.espoinnovationgarden.fi/en	Innovation hub area consisting of Otaniemi, Keilaniemi and Tapiola city districts in Espoo. The are comprises 4km2 and there are 5000 researchers, 25 R&D units and 16000 students. The area is also a home for hundreds of international companies and at least one startup is formed in this area every week.
Tredea	http://www.tredea.fi/	Tampere Region Economic Development Agency. It has four main programmes with a goal of increasing the attractiveness of the Tampere region in the eyes of investors, skilled workers, innovators, and tourists. Tredea provides free services, information and assistance to companies and individuals who are looking to invest or start a business venture in the region. It has co-operation with the universities, local business life as well as municipal and city leaders.

Uusi Tehdas/New Factory	http://newfactory.fi/	An innovation center and business incubator space in Tampere connecting entrepreneurs, students, researchers, mentors, investors, and experts from various fields to help them co-create value. Solving real life problems is at the core of New Factory's way of working.

Table 3. Innovation Platforms included in desk research.

4.2.3   In-depth expert interviews

Interviews are used to collect opinions and information, as well as attitudes, perceptions, experiences and expectations. Interview is usually a face-to-face discussion with one person, but can also be conducted remotely via phone or social media. (Moritz 2005, 193; Martin & Hanington 2012, 102.) Interviewing can help in discovering new ways of looking at a problem and therefore it is an important technique for identifying new and innovative opportunities. Interviewing can be used in combination with other techniques, such as quantitative studies and observation. It can also help in identifying what could be designed, or help in refining hypotheses about a possible solution. Interviews can be structured following an interview guide or a script of questions, or they can be unstructured and more flexible. (Portigal 2013, 11; Martin & Hanington 2012, 102.)

According to Polaine et al. (2013, 50) in-depth interviews are longer, in-context interviews that are usually somewhat open in their structure. They are good for uncovering values, opinions, explicit and latent information, interactions, as well as idea inspiration (Polaine et al. 2013 , 50). Moritz (2005, 190) adds that expert interviews are conducted with a specialist or expert with experience from the field a project is aiming to improve. Interviewing experts helps to obtain understanding and views on the subject matter, especially if it is a new area for a team (Moritz 2005,190).

Interviews for the purposes of this thesis were conducted between May 2015 and January 2016. Altogether 65 interviews were conducted for the whole research project. These are summarized by sector and country in Table 4. However, for the purposes of this thesis 38 interviews were analyzed. The reason behind not analyzing all of the 65 interviews was, simply, time and resource constraints. The interviews were in-depth expert interviews and each of them was audio recorded. The interviewees also had a chance to make drawings during the interviews. Interviewees' were given a possibility to express themselves visually by handing out an example model of innovation platform and an management model options for innovation platform. The visual outputs were photographed, collected, and interpreted in the analysis. The informants of the in-depth interviews for the purposis of this thesis come from Finland (29), Spain (1), Netherlands (2), China (3), Italy (1), Denmark (1) and USA (1). Most of

the interviewees represented public and private sector, but also third sector organizations, innovation platform operators and researchers were well presented. The interviews were audio recorded and transcribed for later analysis.

SECTOR	FINLAND	INTERNATIONAL	SUMMARY
PUBLIC	18	-	18
PRIVATE	17	3	20
THIRD	7	-	7
INNOVATION PLATFORM	6	10	16
RESEARCHER	1	3	4
SUMMARY	49	16	65

Table 4. Summary of interviews conducted for the entire research project.

The interviewees were selected based on their expertise or experience in innovation in the cities, public procurement, Living Labs, or other type of innovation intermediaries in the city context. The interviewees include persons from the city administration, private companies, third sector organizations, innovation intermediaries or platforms, as well as researchers. Interviewees selected from the city administration have experience or expertise on innovation, urban development, and collaboration with private and third sector organizations. Interviewees selected from private sector have experience or expertise on collaboration with the cities. Interviewees selected from third sector have experience or expertise on collaboration with the cities. Interviewees from innovation platforms or intermediaries have experience or expertise on innovation platforms such as living labs, or facilitation of collaborative innovation networks. Researchers interviewed are academics who have examined innovation intermediaries or urban development. Interviews took approximately one to three hours each. An interview guide and a list of interviewees' organizations are attached as Appendices 1 and 2.

4.2.4   Empirical case studies

A case study is a research strategy that includes in-depth research of contextual events or instances utilizing many sources of research evidence (Yin 2002; Martin & Hanington 2012, 28). Case study research enables taking into consideration both simple and complex situations while allowing the researcher to answer how and why type of questions (Baxter & Jack 2008, 556). The researched cases can be individuals, organizations, communities, events or processes (Robson 2002; Marting & Hanington 2012, 28). Martin and Hanington (2012, 28) add that case studies are valuable in exploratory research when attempting to understand existing

phenomena for comparision, inspiration and information. Furthermore, it can also be exploited when investigating the effects of innovations, change or new programs. (Martin & Hanington 2012, 28.)

During the research process for the thesis multiple cases were studied. Set of cases were chosen according to their suitability for the area of concern. Research of the cases in context happened during the exploration stage between April 2015 and January 2016. Information was collected by in-depth expert interviews and online desk research. The interviewees are experts in each of the cases. Next, these cases are shortly introduced.

Amsterdam Smart City

Amsterdam Smart City is an innovation platform of the Amsterdam Metropolitan Area. It has an organized network meeting once a week. Actors in the network include the city of Amsterdam (different sectors) and big companies and infrastructure providers who have the common interest and intent to develop the city and their own operations. Partner companies pay a certain membership fee, which approximately 50 000€ per year. Amsterdam Smart City has projects covering different themes. Competitive bidding, stakeholders, goal, funding and decision making is decided separately for each project. Below Figure 9 is the research team's interpretation of the Amsterdam Smart City's innovation platform.
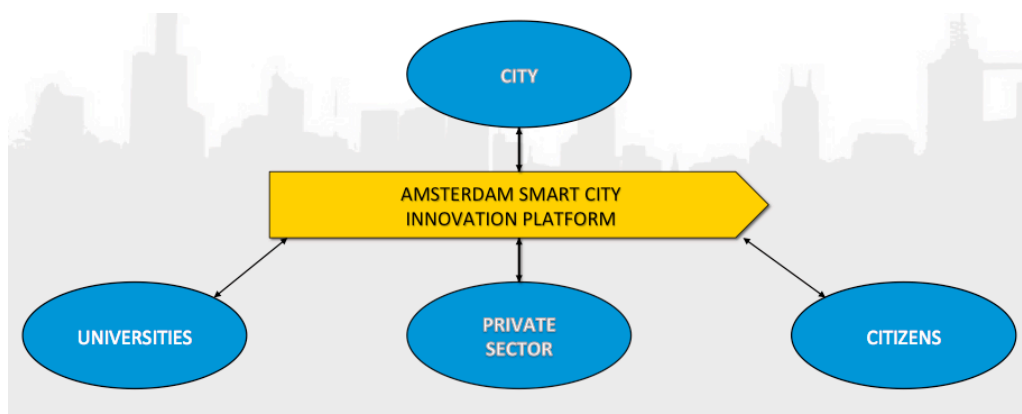

Figure 9. The research team's view of Amsterdam Smart City innovation platform and actors included.

The goal of the Amsterdam Smart City is to challenge businesses, residents, the municipality as well as knowledge institutions to propose innovative ideas and solutions for urban issues. Amsterdam Smart City has developed into a platform including more than 100 partners, who are actively involved in the innovation projects. (Amsterdam Smart City 2016.)

Helsinki Kalasatama Innovators' Club

In Helsinki Kalasatama Innovators' Club (Kehittäjien Klubi in Finnish) different actors (a city, private and third sector, and citizens) develop solutions together (Figure 10). The purpose is also to experiment ideas and solutions in Kalasatama city district and potentially utilize the innovations created in other areas as well. Kalasatama city district acts as an innovation platform and test bed for new innovations and produces solutions for city's, citizens' and companies' needs. Facilitated matchmaking, co-creation events are organized four times a year.
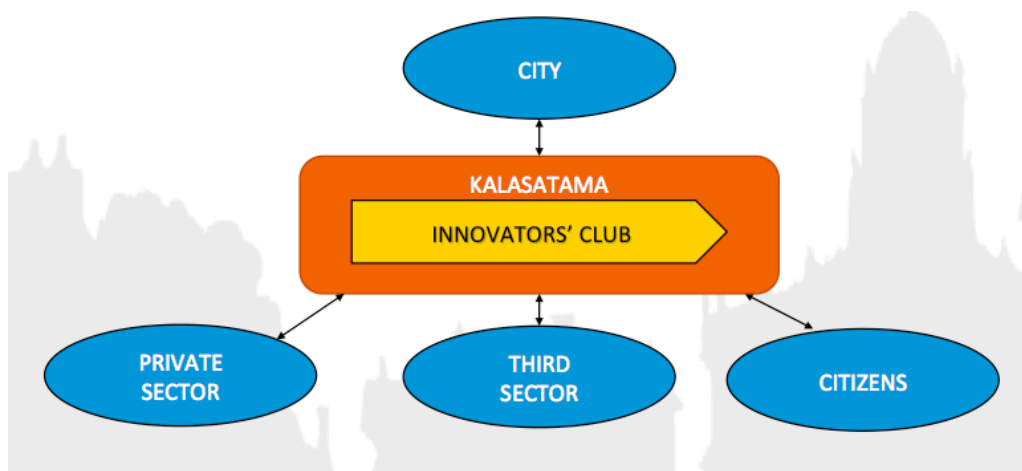

Figure 10. Research team's view of the Kalasatama Innovators' Club and the actors involved.

Smart Kalasatama's goal is to be a city district where everyone co-operates and therefore different stakeholders have been invited to join the Kalasatama Innovators' Club. In the quarterly meetings the stakeholders can network, discuss and plan the future together enabling them to share news and information as well. The Innovators' Club also helps the stakeholders to find collaboration partners and plan projects together. (Fiksu Kalasatama 2016.)

Amsterdam Rooftop Solutions

Amsterdam Rooftop Solutions is and innovation platform that focuses on innovations related to exploiting the roof tops. The company has eight founding members; Amsterdam City and seven partner companies. The purpose is to utilize rooftops and enable, for instance, agriculture, placing of solar panels, creation of parks and places where events can be organized. Rooftop Solutions enhance the energy production, ecology, public-private partnership, and create new business opportunities.

DOLL Living Lab

DOLL is a National Green Lab for lighting, photonics and Smart City technologies situated in Denmark. The stakeholders involved are such as Danish Energy Agency, DTU Technical Univesity of Denmark, as well as regions of Zealand and the capital region. It is hosted by the municipality of Albertslund and it is a home of Eureopean Lighting Cluster Alliance (ELCA).

Figure 11. DOLL Living Lab area (Picture from DOLL Living Lab website 2016).

In the DOLL Living Lab area manufacturers and suppliers can set up and test outdoor lighting solutions on a 1:1 scale on 9,2 kilometers of road and pathways. Companies that work with lighting, intelligent controlling and Smart City solutions can work on the area. Furthermore, qualitative testing of indoor mock-ups in settings such as senior housing, hospitals and schools can be done in the Living Lab. Municipalities and regions have the opportunity to experience different solutions in a real urban environment. This enables decision-makers to choose and buy the solutions. (DOLL Living Lab 2016.)

