

**The smart city as a sociotechnical imaginary –
Translating visions of the future into local networks and
interpretations of smartness**



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Acknowledgements

After 5 years, my time as a student is up. It has been 5 highly memorable, humbling, and inspirational years which I will cherish for the rest of my life, but it does feel strange to no longer being a student. I remember looking forward to writing about a topic of my own choosing, however, writing a master thesis is tough. Nevertheless, I can in the end look back at a time of personal and academic growth. The topic of this thesis is something that genuinely interests me. It is something that might affect the way we interact with technology and even people, which therefore makes it so interesting and important to address. I have for a long time been fascinated and captured by science fiction, utopian and dystopian tales, and I believe the end-result somewhat reflects that.

To have come where I am today, there are a lot of people that needs to be thanked. Firstly, thank you to my informants for taking the time to participate in my project. Your insights are valuable, because they shed light on an emerging phenomenon that is important to study. Thank you to my supervisors Helen Jøsok Gansmo and Thomas Berker, whom both from the very beginning have been encouraging and supportive of my topic, but also have been strict, honest, and calm when I found myself lost. Without their strategic and insightful perspectives, this thesis would likely look very different. During my last semester, I was fortunate to learn from and be supervised by Jenny Melind Bergschöld, whom have been highly encouraging and supportive in my endeavours, but also opened my eyes for how to be a better scholar. A special thanks also goes to the faculty of the Department of Interdisciplinary Studies of Culture for a great learning environment. I want to thank my friends close and distant for providing me with humour and good times during my time writing this thesis. I would also like to extend a sincere and grateful thanks to my Dad, Leslie and Jill, whom have read and commented on my work.

Lastly, and most importantly, my family deserves a warm thank you for your endless support. Words cannot describe my gratitude, but I hope my efforts can. Thank you for everything.

Thomas Edward Sutcliffe

Trondheim, May 2018.

Abstract

This thesis explores smart cities in a European and Norwegian context. Methodologically, the thesis draws on semi-structured qualitative interviews with municipality workers, 60 structured quantitative interviews with citizens in Trondheim, and document analysis to capture a broad perspective on smart cities. Additionally, I actively use STS theories on actor-networks and sociotechnical imaginaries to study how smart cities are translated from an international to a local context. I show in this thesis that climate change and societal issues are influencing the European Union (EU) to rethink courses of technological and societal development. This led to smart cities as a solution to mitigate climate change impact. Since 2012, cities in Europe have been shifting their attention towards the EU led initiative “Horizon 2020”, where prioritizing sustainable and “smart” development of urban spaces is prioritized. I then explore how Trondheim municipality became involved in Horizon 2020 and that municipality workers translate the European smart city as a sociotechnical imaginary into local networks and interpretations of smartness. Through the insights from municipality workers and citizens in Trondheim, I show that there are differences in how the “public” and the municipality perceive smart cities. The municipality workers interpret the smart city as tightly bound to business development and that the smart city platform can enable business opportunities that otherwise would be difficult. However, whereas the citizens are unaware of the municipality’s involvement with Horizon 2020. The unawareness the data shows, points to an unsuccessful enrolment of the citizens to Trondheim municipality’s smart city development.

However, much of the critique of smart cities as an urban development strategy lies on its heavy neo-liberal aspects, and that the public is to engage and co-produce technological- and societal transitions in cities. Lastly, smart city approaches and development also raise important issues to address. For instance, with smart cities largely basing themselves on implementation of information- and communication technologies and open data solutions, issues regarding data security and privacy arise. In light of the Facebook scandal in the spring of 2018, these topics are actualised.

Keywords: smart cities, translation, sociotechnical imaginaries, innovation, sustainability, climate change, EU, citizen engagement.

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CHAPTER 1 – WHAT IS THIS THING CALLED THE SMART CITY?

“Climate change is one of the major challenges of our time and adds considerable stress to our societies and to the environment. [...] Without drastic action today, adapting to these impacts in the future will be more difficult and costly”

(United Nations, n.d.).

Climate change is not something confined to one specific place on Earth, but is present everywhere, although in different shapes and forms, e.g. melting ice caps in the northern hemisphere, rising sea levels, and heavy air pollution in cities. There have been countless efforts to find solutions to human constructed climate change. A recent effort is the climate agreement from Paris 2015. The Paris Agreement from 2015 is a result of a collective political effort and a turning point for creating a low-carbon economy. 196 nations signed to commit to aim for keeping global warming below the 2 degrees Celsius. Ratifying countries can independently decide on how to lower their emissions. However, although climate change is a key factor in emerging policies, other issues have also influenced political spheres towards an age of transition. For instance, in 2008 the United States (U.S.) suffered a major financial crisis, which had significant repercussions in other parts of the world including Europe. With both climate change and financial uncertainty looming, immediate responses were pivotal as business-as-usual no longer was a sustainable course of action. In light of such realities, the European Union (EU) has been active in finding a solution to them. As climate change along with economic and social issues arose, the EU launched the European Innovation Partnership for Smart Cities and Communities (EIP-SCC) in 2012.

I will in this chapter, contextualize and introduce smart cities, as well as the research questions.

THE EUROPEAN INNOVATION PARTNERSHIP FOR SMART CITIES AND COMMUNITIES

In the aftermath of these key events, political institutions such as the EU, there have made serious measures to mitigate and prepare for similar events in the future. The EIP-SCC defines its strategy as such:

The European Innovation Partnership for Smart Cities and Communities combines Information and Communication

Technologies (ICT), energy management and transport management to come up with innovative solutions to the major environmental, societal and health challenges facing European cities today (SCC, 2014).

What this definition describes, is that cities in Europe can expect an increase in innovation. Particularly directed towards improvements in transport and energy distribution. The aim of this partnership is to come up with scalable and transferable solutions to contribute to the EU's 20/20/20 climate action goals¹. Furthermore, the partnership seeks to overcome administrative challenges impeding the conversion to smart cities, and to co-fund demonstration projects by helping to coordinate existing city initiatives by merging its resources. However, the overarching goal of this partnership is to establish strategic partnerships between European cities and industries for the development of urban systems and infrastructures of tomorrow (SCC, 2014). The partnership follows the Smart Cities and Communities Initiative in 2011, which at the time only covered energy, whereas the EIP-SCC also includes information- and communication technology (ICT) and transport management. Along with the EIP-SCC, we find another EU initiative called Horizon 2020. This is the biggest Research & Innovation program with €80 billion available for funding from 2014 to 2020. Horizon 2020 promises more breakthroughs, discoveries and world-firsts by transferring great ideas from the lab to the market (Horizon 2020, n.d.). European leaders and members of the European Parliament has backed Horizon 2020 as a mean to drive economic growth and create jobs (Horizon 2020, n.d.). It is the financial instrument implementing the Innovation Union, where the EIP-SCC lies, and is aimed at securing Europe's global competitiveness. Not only is the smart city a mega trend that will drive urban development for the next decade, but it will also create tremendous business opportunities with a market value of \$1.565 USD trillion by 2020 (Castelnuovo, 2016). To be competitive and to meet the global challenges, the EIP-SCC emphasizes and promotes accelerated innovation as a key approach:

The Innovation Union announced European Innovation Partnerships (EIPs) which are designed to mobilise actors across the innovation cycle and across sectors around an overarching target in order to speed up innovative solutions to societal challenges, including major energy and transport challenges in cities and communities (EIP-SCC, 2012: 2).

¹ The goals entail 20% cut in greenhouse gas emissions (from 1990 levels), 20% of EU energy from renewables, 20% improvement in energy efficiency (see more at https://ec.europa.eu/clima/policies/strategies/2020_en).

By mobilising actors across sectors the EIP-SCC seeks to accelerate innovative solutions societal challenges, which enable cross-sectoral business development addressing key areas as energy and mobility. European cities and communities are to participate to enable such accelerated innovation. An EU initiative connected to the EIP-SCC and Horizon 2020 vision was launched to categorize and incentivize the speed-up of cross-sectorial innovation. This initiative is called lighthouse cities (LHC) and follower cities. The process is rather simple in its form, however complex in its potential success. By that, I mean that for cities to have success, or becoming LHCs, there is an initial “call text”. A call text is in this context a document with specifications and criteria to what content the smart city application must have and follow in order to potentially receive funds from the Horizon 2020 program. The funds are earmarked for the realisation of demonstration projects within the city. The responsible entities in that specific city or community must, as the EIP-SCC (2012) states, innovate across sectors. Each consortium has roughly nine months to construct a consortium including private and public stakeholders, research institutions, relevant social groups, as well as other cities. Thus, making it a complex task. However, during this process new networks may form, alliances arise, and the gain of transnational cooperation is achieved. What, then, are smart cities? For the remainder of this thesis, I shall use the vision of smart cities from the EIP-SCC, and this is the definition I refer to when talking about smart cities.

Smart cities should be regarded as systems of people interacting with and using flows of energy, materials, services and financing to catalyse sustainable economic development, resilience, and high quality of life; these flows and interactions become smart through making strategic use of information and communication infrastructure and services in a process of transparent urban planning and management that is responsive to the social and economic needs of society (SIP, 2013: 5).

The smart city in a European context is then a solution to address climate change and other societal challenges. Since smart cities materializes locally, and more specifically in particular urban spaces, it is interesting to attempt to unravel the “black box” that is such processes. Before introducing previous research, the scope of the project, and the research questions, I shall continue to examine what smart cities are and can be. Above, I presented the EUs definition of the smart city, which contains technical dimensions, especially emphasized through innovation, and social dimensions through the notion of “systems of people”.

Smart cities are new phenomena and is by many understood as a utopia², as it is an imagined place. Many scholarly attempts have been made to give smart cities meaning, however, private and public sector also have given smart cities meaning as well, as I shall present in this thesis.

PREVIOUS RESEARCH ON SMART CITIES

The term and phenomena smart cities is relatively new. Historically, the use of the term ‘smart’ was first applied within literature of new urbanism in urban growth and development in America in the 1990s, and it was only recently that the term was introduced the European context (Söderström, Paasche & Klauser, 2014). Although the phenomenon is new, a lot of research has been conducted. Scholarly attempts of conceptualisations, definitions, critiques, and elaborations have been done. What have others written about smart cities?

Söderström et al. (2014) for example, consider IBMs (International Business Machines) smart city strategy as storytelling, which means that their campaign on smart cities is telling a story to the market and different stakeholders that the solution to urban and global issues is technology, thus excluding the human factor from the equation. This discourse, according to Söderström et al. (2014) is a technocratic fiction, or a top-down technocratic approach, which can be used to tell the story that technology can make the big difference and to make lives better for people, but it also hides a more strategic purpose, which is to not only gain market influence but also to make profits. Söderström et al. (2014) argues that the smart city storyline subtly introduces a new moral imperative where ‘smartness’ becomes a necessary asset for cities. Such a narrative may seem convincing, as it also draws the attention away from citizen engagement approaches. Additionally, it should be noted that IBM legally owns the term “smarter cities” thus showcasing their strong engagement with visions of future cities where technologies seemingly are pivotal, which in turn gives them market influence. In planning theory for instance, stories are recognized as important because “*they provide actors involved in planning with an understanding of what the problem they have to solve is*” (Söderström et al., 2014: 310).

Hollands (2008) on the other hand, criticizes the smart cities’ technological focus, and he points out that there must be a bigger social and political will to make the change from an ‘ordinary city’ to a ‘smart’ one.

² The word “Utopia” was first coined by Sir Thomas More in 1516, where he describes it as an ideal island in which legal, political, and economic systems allowed its community to live in harmony and in peace. Since then, the term utopia has been used to describe an imaginary project alternative to the existing social order, an ideal model of society” (Grossi and Pianezzi, 2017: 80). “Utopia” stems from the Greek words “*ou*” (not) and “*topos*” (place), meaning “no place”, which is similar to the other Greek words “*eu*” (good) and “*topos*” (place), translating to “the good place” (Grossi & Pianezzi 2017; Duncombe 2012).

Hollands (2008) argues that the ability to create smart cities and promote education and learning is not inherent to ICTs, but an outcome of relations between ICTs and their social context. Additionally, Hollands (2008) describes that smart cities need to create a shift in the balance of power between the use of ICT's by businesses, governments, communities and people, as well as seek to balance economic growth with sustainability. In addition to creating global competitiveness and economic growth, smart cities may also provide an opportunity for enhancing citizen participation and influence in local decision-making.