Living Labs Approach

Two Living Lab approaches were included in this case study research; Shanghai Sino-Finnish Center and Amsterdam Living Lab (pictured below). These Living Labs are essentially idea incubators and innovation ecosystems. They combine public and private sector people within the scope of research and innovation processes. The goal is also to involve users.
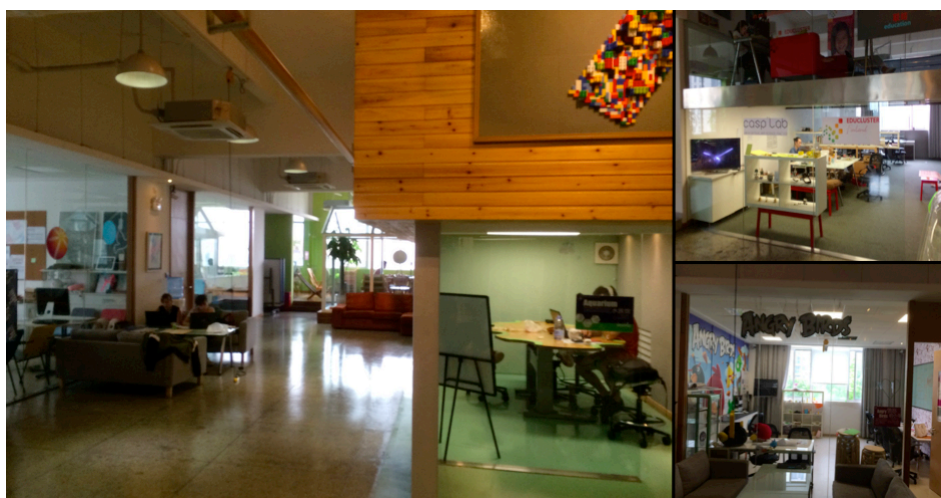

Figure 12. Shanghai Sino-Finnish Center (picture by Jukka Ojasalo).
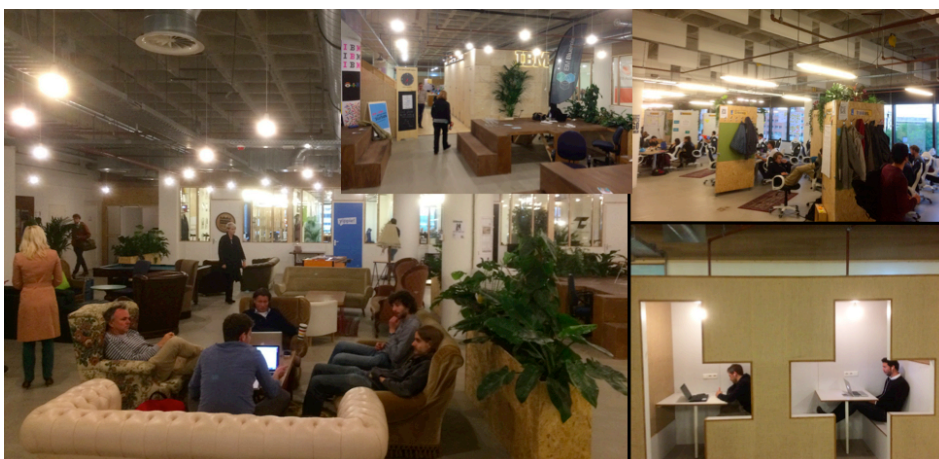
Figure 13. Amsterdam Living Lab (picture by Jukka Ojasalo).

Genova Smart City Association

Genova Smart City Association is an open association that is separate from the city organization. Practical operations are handled by two to three people. The association has over 90 members that consist of the city, big and small businesses, research institutions as well as resident's associations. The membership fee varies depending, for instance, on the size of the business. Member organization has a significant role in the operation while also acting as an expert in EU funding and funding applications. Additionally, a scientific committee has an important role. It defines criteria that the development projects should cover and also estimates the project ideas. The association meets two times a year. In meetings ideation and innovation is often based on public funding opportunities.

Genova Smart City Association was created in 2010 when the city started the transformation process to become a smart city. The goal is to improve citizens' quality of life through sustainable and economic development. The process is based on research and innovation and led by the local government. (Transform 2016.)

Sentilo

Situated in Barcelona, Spain, Sentilo is a technical open data solution that can be openly leveraged, also for commercial use. It entails an open IT-architecture, which enables external parties to utilize the real time data gathered from several different city owned data sensors. The data inlcudes, for instance, meteorological information, levels of light or noise, and occupancy of parking lots or trash cans. The actual open innovation platform in this case is the developer community consisting of technical, executive and member committees as well as advisory board, and steering group of cities located in Barcelona metropolitan area. The developer community is build around the open source platform.
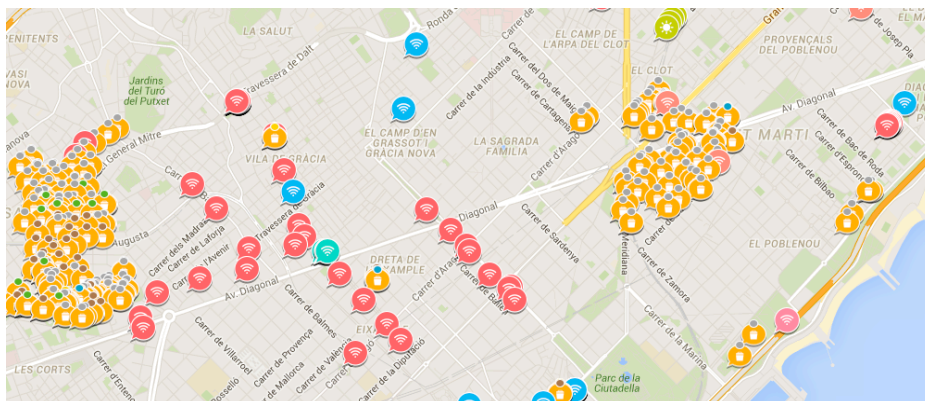
Figure 14. A picture of a map of data sensors in Sentilo platform (Sentilo 2016).

According to Sentilo webpage (2016a) sentilo is an open source sensor and actuator platform that aims in openness and easy interoperability in the Smart City architecture. The platform is built, used and supported by an active and versatile community consisting of cities and companies (Sentilo 2016a).

The Miami Foundation
The Miami Foundation is an organization located in Miami, USA, that unites and supports different actors operating in the Miami area who want to make Miami a better place to live. It brings together donors, different NGOs and citizens to develop the city. The foundation provides small funding via open applications that enable implementation of projects that improve and develop the city area. The amount of funding can be on average 8.000 $. A basis for operations is a fund that is based on donations. Gathering the donations is one of the basic functions of the Miami Foundation. The financial help is not so big but the Miami Foundation also provides expert help for implementation of concrete projects such as planning and building a skateboarding park. Exper help can include, for instance, assitance with city bureaucracy, communications, or law issues. Personnel of the foundation includes approximately ten persons and, in addition, some seasonal workers and partners.

The Miami Foundation works with all kinds of donors, who have donated over $220 Million over the years and have enabled the foundation to invest in the community over $10 Million every year. The aim is to help anyone to become a philanthropist and be effective at it. The foundation offers personal service, has a team that understands the community and is able to help the donors to decide what causes are of importance to them. (The Miami Foundation 2016.)

Urban Mill
Urban Mill is an open co-working and co-creation platform located in Otaniemi, Espoo. The area is also called Espoo Innovation Garden, which is shortly introduced in Desk research sub-

chapter. It is a physical space but also a service and a community. The goal is to bring together private sector, city employees, entrepreneurs, citizens, students and other actors that want to develop urban environments. In Urban Mill events can be organized and people can utilize the co-working spaces.

Urban Mill has three roles; transformation means for its stakeholders, focal point for developer communities, and both physical and virtual co-creation development platform. The purpose is to create solutions to urban problems. Urban Mill also co-operates with other different co-creation spaces or innovation platforms. (Urban Mill 2016.)

Forum Virium Helsinki

Forum Virium Helsinki (FVH) is a development and innovation company owned by the city of Helsinki. It has soon existed for ten years and has almost 40 employees currently. FVH works on different projects that focus on creating innovative, digital services for Helsinki city. The goal is to include a city organization, companies, users, research institutions, startups, communities, developers and so on to enable a perfect quadruple helix. FVH's role is often that of a facilitator and it seeks to bring together parties that have common interests. It can be described as an innovation intermediary that aims at open innovation. It also helps in finding the right funding options.

FVH's development projects are divided into themes, which are well-being, Smart City, media, environment and energy, innovative procurement, as well as growth services and innovation communities. Its mission is to create digital services with co-operation between companies, public sector and citizens in Helsinkin Metropolitan Area that are internationally competitive. FVH values are open open co-operation, commitment to goals, and creating innovations. (Forum Virium Helsinki 2016.)

DigiEspoo

DigiEspoo is part of city of Espoo's digital agenda. In the digital agenda Espoo has considered what kind of actions are needed to discover new digitally enabled modes of operations to organize and produce the city's services. It highlights the culture of fast experimentations and the ability to concretize them. In practice DigiEspoo is an open event that is organized 3-4 times a year. These events have certain main themes and the goal is to find those new modes of operations. DigiEspoo events enable potential partners interested in digitalization of city of Espoo's services to present their solutions to the city representatives. So far DigiEspoo operation has been quite small-scale financially but 2016 budget has allocated resources for experimentation projects.

Helsinki Business Hub

Helsinki Business Hub (HBH) is the regional development agency for Helsinki region and it helps investors to invest in Helsinki region as well as advances business growth (Helsinki Business Hub 2016). It helps companies to develop right products and services that match market needs and demand. HBH also helps companies to create a proof-of-concept by piloting. The goal is to help companies grow, create more jobs, internationalize and bring in capital. Successful companies draw investors, who in turn invest money leading to growth, product development and internationalization.

4.2.5   Co-creation workshops

Stickdorn and Schneider (2012) state that co-creation is one of the five principles of service design thinking. In fact, facilitating co-creation in groups of stakeholders is a fundamental part of service design. Co-creation facilitates interaction between stakeholders, and customers are able to add value to the service that is being developed. Achieving this co-creativity among stakeholders is also a sign of a good Service Designer. There are several methods and tools available to be used in co-creation. (Stickdorn & Schneider 2012, 31, 123.) Ojasalo et al. (2015) point out that co-creation workshops can also be used in working with future trends and weak signals.

Vaajakallio (2012, 217) states that sometimes co-creation workshops are referred to, for example, as design games, drama-inspired methods, or scenarios. Many workshops share the same goal with design games, such as involving users in the design process. The difference is that workshop refers only to the event itself excluding explanations how it is organized, whereas design games, drama-inspired methods and scenarios enlighten also the actions in the workshop. (Vaajakallio 2012, 217.) Vaajakallio (2012, 222) describes creative co-creation with design games as "the process of constructing user understanding as an interplay between subjective and collective interpretations".

Polaine et al. (2013, 60, 75) separate user workshops and client workshop. User workshops are an efficient way to produce vast amount of insights and ideas. Probe-like tasks can be used to warm-up the participants and they work as discussion generators. The purpose of the workshops is to encourage participants to create their own ideas and have them use sketching and collage making. Groups of 4 to 16 people are ideal for a user workshop. (Polaine et al. 2013, 60-61.) In client workshops the ideal size would be 6 to 12 participants. However, sometimes the situation might require a larger number of participants. In these cases it would be useful to have more groups and facilitators within a workshop. In some cases, both users and clients are working together in workshops. (Polaine et al. 2013, 75.) In preparing for workshops Polaine et al. (2013, 61-62) suggest the following aspects to be taken into consid-

eration; recruiting, preparing the venue, creating a schedule, designing the tools, as well as documenting the workshop.

Figure 15. Results from one of the co-creation workshops.

Co-creation workshops are one of the main methods in the beginning of the design process to discover, gather insights and inspiration. The research team organized altogether five co-creation workshops in the cities of Helsinki, Lahti, Vantaa and Espoo. These workshops were held in April, June, August, October and December 2015. The co-creation workshops addressed innovation collaboration between the cities and external actors. The participants of the workshops were from public, private and third sectors and one of the workshops also included citizens. The data from the workshops include transcriptions of selected parts of the workshops, notes, photos of written and drawn material during the workshops (for example Figure 15), as well as written summaries of the main conclusions of the workshops. Each of the workshops varied a little in their content and activities as the team planned them to suit the specific participants. Learnings and feedback from each workshop was also gathered and based on those improvements and changes were made for the following workshops. Additionally, validation workshop with the steering group was held to test and evaluate the scenarios. This is further explained in subchapter 4.4.4.

4.3   Envision

Envisioning stage of the thesis process consists of sensemaking, data analysis, and initial ideation of solutions. During this stage the service design tools and methods called affinity diagramming, open coding and selective coding, mindmapping, brainstorming and stakeholder mapping were used. Based on the analyzed data four themes were created. The tools and methods and the resulting themes are explained in this chapter.

4.3.1   Affinity diagramming

According to Martin and Hanington (2012, 12) affinity diagrammig is a method for clustering and organizing qualitative data. It helps designers recognize insights, observations, concerns, or requirements by using sticky notes (Martin & Hanington 2012, 12).