Vanolo (2014) on the other hand, illustrates that the “*catchy urban imaginaries of the smart city [deeply influences urban policies] where the ‘smart city’ discourse may be used by urban managers and political and economic urban elites to support specific development policies*” (Vanolo, 2014: 886). Vanolo describes how smart city discourses or strategies pressures city governments to change – a so-called new ‘geometry of power’. This, along with increased global competition, pressures cities and local governments to transition themselves from cities to smart and competitive cities. His paper focuses on the production of smart city discourses and the power-knowledge implication on cities.

Castelnovo (2016) argues that smart city initiatives are highly information intensive and often use citizen generated information³. Furthermore, he highlights that citizens can contribute to the development of smart cities by actively participating in smart city initiatives. Castelnovo (2016) discusses in his work that citizens as sensors/information providers can act as co-producers only if they are given back the control over their user-generated information. He thus concludes that the development of a user-centric personal data ecosystem is an enabling condition for citizens’ participation in smart city initiatives as sensors/information providers, and that Citizens’ engagement is both an enabling condition and a possible outcome of demand-driven policies in smart cities (Castelnovo, 2016: 102).

I find it relevant to include the Norwegian White Paper *St. Meld 27*. (2015-2016) *Digital Agenda for Norway*, because it is one of few official political documents in Norway addressing the smart city and the EUs Horizon 2020 program. The white paper also addresses and acknowledges smart cities as an emerging phenomenon, and recognizes the global and urban issues threatening our societies, and emphasize technology as the solution. It continuously addresses various technologies that might change and improve cities, and its focus on technology overshadows other important aspects of such a transition as the social dimension. The white paper lacks a discussion of potential downsides of increased ICT-use and measurement technologies.

³ Information created by citizens through activities such as their movement within urban spaces.

Lastly, there are contributions from the Norwegian government and chronicles that emphasize that city development should have citizen engagement processes. The Norwegian government points to better decisions, making the elected better in representing the public, increases the public's trust towards the elected, and makes it easier to implement adopted measures, when participatory processes are included in city development (Kommune- og regionreform, 2015). Additionally, perspectives on city development in Trondheim argues that it seems that decisions are based on someone discussing behind closed doors, rather than public debate (Heidenreich, Næss & Liste, 2016). Similarly Ingeborgrud, Lagesen & Sutcliffe (2016) look at Trondheim municipality's workshop "Climate-KIC" where people can participate in a 24 hour workshop to develop innovative solutions and ideas for local issues. The participants in 2016 were mostly students already interested and dedicated to innovation, however, they argue that the municipality needs to engage broader by including non-academics as well.

THE "KNOWLEDGE AXIS"

Visions in a political context such as the EU, may function as tools that can be used to plot a certain course for sustainable development. It is interesting to point out that the Norwegian University of Science and Technology (NTNU) is Norway's technical university situated in Norway's technology capital. It can also provide concrete frameworks such as what the EIP-SCC is doing. Trondheim municipality, however, is in an early stage of finding out what kind of smart city Trondheim will be. What we know is that focus on climate is great. There are highly ambitious projects in motion such as "Greener Trondheim" for a transition away from conventional transport as cars to public transport, cycling and walking. Additionally, there is a political consensus through the energy and climate plan for 2017-2030 (Kommunedelplan, 2017), where 52 % of Trondheim's greenhouse gas emissions can be traced back to the transport sector. This plan seeks to reduce 85 % of the emissions by 2030. Nevertheless, as the technology capital of Norway it must also be competitive and look for the best solutions to solve other societal challenges as urbanisation, resource management, and improvements to services. Since 2013, the municipality along with other stakeholders, have been active in applying for EU funds to initiate demonstration projects. During this period, the municipality has scoped out three specific areas in Trondheim as places for developing and deploying smart city demonstration projects, which can be seen in figure 1 below⁴.

⁴ Additionally, the municipality has a website where one can follow the application process of their CityXchange consortium: <https://sites.google.com/trondheim.kommune.no/smart-city-trondheim/smart-city-trondheim>

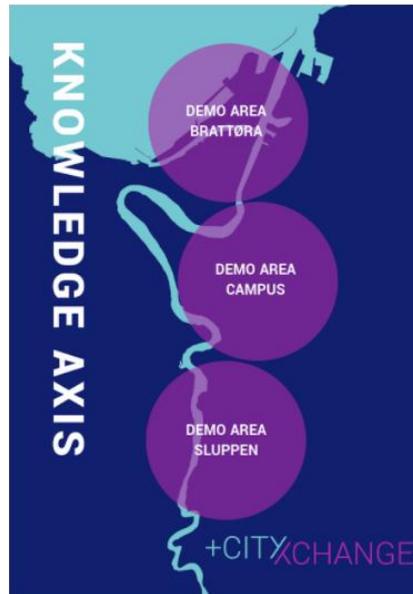


Figure 1: Areas for demonstration projects in Trondheim’s current and third application CityXchange (Illustration: JJ Design/ source: Helle, T. (2017)).

Demo area Brattøra: depicted at the centre of Trondheim, this is an area envisioned to be a central hub for transport.

Demo area Campus: NTNU’s main campus area is under development. This campus has buildings connected to their own distribution system for energy and local production, energy storage and flexibility ideal for testing out projects.

Demo area Sluppen: The southern part of Trondheim called Sluppen is a city district in early development. This is an area with collections of apartments and house, public buildings, and commercial centres. Mobility, energy solutions, and district development are key challenges.

Trondheim municipality has defined these knowledge intensive areas as suitable places for smart city development, hence the name “Knowledge axis”.

PROJECT SCOPE AND RESEARCH QUESTIONS

Trondheim municipality is a key actor, which has taken upon it a big task along with other stakeholders to interpret and answer call texts from the Horizon 2020 program. The analysis of the thesis focuses on what happens when the EU’s smart city vision and Horizon 2020 program enter Trondheim. The thesis’ goal is to look at how municipality workers in Trondheim interpret and understand the smart city vision, and by doing so contribute to understanding smart cities in a local context better. The main research question is then as follows:

- *How do municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city?*

Such a translation process raises, however, other questions too. To provide the analysis with other perspectives, and to answer the question above, I shall also attempt to answer the following sub-research questions:

- How did the European smart city become a solution to climate and societal issues?
- How did Trondheim municipality become involved with the EUs Horizon 2020 program?
- How do citizens in Trondheim want to be informed and engaged in smart city development?
- For whom is the smart city?

THESIS STRUCTURE

In this chapter, I have contextualized and briefly introduced previous research on smart cities. I gave a broad overview of the EIP-SCC and Horizon 2020 initiatives, before introducing previous research on smart cities. I also briefly introduce Trondheim's engagement with the Horizon 2020 program. I will present the analytical tools and theories for the analysis in chapter 2. These include Michel Callon's (1986) translation model, and Sheila Jasanoff & Sang Hyun Kim's (2009) sociotechnical imaginaries, as the main analytical tools. In chapter 3, I present and discuss my applied methods and empirical data material for the analyses. Chapter 4 is the first of three analysis chapters. Herein, I will describe the background for the EIP-SCC and Horizon 2020 program, along with the SIP and Operational Implementation Plan (OIP). An overview of current LHCs are presented in detail. To conclude the chapter, I connect these documents to the conceptual framework of Callon (1986) and Jasanoff & Kim's (2009) sociotechnical imaginaries. I shift the focus in chapter 5 from overarching frameworks in the EU and narrow it down to national and local contexts in Norway and Trondheim. Here, we will see how municipality workers understand and interpret the smart city. In chapter 6, I narrow the focus to how the informants view citizen engagement in their second application process. It also draws on interviews from citizens in Trondheim and their thoughts on smart city aspects. In the final chapter, I summarize the analysis chapters with further discussions.

CHAPTER 2 – THEORETICAL APPROACHES

The purpose of this chapter is to give an overview of the theoretical approaches that I will use in the analyses. To help understand the complex process of becoming a smart city, the following perspectives may clarify some of the interpretative flexible sides to them, but also necessary to answer the research questions. But first, I shall briefly introduce the field of Science and Technology Studies (STS) and why this field of study is relevant to smart cities.

In describing STS as a field of study, Skjølvold (2015) describes it as the study of how politics, culture, and society affect technological innovation and scientific research, and in turn how these influence society, politics, and culture. Much of the emphasis has been on moving away from internalist explanations and technology deterministic views, which entail understanding science and technology as something outside of that enters and changes society with autonomous characteristics without influence from social or political factors. From these ways of understanding science and technology, STS paved the way for new theories which emphasized co-construction, negotiations, and processes between technology and humans. The Social Construction of Technology (SCOT) and Actor-Network Theory (ANT) are such contributions.

SOCIOTECHNICAL IMAGINARIES AND CO-PRODUCTION

People use their imagination to picture and envision how the future might look like and come to be known. These, at times highly creative idealistic visions of future societies, though, were potentially too advanced to follow through or to implement due to lack of knowledge, the right technologies, tools, or capacity. Today, however, imaginations or visions of the future are no longer constricted or confined to the realm of science fiction or tales of utopias, but are, as Sheila Jasanoff & Sang-Hyun Kim (2009: 122) argue, “*an important cultural resource that enables new forms of life by projecting positive goals and seeking to attain them*”. Visions no longer reside within individual minds, but are shared and incorporated in broader, often political contexts. Such imaginations assemble systems of significance which enable collective interpretations of social reality (Castoriadis, 1987). Imaginations also, according to Anderson (1991), may form a basis of shared sense of belonging and attachment to a political community. To take this a step further, Jasanoff & Kim (2009: 122) points out that imagination can be viewed as “*an organized field of social practices*”, which serves a key component in the making of social order.

Jasanoff & Kim (2009) introduce the concept of ‘*sociotechnical imaginaries*’ as a tool to show that the capacity to imagine the future is an important aspect of social and political life, and how collective visions of desirable and feasible techno-scientific futures are described (Ballo, 2015). Sociotechnical imaginaries are moreover embedded in and are produced by individual or collective accounts of potential futures across scales (Jasanoff 2015; Ballo 2015).

The notion that sociotechnical imaginaries can inaugurate the need for political decisions, justify new investments in science and technology, encourage types of technological processes, or in fact justify the inclusion or exclusion of different actors is especially important for emerging work on smart cities (Jasanoff, 2015). This is because smart cities contain networks of people, organisations, institutions, and businesses that are positioning themselves to reach out with their goals. The EU can be such a mediator in creating and initiating imaginaries. In the case of smart cities, then, we can see that it is a vision and an imaginary of how future cities can look like, what they will contain, and how and for whom they are organized. It is important to note that such imaginaries are not neutral constructs, because they are framed in ways where some elements are included and some excluded, as mentioned above. As we also will see in coming chapters, some actors inherit more power and influence than others with which they can implement and spread their imaginations and visions, which over time might materialize into concrete projects or even selected urban areas of smartness.

As Jasanoff & Kim (2009: 123-24) argue, “*sociotechnical imaginaries should not be seen as static or tightly bound belief systems*”. It would be naïve, they continue, to think that some imaginaries are overarching guidelines for producing knowledge or knowledge-based technologies within the spaces of democratic policymaking. On the other hand, of the multiple sociotechnical imaginaries at play in society, some tend to be more enduring. Especially at national levels, but also at big institutions as the EU, because herein lies powerful instruments of creating meaning and setting goals. The imaginary smart cities, are emerging within and across international, transnational, and national political, scientific and technological spheres. Smart cities are emerging as one of the solutions and trends to mitigate and solve global and local issues (Castelnovo, 2016). The context may define what it means and for whom it is intended. This sort of interpretability is called *interpretative flexibility*⁵, a term coined by Collins (1981) to describe how technologies, artefacts, and in this case, sociotechnical imaginaries, can be interpreted differently by various relevant social groups (Collins, 1981; Bijker et al., 1987). Moreover, if used in the right context, sociotechnical imaginaries may function as immensely

⁵ See also Bijker, Hughes & Pinch (1987) for the social construction of technological systems.

powerful tools in achieving certain goals within specified areas (Jasanoff & Kim, 2009).

Building on this, and the discussion of sociotechnical imaginaries, Jasanoff & Kim (2009) introduce expert perceptions of the public that are conceptualized as *imagined publics*. Imagined publics or “imagined lay persons” can be ascribed roles in processes of sociotechnical change, and be involved in decision-making processes in developing directions for technological development. As I see it, this can be a useful perspective to include when trying to understand how technical, industrial, and policy networks interpret imaginaries in an anticipated future or urban space. For example, the “energy consumer” is an integrated part in the imaginary for the future smart grid, according to Ballo (2015). In this context the consumer is construed as a “rational resource man” who is intended to realize and benefit from this sociotechnical change. In this way, expectations of future users or actors’ attributes can be incorporated or scripted into technologies and sociotechnical systems (Akrich 1992; Woolgar 1990; Latour 1992).