In this thesis affinity diagramming was used to make sense of and create themes of the inter-view data of the English speaking interviewees. Altogether nine of the interviews analyzed for the purposes of this thesis were conducted abroad and in English. After receiving the tran-scribed interviews the English versions were combined in a separate word document. All in-terviews were first read through to get an overview and while reading them through the se-cond time issues were highlighted that were relevant to the research topic. After that insights were written down on sticky notes and placed on a wall (Figure 16). Next, the notes were clustered according to their affinity after which certain themes started to form. Finally, after re-organizing some of the sticky notes a few times, four overarching themes were discovered. The reason why affinity diagramming with sticky notes was only done with the English inter-view data was that it was manageable compared to a very large amount of data from the in-terviews and workshops conducted in Finnish. Creating affinity diagram also helped with the analysis of the rest of the data as an idea of what to look for formed though this process.
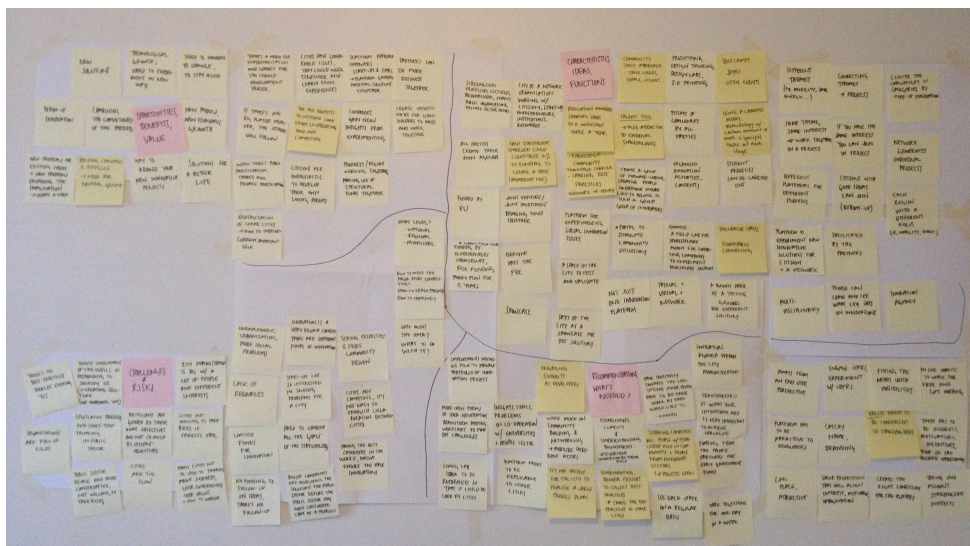

Figure 16. Affinity diagramming for the thesis during envisioning stage.

In addition to affinity diagramming, open coding and selective coding were used to analyze the Finnish interviews as well as the workshops. This method and process is explained next.

4.3.2   Open coding and selective coding

This qualitative explorative study is mostly based on data from in-depth interviews and co-creative multi-actor workshops, and their analysis with open coding and selective coding in terms of the grounded theory (Glaser 1978; Gummesson 2000). Grounded theory was developed by Glaser and Strauss in 1967 and it is a form of qualitative research with an aim to produce theory grounded in data (Corbin & Strauss 2014, 6). According to Moghaddam (2006) grounded theory is "a way of enlightening the clear, the implicit, the unrecognised and the unknown." Engward (2013, 37) adds that it is a systematic research approach and the data collected and analyzed generates hypotheses and theories. Essential part of grounded theory analysis is the process of coding (Babchuk 1997 in Moghaddam 2006). Coding includes naming and categorazing the data (Moghaddam 2006). According to Strauss and Corbin (1998, 3) coding is an analytic process consisting of fracturing, conceptualizing and integrating the data to form theory. Hence, grounded theory coding is a way to analyze content to find and conceptualize the core issues in a vast amount of data. The data should be reviewed several times in the process of looking for emerging codes and concepts. (Moghaddam 2006.)

Open coding process takes place in the beginning of a study and it allows decomposing the data into separate units of relevance or meaning (Goulding 1999; Moghaddan 2006). The aim is to conceptualize and label the data (Moghaddan 2006). Holton (2008) states that before becoming selective and focused in a certain problem, the researcher can see the direction where the study is going with the help of open coding. By coding line by line the researcher can verify and saturate categories. Open coding also helps stimulating ideas. (Holton 2008.) In the final stage of data analysis the coding becomes selective and patterns start to emerge (Moghaddan 2006; Holton 2008). Holton (2008) continues that at this stage open coding ends and selective coding focuses only on the categories that adequately relate to the core category. Selective coding starts when the researcher is sure that the core category has been discovered (Holton 2008).

In this thesis process the amount of data from interviews and co-creation workshops was very vast. Therefore, in addition to affinity diagraming, open coding and selective coding method was used to analyze the data from the Finnish speaking interviewees as well as the workshops. The process of coding the data started with gathering all of the interview and workshop transcriptions in the same word document. In the end, there was almost 1000 pages of transcribed data so the coding was time consuming and intense. The data was first glansed through in a fast manner and after that read through in detail. Only after going through the data a few times, the open coding commenced. In practice, issues of importance and relevance to the thesis topic were highlighted and then copied to a separate word document. The purpose was to recognize, develop and related the emerging concepts and themes in order to

address the research questions. After open coding the amount of data was still hundreds of pages long. The next step was to start the selective coding and go through the summarized data several times while also colour coding the data to recognize different themes. After the selective coding process the data was compressed to under 100 pages which was much more manageable. The process of analyzing the data with open and selective coding took altogether several months as the data was revisited time after time. However, this also allowed for finding the relevant issues and generated a lot of ideas.

4.3.3   Mindmapping

Mindmapping is a visual thinking tool, a way of documenting thoughts and their connections. It is a process of looking for patterns in a vast quantity of data. With a help of a mind map it is possible to visually organize data and that way to understand the problem better. Mindmapping helps in generating ideas and developing concepts. Mind maps start from the one central theme, and lines, symbols, words and images are drawn from there to create connected insights, ideas, and solutions. (Liedtka & Oglivie 2011, 81; Martin & Hanington 2012, 118; Moritz 2005, 205.) Figure 17 below reprents an example of a mind map including laws and basic principles of mindmapping.
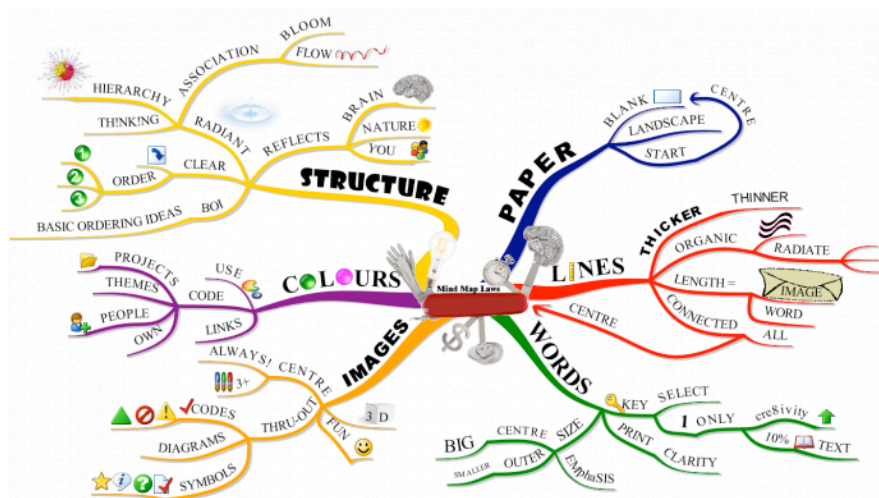

Figure 17. Example of a mind map by MindWerx International (2015).

Initially mindmapping was used in the very beginning to construct a visualization of the thesis. During data analysis mindmapping was used to find patterns and themes in the data. This helped in coming up with ideas of possible scenarios and what they might entail. While visualizing mindmap of the results ideas for the scenarios were simultaneously written down.

4.3.4 Brainstorming

Brainstorming is an ideation technique to quickly generate alternative solutions and opportunities, as well as to identify the most interesting key ideas to develop further. Everyone in the brainstorming group is encouraged to have wild ideas without criticism. It is a cheap, fast and effective way to generate a large number of ideas at any stage of a design project. Furthermore, it creates a shared understanding of potential opportunities. (Moritz, 2005, 210; Design Council 2015b, 17.) Liedtka and Oglivie (2011, 101) suggest brainstorming to be used in combination with concept development in order to translate the ideas into concrete concepts. As Service Design projects may have different needs there are several variations of brainstorming, such as brainwriting, brainshaping, braincharting, or brainracing (Moritz 2005, 211). Technique called bodystorming situates brainstorming in physical experience while combining role-playing and simulation to inspires new ideas as well as spontaneous prototyping (Martin & Hanington 2012, 20).

Brainstorming as well as brainwriting were used in the thesis project several times throughout the process. These methods were used during all of the design stages and were applied also in the co-creation workshops. Furthermore, rainstorming was used for the ideation of the scenarios together with mindmapping method described in the previous subchapter.

4.3.5 Stakeholder mapping

Managing stakeholders means treating them all equally even if they would not contribute to the organization equally. On the other hand, equality can be argued and the most defensible stakeholder theory states that benefits are distributed based on stakeholder contributions. A basis for stakeholder management is stakeholder communication. Some tools for stakeholder management are stakeholder mapping, stakeholder segmentation and materiality assessment. Stakeholders can refer to any groups or individuals that have a relationship with a company. Stakeholder maps can be made to illustrate these. (Phillips 2003, 158, 26-27; Conaway 2012, 38.)

Stickdorn and Schneider (2012, 143) describe a stakeholder map as visual or physical representation of various actors involved in a certain service. A stakeholder map enables interactions between these actors to be charted and analysed and it is a basis for user centered research as well as design development. To make a stakeholder map a comprehensive list of stakeholders is needed. This usually requires desk research and interviews. Interests and motivations of each stakeholder can also be included in the map. Stakeholder maps can be first created speculatively. The maps may take many formats mixing text, photos, and graphics. However, all stakeholder maps should include both internal and external stakeholders. (Stick-

dorn & Schneider 2012, 143-145; Martin & Hanington 2012, 166.) Surbhi (2015) describes internal, or primary, stakeholders as parties, indivduals or groups that participate in managing the business. They can be influenced by the success or failure of the organization or can influence it by themselves. Internal stakeholders have direct impact on the business. External, or secondary, stakeholders are indirectly affected and form the outside business environment. They are not involved in day to day activities of a business but are affected by its operations. (Surbhi 2015.)
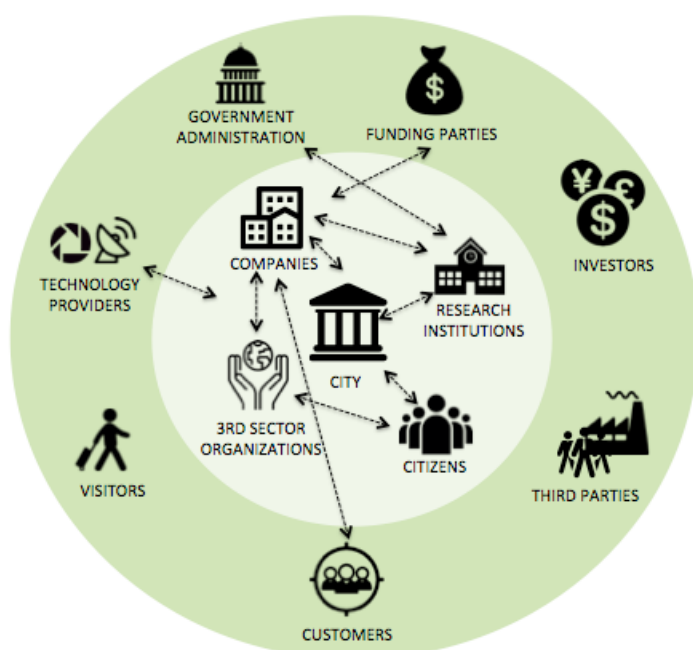

Figure 18. Stakeholder map of internal and external stakeholders in a Smart City innovation collaboration.

Figure 18 above is a stakeholder map for the purposes of this thesis topic and it represents the parties of collaborative innovation in a Smart City context. A light version of the stakeholder map was created while analyzing the data from interviews, workshops, desk research and case studies. The purpose of this stakeholder map is to give a reader an overview what kind of actors are involved when creating innovation collaboration between a city and external actors (companies, third sector oganizations, research institutions and citizens). Internal stakeholders are represented in the inner circle of the figure. Internal stakeholders of collaborative innovation in a Smart City include a city organization, companies, citizens, third sector organizations and research institutions. They are the parties who are primarily influenced by or can influence the innovation collaboration. External stakeholders can include, for instance, funding parties and investors, government's administrative offices, technology providers, visitors to a city, or customers outside a city. Additionally, external stakeholders may include any third parties such as suppliers, producers, logistics companies, or co-operation

partners outside the city. These parties get affected by the internal stakeholders activities, but are not directly involved in it. The arrows between different stakeholders represent the connections and interaction. Indeed, a lot more arrows could be drawn here as the collaboration between parties may take several different forms, but to keep it simple just few arrows were placed in the map.