It has become increasingly important to show how time, place, cultures, and society are forming science and technology, but it has become equally important to show how technology and science are shaping our possibilities to produce and construct society (Skjølsvold, 2015). Sheila Jasanoff (2004) terms this as co-production and defines it as a “*shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it*” (Jasanoff, 2004: 13). Co-production is a way to combine science, technology, and society, and to look at how these are developing together. Jasanoff (2004: 3) describes that co-production should not be viewed as a “fully-fledged theory”, but instead as an idiom – a way of explaining and accounting for complex phenomena. Furthermore, it “*is not about ideas alone; it is equally about concrete, physical things. It is not only about how people organize or express themselves, but also about what they value and how they assume responsibility for their inventions*” (Jasanoff, 2004: 15). When many actors and actants are in dialogue, the policy makers through the EU’s EIP-SCC, industry, entrepreneurs, city planners, and the inevitable users, then it is according to Jasanoff, that democratic interaction is achieved. “*We gain explanatory power by thinking of natural and social order as being produced together*”, she writes (Jasanoff, 2004: 2).

To intertwine co-production and sociotechnical imaginaries into a smart city context, it would be relevant to look at how the actors within the EIP-SCC, different cities and municipalities, industries and businesses, local communities, and among scientists and researchers are interpreting, framing, and advertising the imaginary smart cities.

ACTOR-NETWORK THEORY AND THE TRANSLATION MODEL

Early works in STS focused on explaining and understanding how social and cultural effects were important for the formation of scientific results and technological artefacts, and actor-network theory (ANT) was used to direct attention towards the relations between actors (Skjølsvold, 2015). One key aspect of ANT was that humans were not the only one who acted or had influence. However, ANT-theorists also looked at how human and non-human, e.g. artefacts, technologies, and even visions act, the relationship between them, and the networks they produce. By looking at how humans and non-humans act together over time, one would find that the construction of science is sociotechnical, which means that social groups are not static entities, but that relationships changes over time and are dynamic.

The smart city is a sociotechnical imaginary, in Europe and particularly within the EU, it is embedded in political and innovative strategies. It is in most ways advertised through how new, smart technologies are going to make urban spaces more effective, utilise resources better, reduce greenhouse gas emissions, managing energy production, and to become more sustainable. To understand how the concept of smart cities materializes across Europe, and in our case the city Trondheim in Norway, it may prove relevant to look at Michel Callon's (1986) *translation model*. He uses this conceptual framework to analyse the case of the scallops in St. Brieux Bay in France and tells the story of how three marine biologists try to save the scallop population from disappearing. This method of studying actors is widely applicable, especially in situations where we can find various actors and meanings. To study how actors relate to each other, Michel Callon (1986) looked at the case of the scallops of St. Brieux Bay in France, where three scientists along with other actors and actants⁶ acted together to have the right to speak on behalf of others. Translation is a way to understand how certain actors are presenting specific types of technologies, controversies, or even imaginaries to win ahead with his/her/its own interests and beliefs to how the 'thing' in question should be understood or interpreted. Callon (1986) describes four phases of translation: (i) *problematization*, (ii) *interessement*⁷, or creating interest, (iii) *enrolment*, and (iv) *mobilisation*. Problematization, is about making one's own interests and knowledge into an answer to one or a set of specific problems, e.g. climate change or air pollution in cities, and making oneself an obligatory passage point. Phase two, interessement, is when actors and their identities are identified, created and formed – who shares the same concern about climate change or polluting city centres? Enrolment builds on the second phase and seeks to construct and establish facts about the issue in

⁶ Is in literary theory "an object or creature playing any of a set of active roles in a narrative" (Oxford dictionary).

⁷ I shall be using this term throughout the analysis to describe the process of creating interest for something by someone.

question. It is about coordinating, negotiating, and compromising the roles given in phase two so that one can establish an alliance, which is stabilized. Phases two and three refer to the process where the involved actors create interessement for their case, to enrol them, and later point out spokespersons to represent their case. The last phase Callon introduces is mobilisation and is about stabilizing the network of actors. Through action and concrete work in the public sphere or within an urban space, such as LHCs, we can then see if the stabilized networks are strong enough. For example, have the potential solutions been accepted by all parties included? If this is the case, only then can the projects be realized and put in motion by the network. If not, new negotiations will take place, and maybe new actors come in and others fall out of the process. Callon (1986: 196) concludes the introduction of his four stages of translation with that “*translation is a process, never a completed accomplishment*”. In this regard, if a city receives the LHC status, and over time implements new systems and technologies, the initial network might embark on other projects, which may need further negotiation between actors. Visions like this will change over time and never fully settle.

How Trondheim municipality and its potential allies can translate the sociotechnical imaginary and vision smart cities from the EIP-SCC into action, depends on the strength of the alliances, if they are able to mobilise relevant social groups within the city. Until now, Trondheim has submitted two applications (in 2014 and 2017) for becoming an official LHC, which, due to various reasons, has been declined. Additionally, they are part of a third application process, which has a deadline in the spring of 2018. It will be interesting if the Trondheim alliance can produce translations that are sound and will justify their goal of becoming a LHC.

THE ‘SUBLIME’

Since innovation lies at the heart of the imaginary the European smart city, the term *sublime*⁸ may be of relevance to this thesis. David Nye (1996: *xiii*) writes that the sublime underlies the enthusiasm for technology, it taps into fundamental hopes and fears, and when experienced by large groups, the sublime can weld societies together. The sublime, then, inherits a deterministic character where much of the emphasis lies on the technical and economic factors of the innovation. The European smart city seems, according to the EIP-SCC, to be achievable through technological innovation, thus introducing the term sublime may say something about the smart city as something about the

⁸ There are several definitions of the word «sublime», but for the purpose here, «sublime» is by the Oxford dictionary defined as something «of very great excellence or beauty» or something that «produces an overwhelming sense of awe or other high emotion through being vast or grand».

emotions one gets when met with visions of the future, as the sublime is part of contemporary consciousness (Nye, 1996).

Much of the way the sublime represents something extraordinary, and by linking the EIP-SCCs smart city to something of subliminal nature, the massive innovative focus and the desire to solve climate change and other societal issues, can be understood as a *technological fix*. Skjølsvold (2012: 10) writes that the notion of a technical fix implies that the problems faced by mankind can be solved through the application of new technology rather than altered practices.

CHAPTER 3 – METHODOLOGICAL CONSIDERATIONS

In chapters 1 and 2, I provided a brief background and context to smart cities with previous research, as well as introducing the theoretical approaches I will apply to answer the research questions. In this chapter, I will present and discuss the chosen methodological approaches and the data material. Thereafter, I shall describe the process of analysing the data, as well as reflecting on the choices I made.

DEFINING THE RESEARCH QUESTIONS

Thagaard (2013) and Aubert (1969) point to “problem oriented empiricism” as a tradition within Norwegian sociology. It highlights that societal research should be based on issues which are important in the respective society. For this thesis, I have chosen a topic that may have potential effects in Trondheim and may thus be relevant for the city. The knowledge produced during the research can later be of practical relevance, however, Silverman (2011) points out that this type of reasoning can be problematic as the researcher not only takes over the issue at hand, but also the view of what the reason behind the problem is as it is viewed generally in society. Thagaard (2013) continues that it is important for the researcher not to engage in such a mind-set. That means basing and defining the research questions on professional grounds. Since smart cities are new, it is important to have an open, critical and reflected attitude to which questions one raises. I had no previous knowledge about smart cities, and tried to be open minded.

I was introduced to smart cities through an internship at Trondheim municipality which was organized by NTNU. The municipality was working on a smart city application for the Horizon 2020 program, and during the internship, the focus was on participation processes, where we (the interns) did research on how other cities did citizen engagement, additional to fieldwork in Trondheim. The focus on citizen engagement and insights from our coordinators at the municipality led me to think more about what smart cities are and where the smart city comes from. That meant shifting my perspective from local towards international levels. Since the smart city phenomenon was and still is new, and because it proliferates rapidly, I wanted to understand why, which meant looking closer at the vision of smart cities. What happens when the vision enters local communities and cities? This question triggered my curiosity further as well as seeing its societal relevance. I found that the EU had a smart city initiative, which Trondheim municipality was part of. The thesis is a result of inspiration from the internship, where I at first researched local participatory

processes and understandings of smart cities, whereas my thesis first looks at where the smart city comes from and how it translates into local contexts. I describe in the next section, the methodological approaches I have used to answer the research questions.

THE DATA MATERIAL

The research questions cover different levels of inquiry. Firstly, the first sub-research question looks at an international level. Secondly, the main research questions deal with local and more specifically people who are working with smart city development in Trondheim. Third and lastly, the last sub-research questions shifts the attention towards the citizens. Because the research questions cover different levels, I had to find a method that would best answer these. The result is therefore a mixed-methods, or a *methodological triangulation* (Thagaard, 2013). Thagaard (2013: 18) argues that since qualitative and quantitative methods produce different types of data, there could be benefits to combine them in the same research project. To capture the different perspectives in the research questions, I engaged different methods to find contrasting dimensions of smart cities. My mixed-methods design involves document studies, qualitative interviews, and quantitative survey interviews.

The thesis follows a top-down structure, where I first use documents to answer the first sub-question in chapter 4. In chapter 5 and 6, I use the qualitative interviews, and the quantitative survey interviews are present in chapter 6. This project is a result of flexibility and openness to the material out there. Much of the emphasis on smart cities lies on flashy new technical solutions, and the critique is often based on the notion that smart cities should be areas of social cohesion and learning as well as implementation of technical systems.

I would like to repeat the main research question as I presented it in the introduction: *How do municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city?*

METHOD 1 – DOCUMENT STUDIES

Documents distinguish themselves from data the researcher has collected, because they are written with another purpose of that of the researcher (Thagaard, 2013). Documents and texts are also what Silverman (2011) calls *natural occurring data*.

Since the sub-research question “*how did the European smart city become a solution to climate and societal issues?*” engages at an international level, it is useful to look at politically oriented documents as a source to understand what

the smart city is, and what directions that entails, e.g. political and technological motifs. It is moreover relevant to analyse the EU documents (see table 1 below) as much of my focus lies on how narratives of the smart city translates to other, often political and urban contexts. In the case of European smart cities, there is an overarching document, the EIP-SCC, that outlines a proposal for creating sustainable and smart cities in Europe. The *Strategic Implementation Plan* (SIP) and the *Operational Implementation Plan* (OIP) are more detailed documents describing how the vision and goals in the EIP-SCC can be attained. Riles (2006) argues that texts can be important carriers of political content, and that such documents may prove valuable to understand policy development. The documents I have chosen, and especially the official European documents, can function as political instruments because they are, as we shall see in chapter 4, influencing policy makers, city planners, as well as private and public stakeholders locally. The content of these texts are political in the sense that they are representations of solutions to climate change and other societal issues. There is also great emphasis on innovation across sectors, and it has aspects of research and development (R&D) in them.

Document type	Document name	Author
EU documents on smart cities	“Communication from the Commission – Smart Cities and Communities – European Innovation Partnership” (EIP-SCC)	The European Commission
	<i>Strategic Implementation Plan</i> (SIP)	High Level Group of the EIP-SCC
	<i>Operational Implementation Plan</i> (OIP)	The Sherpa Group of the EIP-SCC
EU climate/sustainability targets	<i>Europe 2020</i>	The European Commission
	<i>An Energy Strategy for Europe</i>	Commission of the European Communities
Norwegian white papers	<i>St. Meld 27 – Digital Agenda for Norge</i> (Digital Agenda for Norway)	Ministry of Local Government and Modernisation

Table 1: List of documents which are included in the data material.

The European documents are relevant because they are the originating documents to smart cities in Europe. Thus, being relevant to understand the

visions. *Europe 2020* and *An Energy Strategy for Europe* are included for the purpose of understanding parts of the process leading to EUs smart city initiative, which the research question for chapter 4 also requires. The EUs climate and sustainability target documents provide a possible approach to see how European smart cities have emerged as a strategy to mitigate climate and societal issues. After an increase in climate focus and with economic instability, the EU recognized and understood the magnitude of continuing with business-as-usual and looked to find another course of direction, which partly resulted in these two documents. Although they do not discuss smart cities, they do however contain much of the aspects in which the EIP-SCC, SIP, and OIP do. These aspects are for example sustainability and climate targets. The Norwegian white paper represents a national policy perspective on smart cities. The white paper may be helpful in providing a context for how smart cities are perceived politically in Norway.

METHOD 2 – QUALITATIVE AND QUANTITATIVE INTERVIEWS

I conducted two qualitative interviews alone and 60 quantitative interviews with fellow students during the internship. The goal of the qualitative interview is to capture rich and comprehensive information about the life situation of the interview object (Thagaard, 2013: 95). It gives the researcher a sound foundation for receiving insights to people’s experiences, thoughts and feelings about a specific topic or field, where the researcher is viewed as a neutral receiver of his/her experiences. In this project, the intention of the interviews was to gain insights to the two informants’ experiences through the municipality’s smart city-work. To use the qualitative interview as method is, according to Thagaard (2013), useful when studying phenomena with little previous research on the field, which is the case of smart cities, especially in Norway.

I was introduced to both of my informants through my internship at Trondheim municipality. The first informant is an engineer at Trondheim municipality and was the first I reached out to. He will for the remainder of the thesis be given the fictional name Stephen. He was closely connected to the smart city application called SCC-1. The second informant was also connected to the SCC-1 application where he worked as a climate advisor. He has been given the fictional name Charles.

Profession	Name
Engineer	Stephen
Climate advisor	Charles

Table 2: List of informants.

The informants I got access to for this project represent what Thagaard (2013: 60-61) calls a *strategic convenience sample*, where the selection is strategic in the sense that they possess qualities which are relevant for the research questions, which in this case are insights and reflections on their experiences with the smart city application. The approach leading to the choosing of informants is based on their accessibility to the researcher (Thagaard, 2013). However, more importantly, they are key to answer the research questions “*how did Trondheim municipality become involved with the EUs Horizon 2020 program, and, how do municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city?*”, but also “*for whom is the smart city?*”. Having access to the informants gives the researcher an opportunity to study the interview objects’ own experiences, understandings, and perspectives on the topic, but also to gain insight in their life situation (Thagaard, 2013). It would in this regard be difficult to gain a proper insight to the experiences from people connected to the application by only using documents. As the application itself was inaccessible, and little research is done on the field locally, the task would not be possible. Therefore, the qualitative interview is valuable.

The specific qualitative method I applied, is called the *qualitative research interview*, which is characterized by determined topics, but flexible in the way that they follow the informant’s storyline, at the same time making sure that the topics important to the research question are discussed (Thagaard, 2013: 98). Because the thesis’ goal is to research how municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city, it was natural to conduct the interviews at their workplace. There is a long tradition within the field of Science and Technology studies (STS) to study the informants own environment. For instance, Jelsma (2003) and Strengers (2013) highlight that meeting informants in their natural environment could provide insights to their day to day practices, which otherwise would be difficult to access. My first interview took place in the offices of Stephen. My interview guide, was semi-structured and I had planned to begin by asking some general questions about education and work experience and then gradually enter the topic of my thesis and research question. This approach worked well, as Stephen included other topics that helped me see the bigger picture. Had I chosen a more strict approach with specific questions, he would perhaps not be as detailed. The interview guide was also flexible in the sense that it would allow the informants to speak candidly. By giving them that possibility, potential side tracking of the main topic could provide valuable perspectives.

The second interview was with Charles. The interviews with Charles were conducted with a significant time gap. First, I met him at his office, whereas the second interview was done via Skype. During the time between them, I had developed new thoughts on how to design the project, which was useful as I had time to find new topics within smart cities to ask about. The interview guide

used for Charles was also semi-structured, however, with a slightly different approach to topic. Here, I wanted to shift my focus slightly towards citizen engagement perspectives, thus pursuing the initial topic my fellow students and I researched at the internship.

THE QUANTITATIVE INTERVIEWS

The fieldwork from the internship resulted in 60 quantitative survey interviews with randomly selected citizens at the NTNU campus Dragvoll, and shopping centres in Trondheim centre. The choosing of this method was of importance, because it provides us with a valuable citizen perspective to answer the research question of *how do citizens in Trondheim want to be informed and engaged in smart city development*. This quantitative method was helpful in constructing a broader picture of the smart city. What differs from the inductive approach found in the semi-structured interview where the goal is to gain insight in the participants experiences, the quantitative structured interviews are of a more strict nature. The interview guide has characteristics in the form of a multiple choice questionnaire rather than more open-ended questions in the semi-structured guides (Patton, 1987). The structured interview, according to Patton (1987: 15), requires a deductive approach because the questions must be predetermined based on some criteria about what is important to measure. What we, during the internship, wanted to find out was if they had heard about the term smart cities, where they stand in relation to data collection from private and public bodies, and how they would like to be informed and engaged in smart city development.

Structured interviews can be used for collecting data for a statistical survey and for qualitative research (Patton, 1987). The quantitative survey interview we used helped us capture possible tendencies regarding smart cities in Trondheim, and it was quantitative, because of the large amount of interviewees we had. We developed an interview guide where we included both open-ended and close-ended questions, but they were asked in the same order each time. We introduced ourselves and asked politely if they had a couple of minutes for our questions. Sometimes we felt the need to introduce our project more in-depth to establish a level of trust with the informants. The interview guide was structured into four parts where part 1 was to map if the respondents had heard about smart cities. If they had, we would ask what they had heard or think about when hearing the term smart cities. Part 2 was related to their position regarding trust towards public and private bodies in gathering personal data from citizens. Part 3 was about how they would like to be informed and engaged in a smart city transition, and part 4 was standard background information such as occupation, gender, and age. We interviewed 25 women and

35 men, where the average age was 36.6 years. The interview guide was an attempt to cover some central elements to and their awareness about smart cities.

Occupation	Number of yes
Student	22
Public sector	12
Private sector	9
Self-employed	1
Social benefits	2
Retired	8
Other	6

Table 3: List over the informants’ occupation in numbers.

The inclusion of this structured quantitative survey provides another important dimension to smart cities. My aim in using methodological triangulation is to capture more than just one dimension of smart city development. By integrating this method, I was able to capture international (EU), national (Norwegian), and local (Trondheim) perspectives of smart cities.

THE PROCESS OF ANALYSING THE DATA

I analysed the documents and the qualitative interviews by using *open coding* Corbin & Strauss (2008: 159-165), where they write that open coding is an approach where the researcher engages in an observant and open-mindedly to patterns and topics which he or she find interesting. I have in my analyses applied this approach. I started by summarizing the documents and interviews, and on that basis I could easier find similarities and dissimilarities which gave me a better overview of the data material. It also provided me the opportunity to decide on what aspects to include in my thesis. As I am interested in visions about smart cities, I have tried to identify phrases and sections within the EU documents where visions are apparent. As I see it, the visions and strategies in these documents play an important role in understanding how visions migrate and are translated into other contexts such as Trondheim. After identifying segments where visions were presented, I studied their content and tried to locate expressions or words which were meant to relay the meaning of these visions. Corbin & Strauss (2008: 159-165) argue that finding expressions and words within the material is one of the cornerstones of qualitative research.

The qualitative interviews were recorded and transcribed *ad verbatim* via a recording device on my smart phone called Audio Recorder. For clarification, I am the only one with access to the recordings as they are password and finger recognition protected. I have chosen to write the thesis in English, because I am bilingual and I did not want to limit my work to Norwegian speakers only. However, the qualitative interviews were conducted in Norwegian, and therefore had to translate the quotes. For clarification, all quotes included in this thesis from Stephen and Charles are my translations from Norwegian to English, and therefore all translations privilege clarity of meaning over the *verbatim*. For example, if I translated the interview transcriptions directly word for word from Norwegian to English, the English translation would have lost much of its meaning. The EU documents are originally in English and are quoted as is. Other excerpts from documents that are translated to English is the Norwegian white paper, and will be indicated through the use of footnotes.

The structured interviews were converted into infographics by one of my fellow students during the internship and was partly analysed separately from the documents and the qualitative interviews. The topics in the quantitative interviews were predetermined and therefore open coding is of no relevance here. What is relevant, is the overall impression from the complete data material. As I shall present in chapter 6, the findings may point to tendencies and raise interesting questions if smart cities enter urban spaces and engages with people.

ETHICAL CONSIDERATIONS AND REFLECTIONS ON BEING A RESEARCHER

“*All scientific practices demand that the researcher relates to ethical principles which apply internally in research environments as well as in relation to its surroundings*”⁹ (Thagaard, 2013: 24). When studies involve close contact between researcher and the person which is researched, such as in observation and interviews, the researcher receives data which can be connected to the people participating in the project. The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH, 2006: 14), defines such practices as “*information which directly or indirectly can be connected to a single person*”¹⁰. However, before reaching the stage of observing or engaging with the person one wants to study, Alver & Øyen (1997) argue that it is morally wrong to study people without their knowledge or consent. Herein lies the principle that the individual should have sufficient information which can create a basis to give consent or not (Alver & Øyen, 1997). That is called informed consent and is the basis for every research project (Thagaard, 2013: 26). I received informed consent from the informants from the qualitative interviews, because I created an information sheet which the informants received before the

⁹ My translation.

¹⁰ My translation.

interviews, which they approved of (see appendix 4). This project is reported to the Norwegian Centre for Research Data (NSD), which is obligatory for projects dealing with personal information, and thus follows the Norwegian framework for scientific research (NSD, n.d.).

ANONYMISATION AND CONFIDENTIALITY

Because this project deals with information connected to the informants such as identifying their profession and work place, a common principle is to anonymise the participants in the research project, which is also known as the principle of *confidentiality* (Thagaard, 2013). Principle entails that the researcher must anonymise the participants when the results are presented. Anonymisation is defined by the UK Information Commissioner's Office (ICO) as the following. "*Anonymisation is the process of turning data into a form which does not identify individuals and where identification is not likely to take place. This allows for a much wider use of the information*" (ICO, n.d.). I have to my best abilities attempted to keep the informants anonymous by giving them fictive names, which Thagaard (2013: 226) argues one should. However, since Stephen and Charles are part of the same network it is possible that they may have talked about their participation in the project with one another or with other people, Thagaard (2013) raises the question of how the researcher can contain the principle of anonymity if the participants know each other? The simple answer to this is that it is not possible for any researcher to prohibit informants to talk to other people about their participation and as my project does not engage in sensitive or controversial topics I have not had any reason to try to do so either.

THE PROJECTS RELIABILITY AND VALIDITY

Badie, Berg-Scholsser and Morlino (2011) argue that it is challenging to secure the validity of the project when using a mixed-methods approach, where they point out that data from different sources can be difficult to compare. This project is a combination of document studies, qualitative and quantitative interviews. However, I analysed the documents and the qualitative interviews with open coding, which was important because an open-minded approach helped me identify topics I found interesting and relevant to pursue when considering the research questions. The quantitative interviews were analysed as statistics where they pointed at tendencies, which was important when trying to understand how the public understand smart cities. The projects strength lies in its methodological choices, because I focus on three levels (international, national/local, and the citizens), I am able to bring forth several perspectives that are important in smart city development. Another considerable strength is that

the inclusion of different methods, makes the project representative in the context they are studied. Since smart cities are ways of organizing cities with implementation of “smart” technologies, and that information generated by citizens is key for creating effective services, including perspectives from the citizens, municipality workers, and international agendas, the project increases its reliability. The various representations are important to answer the research questions, but also to capture a variety of dimensions to smart cities. By following national ethical guidelines and standards for research such as receiving informed consent, reporting the project to NSD, and anonymising the informants, along with the methodological choices I have made, makes this project reliable and valid.

From this point onwards, I will be analysing the collected data material and discussing the findings with the use of the theories sociotechnical imaginaries and the translation model.

CHAPTER 4 – THE SMART CITY AS A SOLUTION TO CLIMATE CHANGE

In the introduction, I contextualized and introduced the topic smart cities, before I narrowed it down to the research questions. In chapter 2, I presented the theoretical approaches and briefly connected them to the topic of the thesis, whereas in chapter 3 I described the methodological approaches and evaluations of the empirical data. To narrow down the broadness of smart cities, the analyses in this thesis emphasize the European smart city and local smart city work through Trondheim municipality in Norway. In western parts of the world and especially in Europe, there is a major focus on climate change and other significant issues threatening the economy, public health, and energy resources. These focus areas are visible through internationally binding agreements such as the more recent Paris Agreement of 2015. In the Paris Agreement, countries are bound to initiate climate friendlier policies and measures. Thus it seems to be a political consensus towards a transition towards increasingly greener and a more sustainable future. Because the smart city is a new phenomenon globally and regionally, it may be fruitful to understand why cities in a European smart city context is growing, which entails presenting a brief overview of some key processes and strategies prior to the EIP-SCC as a solution to climate change.