4.3.6   Resulting themes; opportunites and challenges

Based on the data and the data analysis with affinity diagraming as well as open and selective coding four different themes emerged; opportunities, challenges, recommendations, and characteristics of open innovation platform (Figure 19). Opportunities and challenges are described in more detail here in this subchapter. Recommendations and characteristics of open innovation platform are incorporated in the scenarios of open innovation platforms, which are explained in the next subchapter. Naturally, also the opportunities and challenges are part of the scenarios described later and, thus, they should be kept in mind while reading through the scenarios.
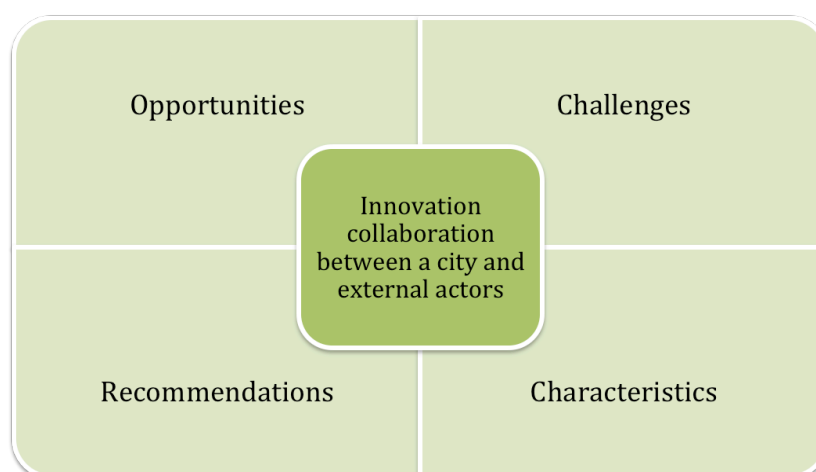

Figure 19. Themes of innovation collaboration between a city and external actors.

There are various opportunities as well as some challenges related to innovation collaboration between a city and companies, 3rd sector organizations, research institutions, and citizens. Table 5 below summarizes the results of the emprical research and they are further explained next starting with opportunities and moving on to challenges.

COLLABORATIVE INNOVATION BETWEEN CITIES AND EXTERNAL ACTORS	
OPPORTUNITIES	CHALLENGES
• Learning and knowledge sharing • Unforeseeable innovation potential • Scalable solutions and services	• Silos in city organizations • Slowness of the city processes • Lack of systematic approach of cities to

• Cost savings to cities • Open data innovations • Citizen participation and bottom up innovation • Innovation from interfaces of different actors • Raising private money for public innovation • Better joint proposals for public funding proposals of innovation • Favorable publicity and branding • Fostering PPPP public private people partnership • Potential for coopetition for companies • Change of attitudes and enrichment of jobs • Emergence of regional and national innovation clusters • Sharing city's infrastructure with external actors • New opportunities for start-ups and SMEs • Sustainable solutions and long-term innovation partnerships • Turning the whole city into an innovation platform	foster innovation • Risk taking reluctance of city organizations and employees • Resistance to change in city organization • Negative attitudes of companies towards cities • Rivalry set-up of actors • Lack of resources of cities • Complexity and size of innovation projects

Table 5. Opportunities and challenges of collaborative innovation between cities and external actors (Ojasalo & Kauppinen 2016).

Opportunities of innovation collaboration

In addition to self-evident opportunities and benefits, such as revenues and profits to companies, more efficient services to the cities and benefits to the society as a whole, the following opportunities and benefits related to innovation collaboration between a city and external actors were discovered. (Ojasalo & Kauppinen 2016.)

Learning and knowledge sharing

The empirical data suggest that a city could function in a sparring role enabling the dialogue, confluence and experimentation with different actors in order to create innovation. Experimentation culture leads to learning and the growth of experience. Experimenting enables creating a working model on how the innovation process could function for collecting best practices and lessons learned. Experimental test cases show what works, and what does not, in reality. Learning from observed failures in the pilot phase represents an opportunity to improve the innovation. Also, sharing the knowledge eases the burden which each party would have on their own. The incentive to participate in collaboration comes from the realization that everyone benefits, at least in terms of learning and new insights. The parties learn from and with each other. Those who are involved in innovation collaboration have the potential to get one step ahead of those that are not. In addition to the learning gains for actors involved in collaborative innovation, eventually the whole society is the beneficiary. Benchmarking the competing service providers enhances one's own services as well. (Ojasalo & Kauppinen 2016.)

Unforeseeable innovation potential

The data show that external input to any innovative process increases the potential to see things from fresh perspective, which in turn can create unpredictable value and benefits. The cities have large pools of data and knowledge of almost all areas of life. However, the data and knowledge are often buried in organizational silos and they are not exploited most effectively. Often, it is easier for an external party to pinpoint areas requiring development. These areas may be unanticipated to the city personnel, but they represent potential innovation. Indeed, innovation platforms enable unexpected encounters, which in turn may lead to new business opportunities, innovation, or at least new perspectives, learning, insights and ideas. Through collaborative innovation, it is possible to create connections that the parties did not even know might be useful for them. Also, through collaborative innovation the development ideas from the front-line employees of a city can be utilized more efficiently. Moreover, the establishment of new customer relationships and new revenues becomes possible. The current economic crisis makes way for changes and opportunities to create something new. As the economically difficult times call for transformation, innovation collaboration encourages stakeholders to renew their thinking and actions and provides opportunities for better visibility. The rapid development of technology also enables unforeseen innovation. Furthermore, the data show that students and young citizens are a potential source of unexpected innovation. (Ojasalo & Kauppinen 2016.)

Scalable solutions and services

Innovation collaboration has a clear potential to result in solutions and services with substantial scalability. This also applies to process innovation and best practices. Scalability means more business opportunities, even internationally. With good scalability, the benefits of the innovation can be disseminated within the same city to different departments or different parts of the city, to other cities home or abroad. The public sector has potential to act as a dynamic engine of scalable innovation since it does not have a commercial interest itself. In contrast, in the private sector the scalability may remain modest and diffusion of innovation slow, since companies tend to hide information and carefully protected their innovations by patents and intellectual property rights. The public sector may therefore be a forerunner of scalable innovations. Many of the cities' problems and needs are universal. Consequently, an innovation developed for the needs of one city, has potential for substantial scalability. If one of the cities of the collaborative innovation network adopts the innovation, this functions as a favorable reference with other potential cities. Already the fact that the solution was developed in collaborative innovation involving a city is a good reference. A city may also offer its contacts to enhance the diffusion of the innovation to other cities. (Ojasalo & Kauppinen 2016.)

Cost savings to the cities

Collaborative innovation of cities brings in cost savings in several ways. Firstly, if the innovation network developing the solution involves several cities, they can share the development costs. Secondly, if several cities adopt the same innovation, it increases the production volume, enables the economies of scale, and is likely to decrease the price. Thirdly, if several cities adopt the innovation, they can also share the maintenance costs. (Ojasalo & Kauppinen 2016.)

Open data innovations

The cities receive and store big amounts of various kind of data as part of their public services. Often the quantity of the data is large enough to function as a "big data" for various digital services. Therefore, the data possessed by the city has a great potential to enable a large number of new innovations. (Ojasalo & Kauppinen 2016.)

Citizen participation and bottom up innovation

Open innovation platform enables the involvement of user communities in a larger scale and offers visibility, thus, opening up the possibilities for bottom-up innovation. The more the citizens are enabled to affect, the more interested they become in participating. While citizens might not think about the business opportunities for innovations, they are very interested in developing and renewing their own urban living environment, thus giving input to the innovation process. The data show that, citizens and third sector organizations can also be trusted to lead their own projects. (Ojasalo & Kauppinen 2016.)

Innovation from interfaces of different actors

Often, the most fruitful innovation emerges in the interaction and collaboration of different kinds of actors. Innovation projects for the cities' needs often involve companies from different industries, large and small companies, third sector organizations, universities and other research institutions, citizens, other cities, etc. Such multi-actor innovation consortia have great potential for totally new kind of services, products, and solutions –even disruptive innovation. (Ojasalo & Kauppinen 2016.)

Raising private money for public innovation

It is in the interest of the cities if new services and solutions can be developed without tax money. The current political mindset in most Western countries is that the cities should not strive to develop and produce everything themselves, but rather seek trusting an increasing share of the service innovation and production to external actors. Collaborative innovation represents a clear opportunity for this development. (Ojasalo & Kauppinen 2016.)

Better joint proposals for public funding opportunities of innovation

Various funding opportunities exist for innovation for the cities. If the innovation project gets external funding from national or international sources, for example from Horizon 2020, the city will save its own tax money. Better funding proposals with higher acceptance likelihood are likely to emerge from collaborative innovation networks. Networking and co-operation creates stronger joint ventures by combining the different perspectives and strengths of each party. This leads to impressive projects and better innovation. (Ojasalo & Kauppinen 2016.)

Favorable publicity and branding

Successful collaborative innovation allows favorable publicity and branding. People make the change happen. Positive word-of-mouth can lead to an improved city brand and it does not necessarily require large investments moneywise. Taking part in cutting-edge innovation collaboration gets the city noticed and gives favorable publicity. This can be a means to brand oneself, create a certain image to the city and increase reputation. Innovation network partners can evoke publicity that benefits all parties by, for instance, by utilizing the social media. Success stories can even get international attention, and thus help in the internationalization and drawing investors. Advocates of innovation collaboration can be used for enhancing the attractiveness of all parties. Good publicity of forerunner innovation will boost the marketing efforts of all parties involved: the city, companies, and research and education institutions. (Ojasalo & Kauppinen 2016.)

Fostering PPPP public private people partnership

There is an evident need for different options for public services, their innovation and production in the future. PPPP public private people partnership is an increasingly popular approach for this purpose. Innovation collaboration enhances PPPP in general, which in turn may bring in several benefits to all parties. It is important for the parties to understand each other's differences and make use of those differences. Encounters have to be regular and open in nature in order to build trust. Collaboration needs to be nourished and clear approaches for PPPP innovation are required. Such approaches may be innovation platforms and intermediary organizations which systematically facilitate PPPP innovation. (Ojasalo & Kauppinen 2016.)

Potential for coopetition

Coopetition refers to a situation where two organizations both compete and cooperate with each other (Bengtsson & Kock, 2000). Collaborative innovation may give an opportunity to companies as well as the cities, that usually compete with each other, to do mutually beneficial collaboration. Coopetition between companies and between the different cities can lead to vitality and new innovations creating benefits for the cities, regions, and nations. Coopetition agitates actors to a better performance. (Ojasalo & Kauppinen 2016.)

Change of attitudes and enrichment of jobs

Innovation collaboration can lead to the change of attitudes and create more enthusiastic atmosphere in the daily work of city employees. Constant communication and co-operative work affects working capacity in a positive manner and makes people more efficient. Increasing knowledge and learning new things can lead to the realization of innovations as opportunities for the better future. Through collaborative innovation, the city workers can be involved in innovation work and implementing their own goals. This can make them to feel of doing something relevant. Participating in co-creative workshops, for instance, can give the feeling of success as the real problems from their point of view are tackled. (Ojasalo & Kauppinen 2016.)

Emergence of regional and national innovation clusters

Larger innovation clusters enable the expansion of markets. Any technical interface can be similar between the cities making them easier for external actors to embrace. Similar interfaces to cities' systems make companies' business planning and benchmarking between the cities easier. Thus, the cities can join their forces and create common interfaces for services, which consequently enhances the emergence of regional and national innovation clusters. An innovation platform facilitating collaborative innovation can be owned by several cities instead of one. Several owners provide more efficient, larger scale learning, enhanced scaling of operations and more efficient organization of activities. Also, the social responsibility of all the stakeholders can be more easily addressed. Combining forces means that structural funding could be exploited more efficiently. (Ojasalo & Kauppinen 2016.)

Sharing city's infrastructure with external actors

Many companies and third sector organizations are interested in learning, knowing, and utilizing the city infrastructure. Sharing a city's infrastructure provides them with new resources for their existing and potential business. It also allows them to learn about the city. This has the potential to increase their competitiveness when serving their private sector customers as well as the city itself. (Ojasalo & Kauppinen 2016.)