The research question for this chapter is:

- How did the European smart city become a solution to climate and societal issues?

AWAY FROM BUSINESS-AS-USUAL

The European Union has been central in international cooperation, e.g. through the Paris Agreement, and it has been producing goals and policies for its members to face the challenges and mitigate familiar and potential threats. For instance, in the aftermath of the financial crisis in 2008, a shift in how European politicians perceived and thought about the future became evident as business-as-usual no longer was sufficient or sustainable. *Europe 2020 – A strategy for smart, sustainable and inclusive growth* from 2010 pointed at new directions in which to take the EU through current climate change and future challenges. This strategy, then, outlines three main courses of direction the European Union should take, and these are smart growth, sustainable growth, and inclusive growth. Smart growth seeks to develop an economy based on knowledge and innovation, while sustainable growth on the other hand seeks to promote a more

resource effective, greener and more competitive economy. Inclusive growth will try to foster high employment with social and territorial cohesion (Europe 2020, 2010: 3). This strategy does not address smart cities as a strategy as such, but may have inspired the EIP-SCCs strategy for smart cities in Europe. What *Europe 2020* proposes is to “[...] foster smart, inclusive and sustainable growth in Europe and to provide a framework for the European Union to emerge strengthened from the current financial and economic crisis” (EIP-SCC, 2012: 2). Referring to *Europe 2020*, this quote is taken from the official EIP-SCC communication from Commission. The adjectives “smart”, “sustainable”, and “inclusive” are present in the European vision of sustainable urban and territorial development:

European cities should be places of advanced social progress and environmental regeneration, as well as places of attraction and engines of economic growth based on a holistic integrated approach in which all aspects of sustainability are taken into account. The SCC should make a key contribution to this broader European policy agenda (EIP-SCC, 2012: 3).

The emphasis is clear regarding both documents, which is to support and push for sustainable and inclusive development. The quote above indicates that the European smart city strategy presented in the EIP-SCC should be a key contributor to the policies presented in *Europe 2020*. Before the release of *Europe 2020*, *An Energy Policy for Europe* from 2007 provided clear indications to what course the EU should take regarding greenhouse gas emissions. The message conveyed above may influence politicians to change strategies and create new policies. The EIP-SCC document is an example of how the seriousness of climate change may affect political decision-making. *An Energy Policy for Europe* discusses strategies concerning sustainability, energy security, and competitiveness. The EIP-SCC includes all these areas in their smart city strategy, and is arguably inspired by and view smart cities as places for addressing these topics. The 2007 energy policy for Europe commits to a long-term reduction of greenhouse gases, and by doing so, affects other strategies. Thus, the following strategies from the EIP-SCC are in alignment with the energy policy and the strategy for sustainable urban growth as in *Europe 2020*. There are, then, some indications that the EIP-SCC draws on several aspects in these documents, which is particularly visible in its supporting documents *Strategic Implementation Plan* (SIP, 2013) and *Operation Implementation Plan* (OIP, 2013-). The SIP outlines the ideas of how to best “harness innovative technologies, innovative funding mechanisms and innovative public private partnerships” (SIP, 2013: 2). Whereas the OIP is a live document, entailing continuous updates when new events presents themselves in the process. The strategies proposed in the SIP and OIP are the results of the

work of a High-Level group¹¹ and their supporting Sherpa group, and contributions from the Smart Cities Stakeholders platform¹². The former are representatives from industry, research and cities, who are appointed by the European Commission, whereas the latter is a collaborative, networking and sharing tool in the domain of the SCC.

Concerning the energy situation in Europe, the graph below depicts different outcomes from primary energy consumption in the EU.

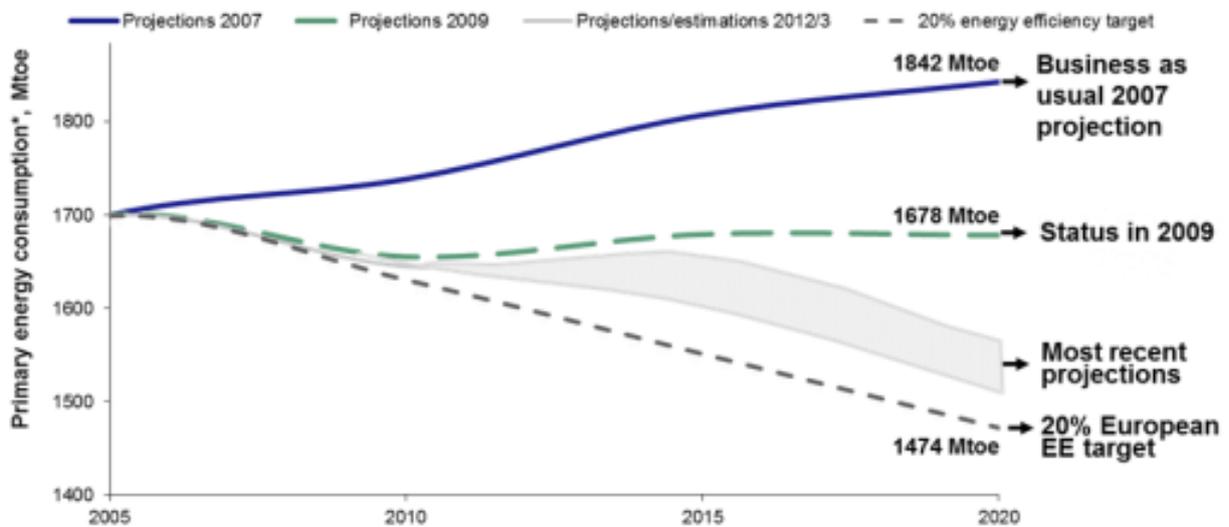


Figure 2: Primary energy consumption scenarios for 2020. (European Commission 2013 in the SIP, 2013).

Figure 2 is not only useful by depicting wanted and unwanted energy consumption scenarios, but serves additionally as a visible tool to understand the seriousness of continuing with business-as-usual. In the graph above, there is a significant gap between the business-as-usual and the future 20 % target where sustainable approaches are implemented. The graph may also show how the European Commission, through innovation, envisions a technical fix, which also seem to be evident in the quote below. As three quarters of EU citizens live in urban areas and consume 75 % of its energy, the EU accentuates that cities and communities play crucial roles in the transition towards sustainability (Covenant of Mayors, 2010). The major share comes from the building and transport sector. By looking at the context of *Europe 2020* and *An Energy Policy for Europe*, the content of these suggests that the EIP-SCC initiative bases itself on them. The goal of this partnership is to bring together cities, industry, and citizens to improve urban life through more sustainable integrated solutions. The EIP-SCC has an overarching goal, which covers many factors, sectors, and key areas of development and focus:

¹¹ High-Level- and Sherpa Group http://ec.europa.eu/eip/smartcities/whos-who/index_en.htm (Retrieved 12.01.2018).

¹² Smart Cities Stakeholders platform <http://eu-smartcities.eu/> (Retrieved 12.01.2018).

This partnership strives at a triple bottom line gain for Europe: a significant improvement of citizens' quality of life, an increased competitiveness of Europe's industry and innovative SMEs together with a strong contribution to sustainability and the EU's 20/20/20 energy and climate targets. This will be achieved through the wide-reaching roll out of integrated, scalable, sustainable Smart City solutions – specifically in areas where energy production, distribution and use; mobility and transport; and information and communication technologies are intimately linked (SIP, 2013: 3).

This goal outlines many areas and factors within society in which they seek to improve. The message conveyed in the quote above seems instrumental in the way it emphasizes the rollout of scalable and sustainable smart city solutions to improve the quality of life of citizens significantly. Energy, mobility, and ICT are areas where the “*most untapped innovation potential and most environment and societal benefits to be gained*” lies (SIP, 2013: 3). Therefore, this partnership values innovation, and puts it at the heart of the development of smart cities and communities. To realise the strategies in the EIP-SCC, details that are more descriptive are present in the companion documents SIP and OIP. In the figure below is a clearer overview of the focus areas of the EIP-SCC.



Figure 3: Priority areas for the EIP-SCC (SIP, 2013: 7).

As seen above, the SIP considers eleven inter-dependent priority areas as most important for smart cities and communities. All are at the intersection of ICT, energy, and transport. Furthermore, the EIP-SCCs SIP calls for smarter ways to deal with growing societal issues:

Cities are becoming more and more of a focal point for our economies and societies at large, particularly because of on-going urbanisation, and the trend towards increasingly knowledge-intensive economies as well as their growing share of resource consumption and emissions. To meet public policy objectives under these circumstances, cities need to change and develop, but in times of tight budgets this change needs to be achieved in a smart way: our cities need to become ‘smart cities’ (SIP, 2013: 3).

It becomes clear through this excerpt from the SIP that cities need to become smart cities in order to mitigate and meet the growing challenges cities are facing, thus the smart city is regarded as a solution to climate change as well as other societal issues. The next section presents the current consortiums and cities, which have officially been awarded the title as LHCs and been allocated funds from the program.

LIGHTHOUSE CITIES

The concept of LHC initiatives is an important vehicle to support success in deploying smart city solutions, and to (over)achieve the goals in *An Energy Policy for Europe* (EIP-SCC, 2012). Table 5 below shows the current lighthouse and follower cities in Europe.

Name of consortium	Lighthouse cities	Follower cities
<i>Triangulum</i> ¹³	Manchester (GB), Eindhoven (NL), Stavanger (NO).	Leipzig (DE), Sabadell (ES), Prague (CZ).
<i>SmartEnCity</i> ¹⁴	Vitoria-Gasteiz (ES), Tartu (EE), Sonderborg (DK).	Lecce (IT), Asenovgrad (BG)
<i>Grow Smarter</i> ¹⁵	Stockholm (SE), Barcelona (ES), Cologne (DE).	Graz (AT), Porto (PT), Suceava (RO), Cork (IE), Valetta (MT).
<i>Smarter Together</i> ¹⁶	Vienna (AT), Munich (DE), Lyon (FR).	Santiago de Compostella (ES), Venice (IT), Sofia (RO).
<i>Replicate</i> ¹⁷	Bristol (GB), San Sebastian (ES), Florence (IT).	Essen (DE), Nilüfer (TR), Lausanne (CH).

¹³ Triangulum consortium <http://triangulum-project.eu/> (Retrieved 12.01.2018).

¹⁴ SmartEnCity consortium <http://smartencity.eu/about/consortium/> (Retrieved 12.01.2018).

¹⁵ Grow Smarter consortium <http://www.grow-smarter.eu/lighthouse-cities/> (Retrieved 12.01.2018).

¹⁶ Smarter Together consortium <http://smarter-together.eu/> (Retrieved 12.01.2018).

¹⁷ Replicate consortium <http://replicate-project.eu/> (Retrieved 12.01.2018).

<i>My Smart Life</i> ¹⁸	Nantes (FR), Hamburg (DE), Helsinki (FI).	Varna (BG), Bydgoszcz (PL), Rijeka (HR), Palencia (ES).
<i>Remourban</i> ¹⁹	Valladolid (ES), Nottingham (GB), Tepebasi/Eskisehir (TR).	Seraing (BE), Miskolc (HU).
<i>Sharing Cities</i> ²⁰	London (GB), Milan (IT), Lisbon (PT).	Bordeaux (FR), Warsaw (PL), Burgas (BG).
<i>Ruggedised</i> ²¹	Rotterdam (NL), Umeå (SE), Glasgow (GB).	Parma (IT), Brno (HR), Gdansk (PL).
<i>BalanCities</i> *	Trondheim (NO), Limerick (IE), Leuven (BE).	-
<i>CityXchange</i> **	Trondheim (NO), Limerick (IE).	Pisek (CZ), Alba Lulia (RO), Sestao (ES), Smolyan (BG), Vora (EE).

Table 5: Table of lighthouse and follower cities with funding from the Horizon 2020 program. *BalanCities did not receive funds. ** Currently under evaluation.

Table 5 indicates that the EU has enrolled cities across Europe to its solution to climate change as well as other urban issues. It has been successful in the sense that so many cities have been incorporating their solution through comprehensive consortiums. The table is an attempt to show that the overarching vision of sustainable smart cities, have and is proliferating across Europe.

DOCUMENTS AS VISION MAKERS

Apart from outlining concrete courses for development, the documents above are moreover influential in creating visions, which stake out paths for future development in the EU. As shown in table 5, there are already several cities committing to these programs, thus the EIP-SCCs vision is gaining traction. For cities, and in turn local policy makers and city planners, to be able to apply for funds, they need to answer a call text. The application process entails translating the content of the call text into a local context, where the call texts content potentially differ from the reality in those cities. Here, Callon's (1986) translation model is helpful to apply. The translation model is way to study how actors interact, but also to describe possible challenges scientific facts or technologies meet before being accepted or rejected. The EIP-SCC and its companion documents SIP and OIP may in this case be understood as the scientific facts or technologies, as Callon (1986) describes in his work.

¹⁸ My Smart Life consortium <https://www.mysmartlife.eu/mysmartlife/> (Retrieved 12.01.2018).

¹⁹ Remourban consortium <http://www.remourban.eu/> (Retrieved 12.01.2018).

²⁰ Sharing Cities consortium <http://www.sharingcities.eu/> (Retrieved 12.01.2018).

²¹ Ruggedised consortium <http://www.ruggedised.eu/> (Retrieved 12.01.2018).

What we have seen thus far, is that through political consensus in the EU, the strategies connected to the EIP-SCC, *Europe 2020* and *An Energy Policy for Europe* have identified climate change, economic, and other related issues as problems. As we shall see in the next chapter, municipality workers are translating these issues into their own local context. This is not, however, a simple or straightforward process. *Europe 2020* and *An Energy Policy for Europe* are the sum of negotiations between actors, something Jasanoff (2004) calls co-production. It is a way of explaining and accounting for complex phenomena. Climate change is for instance such a phenomenon. Furthermore, it is not all alone about the idea of, e.g. climate change, but also how people organize and express themselves together. The vision and strategies proposed by the EIP-SCC show that they could justify courses of development. Thus pointing to Jasanoff & Kim's (2009) and Jasanoff (2015) understanding of sociotechnical imaginaries. The components of the strategies promoting the smart city, inherit both social and technical aspects, which makes the European smart city a sociotechnical imaginary. For example, the emphasis on technologies at the intersection of ICT, energy, and mobility, but also a social dimension where smart cities are regarded as "systems of people" (SIP, 2013: 5).

The visions and specific strategies of the EIP-SCC are shared, in what Jasanoff & Kim (2009) describe as broader contexts. Furthermore, imaginations and visions similar to that of the EIP-SCCs, according to Anderson (1991), may create a sense of sharing and belonging to a community. When looking at table 5, there does seem to be indications to a shared view of climate change as a threat, as well as an understanding of innovation as solution. The EIP-SCC has seemingly provided a solution to which many, by looking at table 5, thus far deem worthy of consideration. To use Callon's (1986) terminology of the problematisation and intersement stages, the smart city solution could be regarded from an EU point of view, as successful ones, because they have identified problems that need action, along with creating incentives and interest for others through their EIP-SCC vision to participate. From this point onwards, cities and communities decide if this is a necessary course of action. What does attract cities to this program is the funding opportunities. If attaining LHC status, the CityXchange consortium estimates indicate that Trondheim's current application with partners may receive up to 40 million NOK (Kommunedelplan, 2017). For the current LHCs, and by applying Jasanoff & Kim's (2009) theory, the imaginary we now understand as smart cities can function as lenses, in which we see the world. When embedded into material networks and societal norms, the imaginary is amplified, which is interesting to see when the EIP-SCC vision entered Trondheim. Looking at how fast this imaginary has proliferated, it could be interpreted as a glittering lure. It advocates for something new, a new way to imagine our future cities through innovative technologies and other material benefits. The serious, yet positive tone provided in the strategies, seems to be closely connected to a "technological fix". This notion, as Skjølsvold

(2012: 10) describes, “*implies that the problems faced by mankind can be ‘solved’ through the application of new technology rather than through altered practices*”. The EIP-SCC does promote inclusive approaches to innovation, but they do seem to emphasize technological innovation over social innovation. Skjølvold (2012: 10) writes further that climate change has introduced “a sense of urgency into much current innovation thinking”. Along these lines, Jasanoff & Kim (2009) state that imaginaries can justify investments in science and technology, but also types of technological processes. The following quote may further the notion that smart cities are sociotechnical imaginaries, and that the EUs immense focus on innovation is a key strategy to mitigate the problematized issues:

Innovation has been placed at the heart of the 2020 strategy as Europe's competitiveness and capacity to create new jobs depends on driving innovation in products and services. It is also the best means of successfully tackling major societal challenges, such as climate change and energy efficiency (EIP-SCC, 2012: 2).

As seen above, innovation is given the role as the protagonist, the EIP-SCC is constructing a narrative where innovative approaches can curb the way towards a sustainable Europe. Innovation seems to act as a rallying point for actors to collaborate and negotiate. The EIP-SCCs narrative proves to be successful to some by looking at the table of LHCs and follower cities. The smart city narrative is incorporated into local contexts, but as we shall see, is that the narrative of European smart cities can be understood through the application of Jasanoff & Kim's (2009) work, as not a static or tightly bound belief system, but rather as a mobile one. When the specifications from call texts and the smart city vision enter cities or specific places therein, local interpretations and negotiations take place. Thus, creating and imagining visions of their own. I will be discussing these perspectives further in the next chapter. But the initial documents presented here, are envisioning a future where sustainability is desired, thus making them vision makers. What are then the effects of the documents and strategies presented above? By applying Callon's (1986) translation model, we might get a clearer view.

TRANSLATING CLIMATE ISSUES TO INNOVATIVE ACTION

Callon's (1986) translation model contains four stages of translation in i) problematisation, ii) interesement, iii) enrolment, and iv) mobilisation. To see how these documents and visions are acting, and what roles they are playing, it will be relevant to apply this model, but also to understand smart cities as a sociotechnical imaginary. The background for launching the EIP-SCC

partnership is according to the EU, the need to come out stronger from the financial and economic crisis in which they at the time were. This process is ongoing. By now, I have shown that the EU has problematized climate change and related challenges as issues through some of the earlier documents as *Europe 2020* and *An Energy Policy for Europe*. What has happened is that through these strategies, they have proliferated from an overarching institution with great resources to smaller contexts, all of them in cities across Europe. This may imply that the current LHCs and follower cities, and presumably other cities such as Trondheim, have been interested and enrolled, and accept the same issues. Not necessarily just because the EU has launched a possible solution, but perhaps even prior to that through a general increased global awareness about climate change. Nevertheless, it may provide a common basis in which to act. The EIP-SCC provides a strategy while Horizon 2020 provides funds. These solutions create interessement, and because everyone can participate, it becomes highly attractive. By borrowing terminology from Callon (1986), these solutions can be considered as “obligatory passage points” (OPPs), which entail a position of power, but also where the “true” knowledge about the problem lies. The OPP, however, may change during the translation process. We can see that the EIP-SCC and connected programs and networks have positioned themselves as indispensable to others.

The second stage, interessement, happens through the mobilisation of resources in form of funds, but also knowledge networks. These are accessible to those who decide to apply. To become a LHC and in turn become a smart one, the EUs initiative can guarantee networks and resources for that realisation. However, it does not necessarily mean that becoming a smart city must happen through EU projects. Nevertheless, to be regarded as a LHC, cities must act in accordance through that initiative. In that sense, there are indications to point to that the initiative has made itself indispensable, or as a necessity for becoming a LHC. The attractiveness of the initiative creates interest, which is apparent in table 5. Every actor being enrolled through interessement can accept the guidelines and specifications of the initiative, but also reject them and create their own ideas, visions, and projects. As I shall present in the next chapter, some interpret the call text and try to interest others through the overarching issues that need solving, and if they manage this, they have created interessement. In addition, as Callon (1986) emphasizes, the translation process is never a fully stabilized one, but may change over time as relations and networks do. There is no guarantee that all interested parties are enrolled. Being interested in something can hardly be regarded as a stable process, thus taking us to stage three, enrolment, which entails coordinating and defining the roles of interested parties.

SUMMARY

I answered the sub research question of how the European smart city became a solution to climate change and societal issues, because it seems to be influenced by directions of sustainability and innovation in *Europe 2020* and *An Energy Policy for Europe*. To summarize, the EIP-SCC may be understood as a platform and as an enabler for innovation within local communities and cities. Additionally, the transfer of knowledge between industry, municipalities, and knowledge institutions to serve a common goal, seems to be embedded in the EUs policy on the future of Europe. In this sense, the EIP-SCC gains its agency through the visions of the future that it enables. However, the task of re-organizing, re-designing, and introducing new technologies and systems into existing infrastructures is not easy, and it creates new problems. To succeed, great collective effort is required. However, the EIP-SCC is also a narrative to increase the proliferation and focus of innovation through smart technologies. The goal was therefore to provide a brief overview of some of the processes that might have led to the initiation of these programs and the start towards smart cities. For this thesis, I look at Trondheim municipality's engagement with these programs. What happened when such overarching visions entered local urban spaces? How is the municipality translating the sociotechnical imaginary the smart city, and how are the informants understanding it?

CHAPTER 5 – THE EUROPEAN SMART CITY²² COMES TO NORWAY

I demonstrated in the previous chapter that global political consensus and scientific discoveries on climate change are closely linked to the EU's smart city initiative. Climate change, the financial crisis in 2008, and other societal issues influenced and triggered the EU to rethink their stance on energy policies and strategies on economy. To accelerate the transition towards a sustainable future for European cities, the EU, through the European Commission, launched in 2012 the European Innovation Partnership for Smart Cities and Communities as a solution to mitigate the problematized issues. With the EIP-SCC and the Horizon 2020 R&D program being seamlessly interwoven, they have created a platform for European cities and communities enable cross sectorial innovation for the purpose of mitigating both global and local issues. The European smart city could be understood as a sociotechnical imaginary, because the vision contains technical and social dimensions, as well as having the ability to justify a specific direction, which in this case point to a sustainable, smart, and competitive one. These directions seem to be driven by the notion of a technical fix, because much of the emphasis lies on technology such as ICT and innovative solutions to fix the defined problems. In this chapter, I will show how two informants from Trondheim municipality understand and interpret the imaginary smart city.

The research questions for this chapter are:

- How did Trondheim municipality become involved with the EU's Horizon 2020 program?
- And how do municipality workers in Trondheim municipality interpret and translate the EIP-SCC's vision of the smart city?

THE SMART CITY AS A TECHNICAL FIX?

Norway is an active nation in developing climate friendlier policies and technologies. Although its income mainly comes from the gas and oil sector, there are however many indications that point to an increase in climate awareness in policy documents, as well as initiatives such as the subsidising of electrical vehicles. Norway signed the Kyoto protocol and the Paris agreement, which does indicate that climate change is recognized as an issue. Thus, reducing climate impact is high on the agenda of the Norwegian government and

²² I decided to call the smart city in this context for «The European smart city», because smart cities are phenomena that are present in other parts of the world as well.

shows that climate issues are problematized by the political community in Norway. The problematisation of climate change is especially visible locally. For instance, Oslo city council is removing parking spaces for the purpose of an emission-free city centre (Haugan, 2017). Activist groups and citizens have also been vocal in terms of discontent towards the ongoing discussion of making the heart of Oslo a car free zone. Not necessarily because they are against climate action, but because a car free zone limits many peoples every day practices. Furthermore, a more recent attempt through the climate bill from 2017 functions as a promoter of the climate goals towards a low-emission-society in 2050 (Klimaloven, 2017). The Norwegian government has identified the transport sector as a key area to change. Alongside the EU, the current Norwegian government launched ambitious goals to reduce greenhouse gas emissions from the transport sector with 35-40 % by 2030 from 2005 levels. The transport sector should aim by 2050 to be climate neutral or emission free (Klima- og miljødepartementet, 2017). There is a national consensus among the ruling parties that the transport sector needs to transition towards sustainability. The emphasis on transport, then, is in many ways in alignment with the EIP-SCCs focus area on transport and mobility. Both documents describe transport to be a major contributor to climate change, thus we can see that climate change and transport are problematized in Norway as well as in the EU. By using Callon's (1986) translation model, we can see that through the climate bill and the white paper, it is possible to argue that the European smart city translations happen nationally.