New opportunities for start-ups and SMEs

Start-ups and SMEs are often overshadowed by bigger companies. Innovation collaboration creates more opportunities for smaller companies and enables them to show and prove their skills as well as exploit their niche know-how. Smaller actors are usually more agile, flexible and open-minded. This fosters the experimental culture. Start-ups tend to prefer experiments in innovation. An innovation platform and networks can offer support, mentoring, assistance in marketing and sales-oriented operations, and other resources which are scarce with small companies. Partnering possibilities and matchmaking are vital for smaller actors. Innovation platforms offer the smaller actors with opportunities to get involved with bigger actors. In

turn, smaller companies activate the bigger ones to do things differently. (Ojasalo & Kauppinen 2016.)

Sustainable solutions and long-term innovation partnerships

Scalable solutions, services as well as processes foster sustainability. Innovation collaboration enhances the usage of resources and in long-term enables savings in the resources. Sustainable and profitable services that consider the interest of all stakeholders can be easier to design through collaborative innovation. Collaborative innovation enables the city to develop various preventive services and thus create sustainability. It also enables them to think the production and consumption of public services differently and innovate services, which in the long term save costs and resources. Long-term collaboration enables better partnerships and more efficient production of services while adding to customer understanding. (Ojasalo & Kauppinen 2016.)

Turning the whole city into an innovation platform

A city as an innovation platform offers opportunities for developing new solutions in an agile manner and is a basis for competitiveness. The city infrastructure, processes and special events can be designed to allow experimentation and innovation. It has an effect on the attractiveness and economy of the city as well as the whole region. Successful cities attract people, companies and investors. Different challenges and competitions with prizes and awards arranged by the city are a great way to engage people and businesses to innovate for the city. New business opportunities can arise through competitions. Embracing innovation atmosphere lowers the barrier to external actors to recognize and take part in solving a city's challenges. (Ojasalo & Kauppinen 2016.)

Challenges of innovation collaboration

The empirical study found the following challenges of innovation collaboration between a city and external actors.

Silos in city organizations

The cities have the historical and legislative burden of being organized into departments, which tend to protect their own territories from outsiders. Thus, other departments within the city organization as well as external actors outside the city organization may have very little influence on the decision making and function of the department. Also, the role of professions and professional identity of employees is often strong within city organizations. This enhances the silo effect. Consequently, this also restricts the innovativeness of the department in several ways.

- The department is not aware of the end user needs and they lack deep customer understanding. Most importantly, they do not see existing problems and needs ho-

listically from the customer perspective. They often see just one aspect or symptom of the problem. For example, when citizens and companies deal with the city, they often have to go from one department to another to get all the aspects of their problem covered.

- Several innovations require multi-sectoral collaboration. Since the collaboration between the departments is stiff, also their innovation remains modest.

- The department may have an extensive body of data and knowledge which has accumulated in their area. However, the department does not understand the potential value of the information for innovation. If an external actor, a company for example, or some other city department had an access to the data or knowledge they might be able to exploit it for innovation.

- City employees are often obligated to primarily think about the objective of their own department and secondarily larger objectives and needs of the city. Thus, their job is primarily to "think inside the box." This often results from the "management by results" approach implemented in cities.

- Attitudinal reluctance to disturb the existing status quo of territories within the city organization cements the innovative stagnation. Collaboration between departments is difficult since people make sure not to step on each other's territories and cause additional trouble. This is caused by the existing culture in public administration with long historical roots.

- Actors outside one own department are often perceived as "enemies" rather than potential partners for collaboration. This is a big obstacle to innovation and a lost opportunity because the most fruitful innovation often takes place in the interface of silos.

(Ojasalo & Kauppinen 2016.)

Slowness of the city processes

The decision making and processes of a city are perceived to be too slow for the requirements of dynamic innovation in general. Slowness is often referred as "bureaucracy". The public sector must operate in terms of legislation in their decision making since they have regulatory responsibility. Regulatory responsibility might require longer decision making processes. Often, companies do not understand that cities are obligated to move more slowly. In this sense, they are different by their nature. A year may be normal or even a short time for some cases for a city in their decision making, but for a start-up company interested in innovation collaboration it may be an eternity. (Ojasalo & Kauppinen 2016.)

Lack of systematic approach in cities to foster innovation

The research found that city employees recognize the need to foster innovation. However, the methods for doing so are still lacking. City official often see a problem, which might be a promising starting point for commercial innovation. Nonetheless, there are no systematic approaches for how to turn the problem in hand into an innovation process that would hopefully result in a commercial service or product. In other words, city officials lack methods how to help turning a problem into a product. The knowledge of the problem remains within the city hall and an opportunity for an innovation is lost. City officials would need a systematic approach how to deal with this issue. The approach should address the following questions: What is the process of dealing with a problem representing a potential innovation? How is the problem defined? Who covers the costs? What resources are required? Who takes the risk? Which city departments exploit the result? Consequently, the following challenges arise in the city hall in an attempt to turn a problem into a product:

- Goal sharing challenge between city departments

- Process management challenge

- Organizational challenge for cross-departmental collaboration

- Resource allocation challenge

- Reporting challenge

(Ojasalo & Kauppinen 2016.)

Risk taking reluctance of city organizations and employees

Risk taking reluctance is often caused by the fear of failure, fear of losing one's job or ruining one's reputation. Thus, if risks are not taken failures won't occur either. City employees might not be willing to take risks in fear of misconduct. It is easier to stick to old habits and procedures. Also companies' risk taking willingness or ability might currently be lower. The competition positioning is also one of the driving forces for risk taking reluctance. The willingness to take risks depends on how much money and resources are needed. A city's ability to take risks can also be affected by the certain regulatory responsibilities it has for the success of a service. If a service is seen as a failure, a city might be responsible for taking correcting actions immediately. Furthermore, risk sharing ambiguity can have an effect on the willingness to take risks. (Ojasalo & Kauppinen 2016.)

Resistance to change in city organization

Change resistance is often mentioned as a big challenge to overcome and it can even override a good change leadership. This concerns the attitudes of employees. Change resistance is linked to abovementioned risk taking reluctance and fear. There are also mental barriers to overcome. Strong bureaus and silos add to this phenomenon. The existing mode of operations

is very hard to change. Additionally, change resistance can add to the impression of slow city processes. Study findings call for the change of attitudes, a culture change, and tackling the change resistance. However, even though change leadership is needed it is not effectively implemented yet. (Ojasalo & Kauppinen 2016.)

Negative attitudes of companies towards cities

It seems that also companies might have peculiar attitudes towards city organizations. The cities are often seen as less attractive partners to collaborate with. Companies might lack understanding about the city organization's processes and functionality. Additionally, smaller companies or start-ups might not be interested in solving problems for cities due to perceiving city processes too stiff and slow. Often, companies do not realize that cities are partners of different kind than private companies. They do not know or like the fact that cities need to follow the legislation and policies on their decision making and processes. (Ojasalo & Kauppinen 2016.)

Rivalry set-up of actors

Both cities and companies tend to compete against each other, meaning that cities compete against other cities and companies against other companies. The cities are facing very similar challenges and it seems unnecessary that all of them would reinvent the wheel time after time. Currently, it is not an easy job to establish collaboration neither between cities nor between companies. This rivalry set-up is certainly affecting the possibilities of open collaborative innovation. However, it is commonly recognized that collaboration and sharing would, indeed, yield more benefits and create more opportunities for innovation. (Ojasalo & Kauppinen 2016.)

Lack of resources in cities

Resources, mainly human or monetary, are perceived to be limited. Development and innovation work is seen as human-dependent. Scarcity of resources and cutting existing resources is seen as a common challenge. Additionally, lack of resources is seen as a limitation to any innovation work. Recruiting more resources is banned in many occasions. Resources allocated for development work are small and continue to diminish. At the same time, the usage of external consultants is criticized. Working hours are always expensive and a large part of any project's budget is dedicated to working hours. Lack of resources is often used as an excuse for not investing in innovation or development. Resource allocation is a challenge on its own. There is also lack of knowledge how to use the resources wisely. Reorganization of resources could help solving this problem. (Ojasalo & Kauppinen 2016.)

Complexity and size of innovation projects

Large and complex projects may turn out to be a barrier to innovation and exclude smaller partner candidates. Trying to implement big ensembles can also turn out to be slow and

strenuous while making the holistic viewing of the overall project more difficult. Complex projects could be split into smaller parts instead. Also, attempts to forecast the future and make perfect plans without possibilities for flexibility or changing the plans are blocking innovation possibilities. (Ojasalo & Kauppinen 2016.)

4.4 Elaborate

Elaboration stage of the process inludes creation and development of solutions, as well as modeling and validation. During this stage the results for the thesis were finalized in the form of scenarios, visualization of scenarios with customer journey maps and moodboards, as well as a validation workshop. As mentioned in the end of previous chapter four different themes emerged from the data. Opportunities and challenges of innovation collaboration between a city and external actors were also explained. In this chapter the remaining two themes, recommendations and characteristics of the open innovation platform, are further contemplated.

4.4.1 Scenarios and design scenarios

Scenarios can be described in various ways and in service design they are often referred to as design scenarios. According to Pillkahn (2008) scenarios are hypothetical views of the future illustrating a cross-section in an established context while also offering guidance and describing development paths. Scenarios are not representing a future reality but they act as a method for expressing it (Durance & Godet 2010). Design Scenarios are hypothetical stories of a future service or situation that are detailed enough to meaningfully explore a certain aspect of a service or a situation (Design Council 2015b, 22; Stickdorn & Schneider 2012, 178). The goal of design scenarios is to make design ideas explicit and concrete, as well as to create common understanding of a potential future service or a situation. Design scenarios can also help to support decision making. (Design Council 2015b, 22; Martin & Hanington 2012, 152.)

Design scenarios can be used in flexible way and at different times throughout a service design project (Design Council 2015b, 22; Martin & Hanington 2012, 152). They can be used as an inspiration in the beginning of a project or they can be used to communicate outcomes to stakeholders in the later stage of delivery (Design Council 2015b, 22). It might be difficult to explain too many ideas at the same time, therefore several scenarios can be made to show different aspects and variations of a service (Moritz 2005, 230). Amer, Daim and Jetter (2013) state that scenarios encourage strategic thinking and help in overcoming thinking limitations. They (ibid.) also add that creating 3-5 scenarios is an approriate amount for a scenario project, although there is no precise advice how many scenarios would be optimal.

Scenarios can be presented, for instance, in the form of scripts or narratives (Schoemaker 1993). Stickdorn and Schneider (2012, 178) state that design scenarios can be presented, in addition to written text, as videos or storyboars. They also work well with personas and storyboards. They can be, for example, written from a persona's perscpective and bring a persona to life, as well as compliment storyboards by providing information and guidance. Design scenarios are widely used as a strategic planning tools and can help in guiding the design of new business models as well as existing models. Thus, they help in preparing for the future. (Martin & Hanington 2012, 152; Osterwalder & Pigneur 2010, 182). Furthermore, they are powerful in explaining interactive experiences (Moritz 2005, 230).

The purpose of this thesis is to create alternative scenarios of open innovation platforms in a smart city context that enable collaborative innovation between a city and external actors. External actors in this case include companies, third sector organizations, research institutions, and citizens. After analyzing the data from desk research, case studies, interviews and workshops, four different themes emerged; opportunities, challenges, recommendations, and characteristics of the open innovation platform. Opportunities and challenges were discussed in the previous chapter and recommendations and characteristics of the open innovation platform are incorporated in the scenarios of open innovation platforms. In addition, the scenarios also focus especially on the opportunities they might create for innovation collaboration in a city.

As the area of research is rather complex and wide, three alternative scenarios of open innovation platforms were ideated and developed. This allowed for approaching the subject from different angles. The scenario development process was iterative in nature and the ideation started already in the exploration stage of the thesis process. Hence, scenarios were modified several times and took several different forms before ending to these three alternative scenarios that are presented next. Table 6 below first briefly summarizes the scenarios and after that each of them is described in written format in more detail. It is also worth pointing out that none of these scenarios are excluding the other. They can all co-exist in an innovative smart city.

SCENARIO	WHAT?	WHY?	HOW?
POP-UP	• Movable, physical pop-up platform showcasing innovation activities and actors in a city. The platform can be set up in different city areas for a	• Concrete, attractive and easy to approach • Not tied to one place • Citizen participation, customer centricity • Showcase activities • Good for marketing and branding purposes • Scalable solutions and services • Potential to gather best practices of collaborative innovation • Enables fast experimentation and testing • Innovation from interfaces of different	• Movable construction elements and digital tools • A city is the main operator and organizer, but external actors can be utilized as

		actors • Change of attitudes and enrichment of jobs • New opportunities for start-ups and SMEs • Fosters PPPP (public, private, people, partnership) • Works well in new city areas	sponsors and partners
BOTTOM-UP	• A city as an open innovation platform where a city's empty spaces and public spaces are utilized to enable bottom-up innovation. A social enterprise is the orchestrator of operations while a city acts as an enabler and a partner.	• Citizens' wellbeing, empowerment of communities, customer centricity and involvement • Makes a city a better place to live and work • Whole city as an innovation platform • Potential for unexpected innovation • Potential for a city to discover weak signals and challenges that it might not have discovered otherwise • Raises entrepreneurial spirit and enhances retention of skill and talent • Good for small scale innovations • New opportunities for start-ups, SMEs and 3rd sector organizations • Sustainable solutions • Fosters PPPP • Cost-effectiveness	• A social enterprise specialized in community engagement is the orchestrator and operator while a city, or other actors, act as enablers and partners • Innovation communities and community co-ordinators • A city's empty and public spaces are utilized for collaborative innovation
ONE-STOP-SHOP	• A digital platform and innovation intermediary enabling one-stop-shop principle for all innovation activities in a city or cities at national level.	• Simple, easy and time saving • Low treshold for finding innovation opportunities • Potential for co-operation between cities that enables sharing resources and saving costs • Encounters and collaboration between different actors and innovation platforms • Increased awareness of existing innovation resources • Easier business planning and benchmarking • Expansion of markets • More efficient and larger scale learning • Enhanced scaling of operations and more efficient organization of activies • More efficient exploitation of structural funding • Potential for open data innovations • Innovation from interfaces of different actors • Coopetition potential for companies • Emergence of regional and national innovation clusters • New opportunities for start-ups, SMEs and 3rd sector	• Digital platform operated and orchestrated by a skilled innovation intermediary • Can be owned by several cities to form a national innovation network

		• Sustainable solutions and long-term inno-vation partnerships • Fosters PPPP	

Table 6. Summary of open innovation platform scenarios.

SCENARIO 1: POP-UP OPEN INNOVATION PLATFORM – THINK OUTSIDE THE BOX

Movable and physical space

A pop-up open innovation platform consists of construction elements, for instance building containers, which are used for creating a movable platform. Hence, it is a physical platform that is not tied to one place. The pop-up can be set up in different city areas for a certain time, and can handle the challenges of a certain city area or a certain theme. More of these pop-ups can be set up, for example, one for each district, or for different challenges or themes. The transferable innovation platform embraces the identity of the area where it is set up on each occasion and can be branded according to the identity of that certain city district. It is engaging the citizens and communities of that certain city district especially, as well as companies, 3rd sector organizations and research institutions that have, or wish to have, operations in the area. Some city areas might have challenges that are typical only for that certain area. The pop-up platform becomes part of a city culture and function, and citizens, companies, third sector organizations and research institutions can also participate in planning of the themes and building of the container concept. It can, thus, be used for purposes of branding and communication of innovation collaboration activities. Furthermore, it allows for copying the ideas or created solutions from one city district to another.

Showcase and more

The pop-up platform is a showcase type of a platform, where a city and possible partners can make their innovation activities open for all to see, experience and participate in. A city and external actors can showcase their upcoming and ongoing innovation projects, and provide information about how collaborative innovation works. Opportunities and benefits as well as other information about collaborative innovation are showcased and success stories presented. A city's challenges can be presented, gathered, and solved via the pop-up platform. It can also act as a place where initial ideas or service concepts are tested. The pop-up platform can help in actions such as finding partners, hosting events, building innovation communities, presenting challenges and competitions, testing and experimenting, and showcasing services. External actors are welcome to showcase their own services and ideas as well as to participate in different activities. External actors can also act as partners in operating the pop-up platform. Additionally, a certain city organization can showcase and test its innovation operations or processes within the pop-up platform. The platform can have changing participants and innovation partners. The physical space can include, for instance, working spaces, information desk, idea sharing spaces, prototyping lab, showcase area, and a cafe or restaurant.

Experimentation

The pop-up platform can be an experimentation project itself, lasting for a year or two. This way a city can gather best practices, learnings and elements that work and don't work in innovation collaboration, as well as help creating a network and a working model for an innovation platform. An innovation platform like this allows smaller scale innovation collaboration to take place and enables the growth of innovation collaboration between a city and external actors. It is a place where learning and sharing happens.

Attractive

In combination with the physical space, digital platform and tools are exploited to make the concept more efficient and appealing. It is important that the platform gathers publicity and is visible in different media. Social media especially can be heavily utilized. Furthermore, the physical space itself has to be very active to keep up the buzz. Different events are hosted at the platform. Due to limited space, live streaming of the events and posting the videos and material online afterwards is utilized, making them open for all. City's employees can make use of the space as a remote working point. There can be rotating schedules for employees from different departments to work at the platform, which allows for interorganizational encounters. Additionally, employees are able to connect with the external actors. The pop-up platform has the ability to create encounters, even unexpected encounters, as well as mutual understanding. It also helps in opening up the city's processes to external actors and finding the right people for collaboration. In essence, it is a place that attracts the attention of everyone in a city.

SCENARIO 2: BOTTOM-UP APPROACH - A CITY AS AN OPEN INNOVATION PLATFORM
People have the power

A city organization isn't necessarily always the identifier of a city's challenges, but challenges, ideas and innovation can form bottom-up. Bottom-up approach has the well-being of the citizens and empowerment of communities as a starting point. Through this approach a city's challenges are solved as citizens are doing well, are active, and are developing solutions to challenges. Creativity is invoked by activeness and experiences. This enables more bottom-up innovation, vigor, and raises entrepreneurial spirit. It contributes to creating a better habitat and more sustainable solutions, which in turn solve also some of the challenges that cities are facing. Startups, SMEs and 3rd sector organizations especially can develop new services in cooperation with the citizens and it is easier for them to get involved in innovation collaboration this way. People are able to work on challenges they feel are important, and the more they are enabled to affect, the more they are likely to be interested in taking part. Innovation communities consisting of citizens can be utilized and new innovation communities formed. They can participate in different development activities and help companies, for instance, by testing new services or taking part in research.

Social enterprise as a facilitator

The motor behind this type of bottom-up innovation is a social enterprise, or organization, specialized in community engagement and activities. It can act as an expert that facilitates the operation and provides help by, for example, organizing events, finding partners or sponsors, providing information of city bureaucracy, or small funding to carry out the development projects and experimentations. Community co-ordinators are appointed to each area. Innovation collaboration needs to have a clear focus on each occasion, for instance, certain challenge or theme in certain city districts or community. Citizens can also be trusted to lead their own projects. Social enterprise as a facilitating organization leads the innovation activites and makes sure that they get publicity and attract citizens as well as other actors to get involved in innovation activities.

A city as an enabler and a partner

The bottom-up approach embraces the thought that the whole city is turned into an open innovation platform, where a city's empty or public spaces such as libraries, city hall, parks, sports venues or museums are utilized for the purposes of innovation activities. This enables, for instance, creation of communal working spaces, meeting places, organized events, or multifunctional workshop spaces. In addition to physical spaces digital tools are exploited for communication and networking purposes. Digital tools also help in finding information, for instance, about free spaces, upcoming events, or innovation communities. A city as an enabler can be the partner removing obstacles that bottom-up innovation might face. Furthermore, it is vital for a city to be an active partner and participant in these bottom-up innovation activities as it enables recognizing weak signals. It would be useful for a city to build a systematic process for capturing ideas that arise from bottom-up innovation. The process should be able to gather ideas, process them, enable experimentation, development and implementation into practice as well. Furthermore, this bottom-up approach can also have other actors such as research institutions as partners.

SCENARIO 3: ONE-STOP-SHOP - OPEN INNOVATION ECOSYSTEM

Digital platform

One-stop-shop open innovation platform allows for the utilization of existing resources and existing innovation platforms, networks, and intermediaries while allowing new collaboration to form. As a variety of innovation platforms exist already, a digital platform combines these spaces, events and operators under the same platform creating an open innovation ecosystem. The main purpose of this approach is to enable a one-stop-shop principle to all innovation activities, where all who are interested can find different activities by a city, by themes or by city districts, as well as platforms, projects, events, talent pools, networks, challenges and competitions, funding possibilities, success stories, partners, previous innovation cases, education possibilities and so on. There is a possibility to include tools such as user profiles, networking, co-creation workspace, project planning, reporting, or innovation models to ena-

ble innovation collaboration via the digital platform. Connection to procurement and pre-commercial procurement are useful elements as well. A city can provide information and data for external actors via the digital platform. Through different focus areas it is easier for different actors to find partners with the same interest. The aim is also to make different actors aware of the existing resources and enable a better use of the resources.

Innovation intermediary

An innovation intermediary is the connecting force behind the digital platform. Skilled intermediary to orchestrate the operations is needed. An innovation intermediary exists physically in the background. The intermediary has to be active and keep the operation and information up to date. It has to be able to facilitate multi-actor network, be the interpreter and matchmaker in the interface between different actors. Thus, the intermediary also strives to form physical contacts between actors. It is also the responsibility of the intermediary to consolidate the information in the platform to form a reasonable ensemble in order to avoid confusion and information overload.

National innovation network

The one-stop-shop approach creates an innovation collaboration network that can be build up nationally. Thus, the digital platform as well as the innovation intermediary can be owned by several cities allowing the sharing of resources. Digital platform together with innovation intermediary enable encounters and collaboration between different actors. This approach empowers collaboration of cities, and saving and sharing of resources in the long term.

4.4.2   Customer journey maps

A customer, or a user, journey map is a visual representation, such as flowchart, map or other graphic illustration, of a customer's journey through a service. It aims to identify the key elements of a service and to show all different interactions and touchpoints customers have throughout a service. Defining these touchpoints can be done by generating customer insights, for example, by observing, interviewing or letting the customers document their own journey maps. Customer journey maps help recognise pain points or problem areas as well as what already works, so called magic moments. Furthermore, these maps can represent either customer's actual or ideal journey. They can be used in the beginning of a design process to document an existing customer experience, as well as in later stages to, for instance, generate ideas for brainstorming, identify novel elements, or for prototyping new experience. (Liedtka & Ogilvie 2011, 61; Design Council 2015b, 11; Stickdorn & Schneider 2012, 151.)

For the purposes of this thesis three customer journey maps to suit the three alternative scenarios were created. The purpose of the customer journey maps in this case is to illustrate examples of different, imagined service journeys for each scenario and to give an idea how an open innovation platform could work as a service. Each customer journey covers before, dur-

ing and after service stages as well as touchpoints, actions and results. However, it has to be kept in mind that these are simplified versions of customer journeys and they are not comprehensively taking into account every possible aspect that might occur. In addition to customer journey maps, short explanation to introduce them are provided.

Figure 20 below illustrates an example of a customer journey for pop-up platform scenario. In this case the customer is a company that seeks to test its new digital service with potential users at the pop-up platform. The customer co-operates with the platform operator to organize a pop-up space. The journey goes through the stages from service idea to service launch and each of the touchpoints is described in the customer journey.

POP-UP OPEN INNOVATION PLATFORM

STAGES	BEFORE			DURING			AFTER		
TOUCH-POINT NAME	Service idea	Booking a showcase	Planning	Set-up	Gather data, test, showcase	Dis-assemble	Data analysis	Making Improve-ments	Launch service
ACTIONS	Development of a new digital service	Agree-ing a showcase time at the pop-up platform	Plan the space, testing and events in collaboration with platform operator	Setting up the pop-up space at the platform	Test, experiment, gather data, agile development, showcase company & services	Disassembling the pop-up space	Furhter analysis of the gathered data	Possible enhance-ments, further developm ent or testing of the service	Launching the new service
RESULTS	New service ready for testing	Showcase time booked and confirmed	Set-up plan ready	Physical space ready	Service testing, development and data gathering completed	Physical space disassem-bled	Data analysis complete	Improved service ready for launching	New service launched

Figure 20. Example of customer journey for pop-up platform scenario.