The former Norwegian EEA- and EU Minister Elisabeth Vik Aspaker emphasized that *“to solve several of our common European challenges, we are completely dependent on municipalities and county councils as active promoters. The transition must happen in local communities”*²³ (Regjeringen, 2016). The transition she points to is sustainable city development, which involves several aspects such as energy, mobility, ICT, and a new economy. Since climate change is problematized, and the political and societal will for a more sustainable transition is increasing, cities and communities are looking for ways in which to make this change happen. Stavanger, a city situated in western Norway, was the first Norwegian city to receive the LHC status with Manchester and Eindhoven as the other two in their Triangulum consortium (see table 5). Heidi Kristina Jakobsen, director at the Stavanger regions Europe office in Brussel, said that the Triangulum project reveals the possibilities for a transition, and it illustrates an area where a particular benefit from international cooperation and EU projects is present (Regjeringen, 2016). The Norwegian Minister of Climate and Environment, Ola Elvestuen, is adamant that the smart city is a solution to address societal issues. However, he acknowledges that the

²³ My translation.

term smart cities is a vague one. During his speech at the City conference in Oslo, he said that:

[s]mart cities have been discussed for quite some time. It varies how we define it. But it is a term that develops over time and we must develop the city (Oslo) to become smarter. That means using the technology and the diversity of information to better solve the tasks in the city²⁴ (Elvestuen, 2018).

Could it here be possible to see this as a desirable technical fix, which is similar to figure 2 where new technology can reduce greenhouse gas emissions. However, he does later in his speech acknowledge that it is also important to organize better by connecting with academia, business, and the citizens. It is, then, clear that smart cities as a phenomenon and solution is gaining traction and awareness politically. Most of the literature on smart cities comes from scholarly fields. The closest political discussion on smart cities in Norway can probably be seen in *St. Meld 27* (2016: 109-113). Although smart cities receive little space here, it is discussed and the government is aware of the potential of smart cities. I showed in chapter 1 that there exists a multitude of different definitions on smart cities, below is the Ministry of Local Government and Modernisation's definition on smart cities:

A smart city uses digital technology to make cities better places to live and work in. Smart city initiatives aim to improve public services and citizens' quality of life, optimal exploitation of shared resources, increase towns productivity, as well as reducing climate and environmental problems in the cities²⁵ (St. Meld 27, 2016: 110).

The definition emphasizes technology as the solution to improve services, the lives of citizens, and reducing climate and environmental problems. Thus, similar to the understanding of Elvestuen, the definition above may mean that technology is ascribed a key role where smart cities could be understood as places where a technical fix is desired. The definition and understanding of what a smart city is, may indicate that technology is to enter the urban spaces and change existing infrastructure and possibly even social practises. What this possible techno-optimistic approach to city development may result in, is perhaps the uptake of similar views locally. Maybe it is worth considering to draw lines to Nye's (1996) sublime, where the smart city is of a subliminal nature, where the sublime underlies the enthusiasm for technology that awaken hopes of future utopian societies.

²⁴ My translation.

²⁵ My translation.

FROM WHERE AND HOW DID SMART CITIES ENTER TRONDHEIM?

Trondheim municipality is aspiring to become a smart city, however, before being involved with the EUs Horizon 2020 program and the EIP-SCC, the city launched in 2009 an ambitious project called “Greener Trondheim”. The project invests NOK 15 billion between 2010 and 2025 (Miljøpakken, n.d.). The goal is to push towards a transition away from car use, especially cars with conventional power as diesel and petrol, to walking, cycling, and public transport. Furthermore, it aims at reducing “*greenhouse gas emissions, congestion, traffic noise, and the number of traffic accidents through better traffic management and a greater share of transport on foot, by bicycle, bus or tram*” (Miljøpakken, n.d.). The Greener Trondheim partnership has therefore problematized the transport sector as an issue, and has in turn deployed resources to the transition towards a sustainable growth in mobility. By 2014, the city saw a reduction of 11 % in total number of car trips. Climate goals are high on the municipality’s agenda where, according to Trondheim municipality’s energy and climate plan for 2017-2030 (2017), 52 % of Trondheim’s greenhouse gas emissions are directly linked to the transport sector. This is an area which has taken on an audacious goal, a reduction of 85 % in greenhouse gases by 2030. Thus, the transport sector is problematized as an area for desired change. The EIP-SCC emphasizes ICT, transport and mobility, and energy as key areas for improvement. Trondheim municipality focuses on these as well, however, their focus lies more so on the transport sector. But from where and how has this emphasis come from? Engineer Stephen explains this: “*transport and mobility wasn’t very central before [...] the focus was very much on energy in buildings. It was very technical oriented [...] the focus on transport has come through the EU*”

The new emphasis on transport he describes here meant a shift and a reframing of what Trondheim viewed as an increasingly concerning issue. Stephen had for some time been involved with several EU-related projects concerning mobility, and as the focus on transport came through the EU, this was partly one of the reasons for his involvement in the municipality’s smart city applications. Transport is a central part of the EUs plan to reduce climate impact, and Trondheim municipality may have become increasingly aware of this when they decided to apply the first time. Trondheim became involved with EUs Horizon 2020 program and EIP-SCC initiative for the first time in 2013. The municipality with other stakeholders were then engaged in smart city initiatives before the white paper *St. Meld 27* was released. However, as Trondheim still is aspiring and working on to become a smart city through the EU initiatives, the increased awareness in national politics may influence local governments and the connected stakeholders emphasis when developing and understanding smart city projects. But how did the municipality become aware

of smart cities, and more specifically, the European smart city initiative? My first informant, Stephen, describes this process as such:

Very much of the fact that we went into the application for the first time, came from NTNU²⁶, because [...] architecture and design had opened their eyes for smart cities. They built a lot of expertise and pushed it on us. NTNU is actually the driver for us. They were absolutely a driver for us.

The municipality's engagement with European smart city initiatives, then, seems to come directly from Trondheim's main research and education institution, NTNU. NTNU has managed to create interest for the Horizon 2020 program and the EIP-SCC, and managed to enrol the municipality when they decided to apply for EU funds. One could argue that the municipality was influenced by the catchy urban imaginary of the smart city, which Vanolo (2014) points to. When the municipality decided to apply, it can be interpreted that they became the obligatory passage point where the municipality administrating the "true" knowledge about the problems that needs solving. However, it is NTNU that is the driver for the municipality and that they had built up expertise on smart cities, thus implying that NTNU at some point was the OPP. NTNU's Smart Sustainable Cities cluster is involved in EU projects, hence NTNU had potentially been interested in the EIP-SCC in first place, and then attempted to interest other stakeholders. Since municipalities are facilitating and developing services for its citizens, there is already much expertise and competence on city development, thus possibly being an important stakeholder to interest and enrol. Callon (1986) writes that creating interest for something entails forcing and stabilizing the other stakeholders' identity though problematisation. That means in this case, that NTNU had identified Trondheim municipality as a relevant stakeholder, it knows the municipality's role and function in society, and possibly even their resources. Furthermore, NTNU was probably familiar with the local governments' climate policies, where perhaps the EUs smart city initiative could help the municipality to fulfil those policies. We can now consider that the municipality is fully interested in becoming a smart city though applying for Horizon 2020 funds, as both NTNU and the municipality are aware of each other's identities. My second informant, Charles, pointed to some factors for why Trondheim would be successful in receiving funding:

[...] it has been a long-lasting cooperation between Trondheim municipality and the research communities at NTNU and SINTEF in many areas [...] Trondheim municipality is involved in some of

²⁶ NTNU has an interdisciplinary competence cluster called NTNU Smart Sustainable Cities. The goal is to develop methods at the intersection of technology, design and people to support cities and citizens in changing practices towards a low-carbon future.

them and there are many big important private companies involved in Trondheim and the region, so to build on that work towards smart city application is historically legitimized in a long-term collaboration across research, politics, management and business.

He, and in turn the municipality, justifies their engagement and their potential success through long-term cross sectorial cooperation. As I showed previously, this is one of the goals of the EIP-SCC, to accelerate interdisciplinary innovation. Having a sound network of knowledge and research, then, seems to be of importance for being successful with the smart city project. By being part of such a network and having access to the newest research in energy, transport and urban development, it provides the central actors such as the municipality and the university with better chances, to what Callon (1986) calls, to interest and enrol other stakeholders into a consortium. It helps when many of the stakeholders even before being enrolled or even being interested in the smart city transition, share many of the same visions, goals and awareness of the challenges for the future. Charles emphasizes this further: “*we have come far in research on sustainability, and Trondheim municipality has come far in many areas of this transition, but we can reach even further and faster within a smart city project*”.

Cooperation seems to be of great importance to reach the overarching goals of reducing climate impact and become sustainable. The smart city project, then, is viewed as a place to accelerate the transition to a low-carbon future, thus realizing the EIP-SCCs plan to make smart city projects places for solving issues quicker. By combining the goal of the EIP-SCC and Charles’ view on cooperation, there are indications that point to that aspects of the European smart city is transferred to Trondheim through NTNU, but maybe also through cooperation in other projects previous to this. There is clearly a will in the municipality to cooperate and engage with other stakeholders. Jasanoff (2004) calls the interaction of different sectors as co-production. Co-production is a way to combine science, technology, and society, and to look at how these are developing together. In Trondheim’s smart city context, we can see that NTNU and the municipality are explaining a complex phenomenon (the smart city), thus co-producing and shaping the possibilities to produce and construct society (see also Skjølsvold 2015). In Callon’s (1986) translation model, to cooperate can be seen as a way to interest others as well as enrolling and convincing them. To be able to submit an application, there must be several actors involved that has different roles in the consortium. The municipality’s focus on transport and mobility was amplified through the engagement with the EUs smart city initiative.

The municipality became aware of and involved with the EUs Horizon 2020 program through an inquiry and approach by NTNU, which had developed expertise and competence on smart cities and encouraged the municipality to

participate. Because the municipality and the R&D environment has a long standing tradition of cooperation, as Charles emphasized, being involved in a EU project that involved cross-sectorial innovation and partnerships was a good opportunity to make the city better in various ways, e.g. competitive and sustainable.

THE SMART CITY AS A TOOLBOX?

There are many definitions circulating of what a smart city is or should be. Cities, or the consortiums, must identify themselves what kind of smart city they want to be. Although the EIP-SCC has laid out a working definition on smart cities to indicate what cities ideally should contain, it is very much up to the members and networks of the respective consortiums to decide that for themselves. Until becoming aware of the funding opportunity from Horizon 2020, there had been many declined approaches from the R&D environments in Trondheim towards the municipality. To gain experience and competence is by Stephen an important factor. However, Charles pointed to other aspects that was appealing to the municipality:

Smart city has a positive ring to it, and it can mean a lot to promote the city [...] as a technology city and a University municipality. Trondheim as a green city that develops solutions for the future and a smart city, will mean access to a lot of funds and the realization of many good projects, which involve many private and public partners that we could not get otherwise. Without this platform, it would entail enormous amounts of work and longer time frames to succeed.

The smart city's positive connotations, the potential resources through funds, the opportunity to promote the city are key factors for being involved in the EIP-SCC and Horizon 2020 program. He also refers to the smart city as a platform for realisation of good projects, which include different partners. His description that the smart city has a positive "ring" to it, may be connected to what Jasanoff & Kim (2009) call a sociotechnical imaginary and Vanolo's (2014) notion of the catchy urban imaginary that influences policies. The EUs vision of the European smart city inherits aspects that are appealing, as it contains technical and social dimensions. It is a concrete way to imagine the future, something to aspire to, and it is as the informants indicate, incorporated into a broader political context. But how are the informants interpreting and understanding smart cities?

As the phenomenon of smart cities is still being developed and co-produced locally, it could be difficult to describe. Stephen understands the smart city like this:

I view it more like an agent, a tool, as opposed to a stand-alone commitment [...] For me, the smart city vision is a framework for something that can provide both frameworks, but also provide content and a few specifics about how to make a city better, really.