The next example is an illustration of a customer journey in the bottom-up platform scenario (Figure 21). In this case, the customer is a citizen who gets an idea how to develop a green-roof solution for the community. The customer journey describes the different touchpoints, actions and results from the idea emergence to the scaling of the solution to a city's other communities. During the journey the customer collaborates with other citizens, community co-ordinator, facilitating organization and other experts.
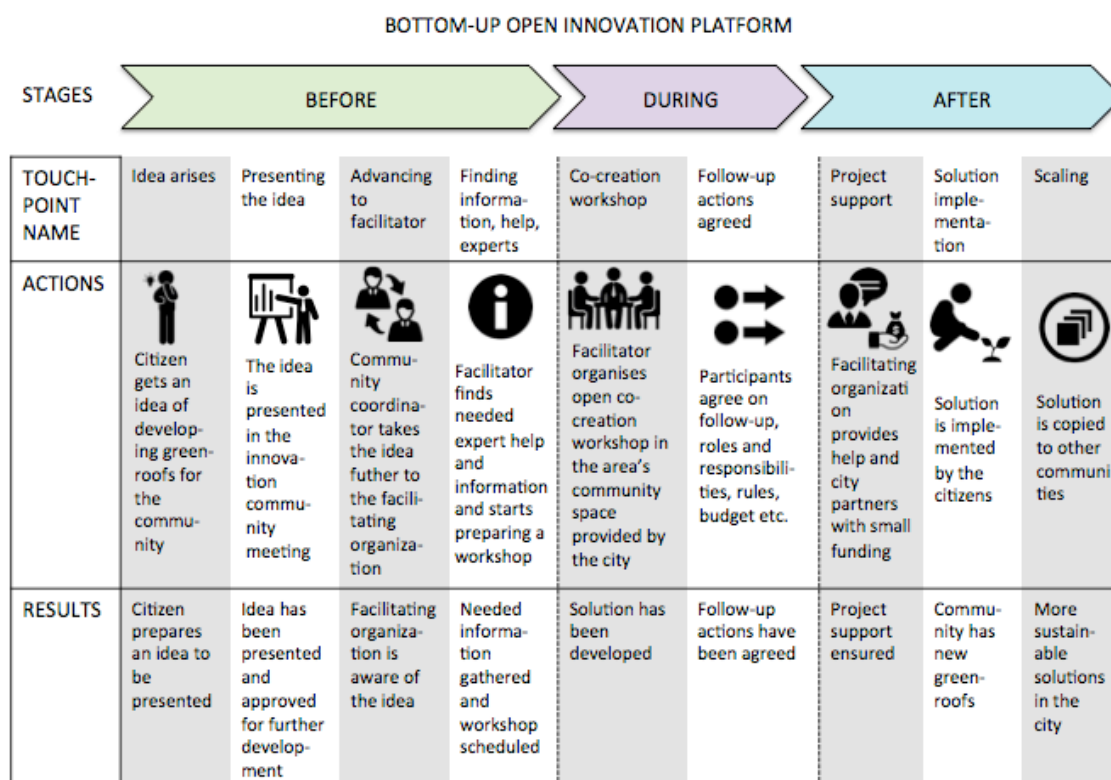
Figure 21. Example of customer journey for bottom-up platform scenario.

The last customer journey gives an example of one-stop-shop platform service situation (Figure 22). The customer in this case is a start-up company who wants to find partners and new possibilites for innovation collaboration. The start-up gets help from both the digital platform as well as the innovation intermediary. The journey goes through the different touchpoints starting from a need to find partners and ending in searching for new opportunities with the new-found partners.
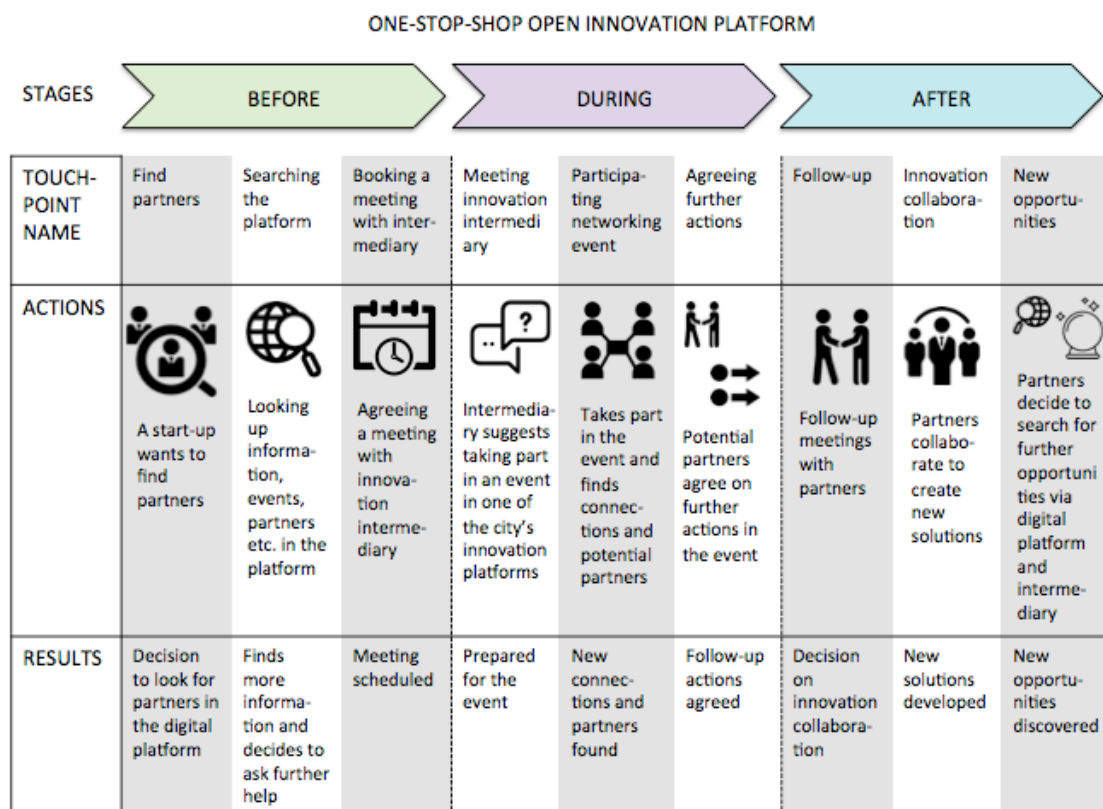
Figure 22. Example of customer journey for one-stop-shop platform scenario.

4.4.3 Moodboards

Moodboard is a collage of different images and materials to illustrate a certain mood or athmosphere and to create an overall impression of a service experience or of the service environment (Moritz 2005, 227). The moodboard helps explaining some unconcious, sensual and intangible values a service might have that are difficult to be described by words. The use of a visual representation helps to establish a shared understanding of the mood and athmosphere of a service inside the design team. (Moritz 2005, 227; Service Design Tools 2015.)

To help to concretize the alternative scenarios, three different moodboards were created for the purposes of this thesis. These moodboards were also used when presenting and evaluating the scenarios in the validation workshop making them easier to explain. The moodboards are presented below in Figures 23, 24 and 25. Moodboards' image sources are attached as Appendix 3.

Figure 23. Moodboard for pop-up platform.

Figure 24. Moodboard for bottom-up platform.

Figure 25. Moodboard for one-stop-shop platform.

4.4.4 Validation workshop

Before finalizing the scenarios, customer journeys and moodboards a validation workshop was held to test, evaluate and validate the scenarios. Validation workshop was held at the steering group meeting of the research project on Innovation Platforms in Smart Cities in the Urban Research and Metropolitan Policy Program in the beginning of April 2016. The participants of the workshop included representatives of all participating cities; Helsinki, Espoo, Vantaa and Lahti. The purpose of this validation workshop was also to compensate the missing execute, or implementation, stage of results of the thesis in order to prove the applicability of the scenarios in the future.
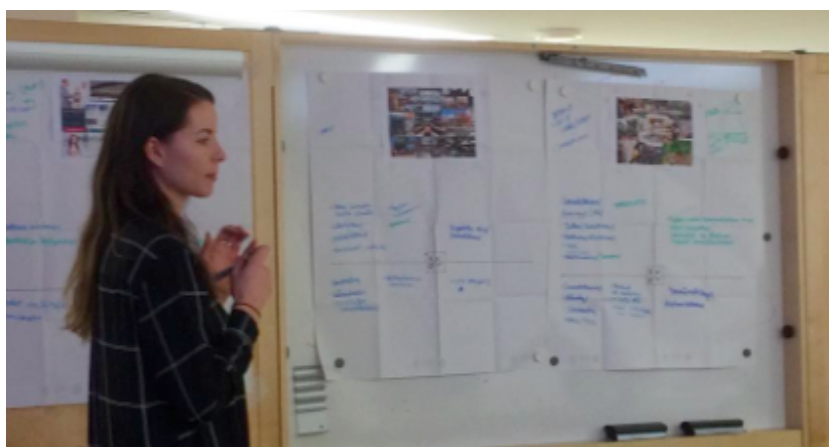
Figure 26. Testing and evaluating the scenarios at validation workshop.

In the validation workshop scenarios were first briefly presented with the help of moodboard visuals. Next, the scenarios were contemplated in a co-creative manner using a SWOT analysis. According to Moritz (2005, 222) SWOT analysis is an effective method to discover strenghts, weaknesses, opportunities and threats a service or an organization might face. SWOT analysis also helps in focusing activities into the areas of strenghts and opportunities (Moritz 2005, 222). Furthermore, validation workshop provided essential and useful feedback in the form of discussion and SWOT analysis sheets. All participants considered the scenarios viable and possible to implement in any city. The participants also thought that the scenarios do not exclude each other and all of them could be well implemented simultaneously. However, there could be a combination of these three scenarios that would be an ideal solution but that would require more research. Thus, this factor is stated as one of the future research opportunities. After the validation workshop, the scenarios and visualizations were moderated to improve them on the basis of feedback and then finalized to the forms that they were presented in the previous subchapters.

5   Conclusions

Now is the right time for cities to start embracing sustainability, citizen-centricity, vibrant economy, accessibility, flexibility, efficient governance and responsiveness (World Economic Forum 2016, 53). Gouillart and Hallet (2015, 47) state that in order to develop and sustain effective and co-creative platforms public sector leaders have to defeat remarkable barriers. However, there are limitless opportunities what they can achieve if and when they are able to start a collaborative pursuit to create new value (Gouillart & Hallet 2015, 47). Hence, despite all of the challenges of collaborative innovation in Smart Cities mentioned throughout this thesis, it is convenient to state in this final chapter that the opportunities are still greater.

This chapter summarizes and evaluates the process and results of the thesis in the light of the posed research questions. Furthermore, the value and contributions of the study are explained. Finally, the report ends in proposing opportunities for further research.

5.1   Summary and evaluation of the process and results

The purpose of this thesis was to develop alternative scenarios of open innovations platforms in a smart city context that enable collaborative innovation between a city and external actors. External actors were defined to include companies, third sector organizations, research institutions, and citizens.

The following research questions were set to reach the goal:
- What kind of scenarios of open innovation platforms enable collaborative innovation in a smart city context?
- What are the opportunities and benefits of collaborative innovation in this context?
- What are the typical challenges when attempting to create innovation between a city and external actors?

Taking into consideration the complexity of the research area, the thesis first shed light on the overall situation of the challenges that cities are facing by giving insights in the introduction to phenomena. There was also a recognized need to increase scientific as well as practical knowledge of innovation collaboration between a city and external actors. Additionally, all Smart City initiatives emphasize innovation collaboration for better services and products needed by cities. The conclusion was that the chosen thesis topic is very current and relevant in nature.

The theoretical framework supported the practical objective of thesis in efficient manner. Existing theories in chapter two explained what Smart Cities, innovation platforms and innovations intermediaries are. Then, open innovation concept as well as innovation and open innovation in the public sector were discussed. Finally, strategies, advantages, as well as obstacles and risks of collaborative innovation in the public sector were explained.

In the beginning of the research process the scope of the research felt somewhat overwhelming especially as the researcher was not previously familiar with the public sector. Thus, the chosen existing theories provided more understanding, guidance and also initial input to all of the research questions posed for the thesis. In particular the existing theories supported providing answers to the research questions "What are the opportunities and benefits of collaborative innovation in this context?" and "What are the typical challenges when attempting to create innovation between a city and external actors?"

To find answers to the research question "What kind of scenarios of open innovation platforms enable collaborative innovation in a smart city context?" a service design and foresight approach was chosen. Research methodology, discussed in chapter three, mainly included theories of service design approach but additionally foresight and futures thinking were considered since the main results of the thesis were laid out in the form of future scenarios. Scenarios can be used as a method in both service design and foresight practices. The core principles of service design are user centricity, co-creativeness, iterative actions, evidencing by visualization, and holistical consideration of the entire service environment (Stickdorn & Schneider 2012, 26). It is also closely related to innovation (Polaine 2013). Additionally, foresight and futures thinking allow an opportunity to form the future and they can be helpful in

making decisions regarding innovation and strategy issues (van Alstyne 2010; van der Duin and den Hartigh 2009). Scenarios are an often used method to understand and shape the future. Therefore, it can be said that service design and foresight as a method approach were very well suited for the purposes of this thesis.

Chapter four of the thesis then explained in detailed manner the entire service design process as well as the tools and methods used for creating the alternative scenarios. The design process based on combination of different service design processes was created for the purposes of this thesis including the stages of explore, envision and elaborate. The thesis design process was visualized in order for the reader to quickly comprehend the whole process. The process was then explained step by step in linear order although some of the tools and methods were used at several stages of the process. The tools and methods used in the design process were explained both in theory and practice, also providing justifications why they were chosen. Additionally, based on the results of the emprical research the opportunities and challenges of collaborative innovation between a city and external actors were explained in detail in subchapter 4.3.6, thus providing scientific value and answer to all research questions. Moreover, the thesis process provided an excellent opportunity to learn more about the service design process, methods and tools in practice. The most challenging part proved to be the data analysis during the envisioning stage. It was challenging due to large amount of data covering a vast area of issues that were also covering the other research subjects related to the larger research project. However, the chosen methods of affinity diagraming, open and selective coding, mindmapping, brainstorming and stakeholder mapping for the purposes of this part of the process were effective to begin the ideation of solutions.

Three alternative scenarios of open innovation platforms enabling collaborative innovation in a Smart City were created as a result of the design process. Those were named as pop-up, bottom-up and one-stop-shop platforms. Based on the rich data and the wide research area it was decided that three scenarios enable approaching the subject from different angles while keeping in mind that none of them were excluding the other. The scenarios were first briefly summarized and then described in written format in more detail. This thesis provides a range of possibilities and potential implications of collaborative innovation in a Smart City in the form of scenarios of open innovation platforms. While certain elements of open innovation platforms may be general, this study finds it relevant to consider several alternative scenarios of open innovation platforms. Different scenarios have different characteristics, and different potential for application in different contexts. The iterative process of writing the scenarios helped in identifying and focusing the key areas. Scenarios as a method in this context was a successful choice to understand the drivers of change in a city environment and to stimulate thinking about the future. As Stojanović et al. (2014, 81, 82) stated, scenarios is one of the tools that can help the public sector in responding to the challenges of complexity, future

changes and their consequences while also help in overcoming the thinking limitations in urban planning processes.

To concretize the scenarios customer journey maps and moodboards for each scenario were created. The purpose of the customer journey maps was to illustrate examples of different, imagined service journeys for each scenario and to give an idea how an open innovation platform could work as a service. Moodboards' goal was to illustrate a certain mood or athmosphere as well as to create an general impression of each scenario. The moodboards were also used when presenting and evaluating the scenarios in the validation workshop. The validation workshop was organized in order to test, evaluate and validate the scenarios and also to compensate the missing execute, or implementation, stage. The validation proved the applicability and viability of the scenarios. The value and contributions of the study are discussed further in the next subchapter.

5.2   Value of the study

This study has both scientific and practical value. The scientific value of the study relates to new empirically based scenarios of open innovation platforms fostering innovation collaboration between a city and external actors. Opportunities and challenges of collaborative innovation between a city and external actors discussed in this thesis also provide novel scientific value. Moreover, the results of this study emerge from particularly rich data, gathered from cities, companies, third sector organizations, innovation platform and innovation intermediary representatives, and researchers both in Finland and abroad. This allowed the utilization of the different perspectives in the analysis.

This study extends the knowledge of public sector innovation, open innovation platforms and innovation intermediaries, collaborative innovation and Smart Cities. Hence, it genuinely focuses on developing the public sector in particular. Additionally, by bringing elements of service design and innovation into areas where they are much needed, the thesis contributes to the knowledge of service design and how it could be utilized in the project concerning the public sector. Moreover, the thesis contributes to the knowledge of using scenario method in the public sector context. The results of the study also help cities in their pragmatic development and policy decision making by offering alternative scenarios for embracing and enhancing collaborative innovation between a city and external actors. Furthermore, this study has practical value for cities, innovation platform operators, research institutions, companies, third sector organizations as well as citizens.

Scenarios created as a result of this thesis are detailed enough to meaningfully investigate different aspects of open innovation platforms as an approach to enable collaborative innova-

tion in a Smart City. Scenarios make the idea of open innovation platforms more precise and concrete and help creating a common understanding how they could help in collaborative innovation between a city and external actors. Moreover, three alternative scenarios show different aspects and variations of the subject. This enables to approach the subject from different angles. They are valuable in supporting decision making processes and as strategic planning tools, thus, helping to prepare for the future. These scenarios can be used as an inspiration for further research and they can also help in building new business models. Additionally, the scenarios can be used to communicate the outcomes of the research to a wider audience in an understandable and concrete manner.

The customer journey maps to support the scenarios illustrate examples of different, imagined service journeys for each scenario and give an idea how an open innovation platform could work as a service. Furthermore, moodboard for each platform scenario illustrates a certain mood or athmosphere and creates an overall impression. Moodboards help explaining some unconcious or intangible values these open innovation platform scenarios might have that are difficult to be described by words. Both customer journeys and moodboards help to concretize the alternative scenarios and thus have practical value for cities, innovation platform operators, research institutions, companies, third sector organizations as well as citizens.

The results of this study are valuable in a sense that they have potential for transferability to other cities internationally that seek to enable or enhance collaborative innovation between a city and external actors. Furthermore, there is potential for transferability also to private sector. For instance, a business can utilize these results when creating innovation collaboration with its partners.

Finally, this thesis also contributes to the larger two year research project on Innovation Platforms in Smart Cities in the Urban Research and Metropolitan Policy Program. The results of the thesis help in achieving the goal of developing a generic concept for open service production and innovation in public sector as well as developing a model for supporting related decision making in public administration.

5.3   Prospects for future research

As stated in the introduction chapter of this report there is a clear need for further research and development of the subject area that is in scope of the larger research project. While this thesis contributes and provides value to this area to some extent there are still plenty of future research opportunities. The prospects for future research related to the thesis topic are discussed next.

The central stakeholders in collaborative innovation in a Smart City context in addition to a city are at least companies, third sector organizations, research institutions, and citizens. In this thesis the focus was more on the public sector. Therefore, this topic could also be further researched and approached from the other actors' perspective.

Schaffers (2015, 371) states that further examination, development and piloting is still needed to discover the potential types and structures of the collaboration models and what issues there are to be resolved. Issues to be solved are, for instance, ownership, governance, access, transferability and interoperability. While the thesis contributes also to these areas opportunities remain for further research. For instance, there is a need for a concrete development model for city organizations, as well as operational instructions how to foster and implement collaborative innovation.

Another further research area related to the thesis is open innovation and the level of opennes. Huizing (2011, 7) states that open innovation as implemented in companies and discussed in the academic literature is not at that stage yet and there is a need for more integrated theories. There is still a lack of knowledge about how and when to use open innovation (Huizing 2011, 8). It could be, for instance, useful to look at how open the open innovation platform essentially needs to be and what is the level of openness in each stage of the innovation process.

Innovation process and management of open platforms are further research areas on their own. Scholten and Scholten (2012, 165) remind that despite the spreading of the open innovation concept, the actual innovation process itself, the management techniques and control mechanisms to secure focus and value in open innovation platforms still need more investigation. This became apparent also during this study and, thus, future research projects can focus on these areas.

As suggested in the validation workshop a further research project could also concern constructing a single preferred future scenario that could be a combination of all of the three scenarios presented in the thesis. A single scenario could then go more into detail with issues such as implementation, innovation process and management, level of openness, or marketing and branding. Furthermore, according to Stojanovic et al. (2014, 93) the research on scenario approach in urban planning process is also quite scarce so far. There are no general guidelines for the implementation of the procedures and techniques for developing scenarios. Therefore, the use of scenarios in the public sector can be further researched. This study was approached from a service design perspective in order to create the scenarios. It would be also interesting to see more studies that investigate the public sector issues with the help of service design.

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Figures

Tables

Appendices

Appendix 1: Interview Guide

INTERVIEW GUIDE/BRIEF

1. Introduce yourself
2. Introduce the KaTuMetro -project (city development and metropolitan policy research programme):
   a. Smart City research project, that investigates and develops solutions for utilizing open innovation in situtation where a city wants to get external actors (e.g. businesses, third sector organizations) to develop solutions for the city's challenges and needs. The goal is to develop an approach, or approaches, where the external actors would innovate solutions to the city's challenges and needs while also building new business opportunities for themselves.
   b. The project is a part of the city development and metropolitan policy research programme, which is funded by Ministry of the Interior, Ministry of Finance, as well as all metropolitan cities including Helsinki, Espoo, Vantaa, Lahti and Hämeenlinna
3. Give the interviewee an A3 paper with the model in it and tell him/her what is the context of the research. I.e. innovation platform that links the city, businesses and the third sector actors. Describe how the innovation platform has been defined in this instance.
   a. An approach where the city enables or leads the external actors' innovations in order to develop solutions for the city's challenges or needs.
   b. There could be many alternative approaches. For example, it could be an intermediary organization facilitating innovation, an organization executing/implementing innovation, a certain pilot target, a pilot building or a neighborhood, Living Lab, Fab Lab, a virtual solution/platform, network etc. Either physical or virtual, or a combination. Etc.
   c. This is a simplified model to visualize the research context. The interviewee could modify and/or complement the model as he/she wishes during the interview.
4. Questions
   a. What ideas or thoughts does this model raise?
   b. What kind of different approaches for implementing such a platform do you see? How could it be realized? What could be the working mechanisms for the platform?
   c. Who are the actors that should be involved in this process?
      1. What are their roles and duties?
      2. How are they networked?
   d. What kind of resources are needed?
   e. What factors would contribute to producing business or third sector innovation activites that would consequently solve the city's needs and challenges?
   f. What would be the most significant challenges?
      1. How can these challenges be tackled?
   g. Have you come across any successful, or unsuccesful, attempts to implement this kind of innovation platform in Finland or abroad?
      1. Tell me about it?
      2. What was successful, unsuccessful?
   h. What advice would you give for a city that plans to build innovation activities between the city and external actors if they have no experience?
   i. Does anything else come to your mind regarding the topic that we haven't discussed yet?

Appendix 2: List of Interviewees' Organizations

INTERVIEWEE'S ORGANISATION	INTERVIEW DATE
Amsterdam Smart City	3.-4.6.2015
Living Lab for Urban Niuse Abatement	25.8.2015
City of Espoo	2.6.2015
City of Espoo	23.6.2015
City of Espoo	24.6.2015
City of Vantaa	14.8.2015
City of Espoo	2.9.2015
City of Espoo	25.8.2015
City of Espoo	15.9.2015
Forum Virium Helsinki	24.9.2015
Demos Helsinki	21.8.2015
6Aika, Forum Virium Helsinki	6.10.2015
Espoon yrittäjät	17.9.2015
Helsingin Diakonissalaitos	8.10.2015
City of Vantaa	11.9.2015
City of Espoo	29.9.2015
Witrafi Oy	25.9.2015
Rinnekotisäätiö	17.11.2015
Helsinki Business Hub –Greater Promotion Ltd Oy	14.10.2015
Setlementtiasunnot Oy	30.11.2015
Nuorisoasuntoliitto Ry	20.10.2015
Attendo, Vartioharjun palvelukoti	28.9.2015
Hoivaonni Oy	14.10.2015
Geometrix Oy	26.11.2015
Debora Oy	20.11.2015
PTCServices Oy	23.10.2015
VTT	19.10.2015
Soste Ry	2.11.2015
ESADE Business & Law School, MoF - Minds on Fire, Bar-celonaHomes	Spring 2015
Saxion University of applied sciences, Aalto University, Adventure Research	Spring 2015
Tongji University, Shanghai	10.6.2015
DDJ Consulting, Isity Global	21.6.2015
Sino-Finnish Centre, Tongji University, Shanghai	17.6.2015
University of Genoa, Department of Economics	15.9.2015
City of Espoo	5.11.2015
Coreorient	12.10.2015
Urban Mill	22.12.2015
Center for Urban & Community Deesign/ University of Miami, School of Architecture	17.12.2015

Appendix 3: Moodboards' Image Sources

Pop-up Platform

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