Instead of interpreting the smart city as something only confined to technical solutions as e.g. the Norwegian Minister of Climate and Environment does, Stephen points to the smart city as a tool, not necessarily with only technical elements, but maybe with other dimensions too, such as social. However, he does admit that the smart city still is very much confined to something technical: *“I feel that smart cities are still a bit tech focused, so a lot of people will think that it is about something smart and high-tech, right”*. He emphasizes that the vision of smart cities is a framework where one can provide content and specifics about how to make a city better. In chapter 1, I introduced the EUs understanding of the smart city, and when comparing it to Stephen’s, we can see that it differs. It is different in the way he provides a more open approach where one can give it various content. Thus, the smart city is flexible in its interpretation. The notion of a technical fix is present in *St. Meld 27* and in the interpretation by the Climate Minister of the smart city, however, Stephen seems to take a broader stance on smart cities. His understanding shows also that the vision and imaginary of the smart city is mobile as it changes depending on its context, thus making it interpretative flexible to the local context. Stephen continues by saying that:

I think it is important to brand Trondheim as a smart city [...] Then it is easier to explain something as concrete as possible in a way that people can participate [...] The vision for me is also very clear in terms of business development. Very closely linked to business development [...] because focus on smart city approaches gives you opportunities for business development.

Here, he takes the EIP-SCCs emphasis on business development and uses it in Trondheim municipality’s smart city context. The discourse of corporate storytelling, as Söderström et al. (2014) point to, has powerful influence on the market, which they consider as a technocratic fiction. Stephen’s understanding of the smart city as closely related to business development, could point to a strong market influence as the smart city market is estimated to be worth up to 1.5 USD trillion by 2020 (Castelnovo, 2016). Additionally, it is important for him to brand the city as a smart one, because it will make it easier to explain something and give it meaning and content for people’s willingness to participate. The social aspect he emphasizes here, may show that he considers the European smart city as a sociotechnical imaginary. It seems clear that some

of the specifics, e.g. business development, is also translated into the municipality's context. Charles too, as I showed earlier, looks at business development as something of importance as it creates opportunities. However, it seems that being involved in smart city development is a natural course of action as "everyone" else are doing it too, which Charles highlights:

As the green transition is proliferating in most cities as a natural part of international politics. It is clear that cities will look at all kinds of image building that support that green transition as very positive. Smart city has become such a brand that can connect different things.

Charles points to that the political dimension is an important factor for finding solutions that can realize the green transition. Trondheim municipality, then, deems the European smart city initiative as a potential enabler of not just their political agenda, but to also brand themselves as a technology capital and University municipality. Images like these seem to create interest among others, thus, the smart city can therefore be understood to be an important cultural resource that "*enables new forms of life by projecting positive goals and seeking to attain them*" (Jasanoff & Kim, 2009: 122). There are several imaginaries being produced in Trondheim by people working with city development. The municipality, depicted through the informants, is envisioning the city to become a smart one, additional to their aspirations to be a technology capital, which they somewhat already are branding themselves as. By inspecting the overarching goal of the EIP-SCC with that of the informants, their interpretations have similarities to that of the EIP-SCCs especially when it comes to business development. The informants are embracing the possibility that through smart city focus one can provide business opportunities, which again can drive innovation.

SUMMARY

In this chapter, I answered the sub-research question of how Trondheim became involved with the EUs Horizon 2020 program, and the main research question of how municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city. The brief answer to the first question is that NTNU managed to interest the municipality, whereas the longer answer is that Trondheim for some time has through various projects such as Greener Trondheim and more lately through the energy and climate plan for 2017-2030, been creating climate friendlier policies and promoting sustainable development. Meaning that Trondheim had already problematized climate change and local pollution as issues to focus on before being involved with Horizon 2020. NTNU

may have amplified this focus in the municipality when NTNU introduced smart cities and “pushed” Trondheim municipality to apply. However, as Stephen highlighted, the focus on transport and mobility came from the EU. National and international policies may also have influenced the municipality to get involved with Horizon 2020. By being involved, it would create new opportunities. The possibility of using the imaginary smart city to brand itself as both a technology capital and as a smart city, was therefore of importance. NTNU managed to create interest through the smart city’s opportunities such as being part of knowledge networks, access to funds, and accelerated innovation. To be able to realize the municipality’s vision of creating a smart city including satisfying international and local goals towards sustainability, the municipality needs to interest and enrol other stakeholders to their cause.

I answered the main research question by showing that when NTNU introduced smart cities to the municipality, several translations took place. In comparison with *St. Meld 27* where smart cities seem to be portrayed as a desirable technical fix, Stephen and Charles seem to make a broader interpretation of the smart city, where they emphasize business and network development along with wanting to engage broader with the public. The informants understanding of the smart city, then, is partly in accordance with that of the EIP-SCCs strategy, where both emphasize business development as a key factor for reaching the goals of being sustainable, smart, and climate friendly. To conclude, the smart city in Stephens view is a toolbox, whereas Charles sees it as a platform. Both understand the smart city as a possibility to involve private and public partners which otherwise would be difficult to get.

CHAPTER 6 – BETWEEN VISION AND REALITY

The imaginary smart city entered Trondheim via initiative from NTNU. The university developed expertise and competence on smart cities and interested the municipality to partake in the EIP-SCC and Horizon 2020 program. The informants showed that there are appealing qualities to smart cities, and that being part of a smart city platform would enable innovation and partnerships that otherwise would be difficult to get. Furthermore, it is clear that partaking in smart city development is another way to satisfy local, national, and international climate policies. The government is also aware of the potential of a smart city, where the Norwegian Minister of Climate and Environment and *St. Meld 27* seem to understand the smart city as a place for reducing societal issues such as urbanisation and climate impact through a technical fix. However, the informants understand the smart city in broader terms, where e.g. Stephen interprets it as a toolbox with various content to solve different issues. But, he points out that it possible would mean something different if he were to ask someone else in the municipality. Hence, the smart city inherits aspects that are interpretative flexible, which for the stakeholders mean negotiations and translations within the consortium to identify what kind of smart city they want to be, and for whom it is. We can already see that the smart city means somewhat else in Trondheim compared to how it is defined by the EIP-SCC. When the imaginary smart city enters local contexts such as Trondheim, the people working with it adapt the imaginary to their experiences, history, culture, and practices. For instance, Charles said that the municipality and the R&D environment in Trondheim has a long-standing relationship based on cooperation. Thus, it was for the municipality right to continue to collaborate when engaging in smart city development. Thus far, Trondheim municipality has been engaged in three attempts to receive Horizon 2020 funds, where the current and third application is under evaluation. During their second application (BalanCities consortium) there were attempts of citizen engagement, and during my time at the municipality, I along with two fellow students researched citizens in Trondheim about smart cities, and this chapter emphasizes citizens as they are regarded as important and key actors within smart city development. In the first part of this chapter, I will present and discuss the findings from the interviews with the citizens, where the second part will focus on the municipality's attempt of citizen engagement and participatory processes.

I will answer the following sub-research questions:

- How do citizens in Trondheim want to be informed and engaged in smart city development?

- For whom is the smart city?

THE PUBLIC'S UNDERSTANDING OF SMART CITY DEVELOPMENT

Sociotechnical imaginaries are active in helping us envision certain situations or futures (Jasanoff & Kim, 2009). In the case of the smart city, it is widely recognized as a positive and even a utopian vision. I have thus far showed that there is great technological emphasis on what the smart city is, but also attempts as depicted through, e.g. Stephen, that it is something broader than just the high-tech. Jasanoff & Kim (2009) write that imaginaries are shared and incorporated into broader political contexts. Trondheim has for some time been a city pushing for climate friendlier policies, and these have highly positive connotations. The expectations for a future smart city for Trondheim are therefore high, at least for some. But what do the citizens think about smart cities?

Of 60 randomly selected citizens, only seven had heard about the expression “smart cities”, and when asked if they knew what it was, the majority of them could not describe it, but used however words as “public transport” and “infrastructure” as connotations. Both words are, as I showed in the previous chapters, closely linked to the focus areas in the EIP-SCC as well as in Trondheim’s Greener Trondheim initiative. Interestingly, the unawareness depicted through the respondents may point to a failing attempts of engaging with the public about the municipality’s plan of becoming a smart city. By drawing on one of the key aspects of Jasanoff & Kim’s (2009) sociotechnical imaginary, policy makers and city planners can justify potential inclusions and exclusions of both technologies and actors. With that said, it does not necessarily mean that the exclusion of citizens has been a deliberate intention from the municipality, because, as Charles said: “*Trondheim municipality is working for its inhabitants, so it is indirectly for the entire population that we get the best infrastructure and opportunities as possible*”. And as I shall later show, there are people being engaged in smart city related development in Trondheim. However, the discoveries from the interviews do point to tendencies towards an uninformed public about the municipality’s involvement with EU smart city projects. The municipality had in the BalanCities consortium some responsibility to interest and enrol other stakeholders in the application. But the inclusion of citizens seems to be somewhat absent. What does this mean today in the light of issues regarding trust towards powerful private and public stakeholders?

On the question on their stance towards public authorities collecting digital data from urban spaces to improve services, increase the quality of life, and cut costs, as well as on their trust towards public authorities not misusing the access to that information, the informants responded more positively than when asked if private stakeholders would gather and manage digital data from

urban spaces. It is important for clarification to note that the results from the interviews only reflect the average value, and it does not take into account that there were some who were more negative and others more positive. It does, however, indicate that the respondents are more sceptical to private actors collecting, and potentially using this data than they are of public authorities. In a European smart city, the goal is to innovate by working interdisciplinary across scales, which means collaborating with private actors. Such actors, are often technology companies, e.g. IBM, seeking to market themselves and their products, thus gaining traction in an increasingly competitive economy (see Söderström et al. 2014). To sum up, the citizens are seemingly unaware of Trondheim’s involvement with the EUs Horizon 2020 program, but how would they like to be informed and engaged?

HOW TO INFORM AND ENGAGE THE PUBLIC IN SMART CITY DEVELOPMENT?

The interviewed citizens expressed quite clearly that they would like to be informed and engaged in smart city development through digital platforms such as social media and web sites, as well as newspapers rather than active participation through e.g. workshops and public hearings (see table 4). To accentuate, these findings are not representative for the population of Trondheim, but it nevertheless point to tendencies which may be of importance for the stakeholders working closely with smart city development. What is interesting here, is the approach the municipality thus far has taken.

The five most preferred			The five least preferred			
Channel	Number of yes	Number of yes in %		Channel	Number of yes	Number of yes in %
1. Social media	55	91.7 %		1. City book	21	35 %
2. Web pages	53	88.3 %		2. E-mail	28	46.7 %
3. Via an app	50	83.3 %		3. Advertisement	37	61.7 %
4. Newspapers	50	83.3 %		4. Public hearing	38	63.3 %

5. Through their work place	48	80 %		5. Workshops	40	66.7 %
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Table 4: List of most and least preferred channels to be informed and engaged with.

Table 4 shows in what way the informants would like to be informed and engaged in the smart city development.

In recent years, Trondheim has hosted several conferences, activities, and workshops related to city development and climate action towards a sustainable future, through e.g. Technoport²⁷ (2017 and 2018) and Climate-KIC²⁸ (2016). These events gained much awareness among politicians, academia, R&D, tech-companies, and entrepreneurs. Climate-KIC was open for everyone, and it is a good initiative to create awareness and promote innovative solutions for the issues concerning cities. Technoport was open for everyone, however through a payment wall. To participate one would need a ticket, and without being part of any of the fields above, it would be expensive for the ordinary citizen to partake. What both these events have in common, is that it is doing well in engaging people that are already interested and concerned with technological and societal development, however, both events need to engage broader and include citizens that might not yet be aware of the challenges their society are facing (Ingeborgrud, Lagesen & Sutcliffe, 2016). NTNU-researchers Heidenreich, Næss, and Liste (2016) point to that it is essential that city development needs experts and competence, and with Technoport and Climate-KIC, these are arenas for knowledge exchange and networking. However, for the citizens who are living with the decisions of policy makers and city planners, the researchers advocate that citizens are to be more involved as well. In relation to the translation model of Callon (1986), the municipality has successfully created interest and enrolled already devoted people regarding climate change and city development, however, the general public seems to be absent in these events, thus indirectly excluding the majority from smart city development.

By looking at how the interviewed citizens want to be informed and engaged in smart city development, and what the municipality, as a contributing partner and facilitator of these events, actually does, there seems to be an increasingly larger gap between them. Could this, along with potential

²⁷ Technoport is a “non-profit member organisation working to promote research driven innovation by creating unique meeting places for entrepreneurs, academics, business leaders, investors, students and dreamers” (Technoport.no). In 2017, the theme was The Human Factor. In 2018 the theme is Deep Tech.

²⁸ Climate-KIC is a European knowledge and innovation community, working towards a prosperous, inclusive, climate-resilient society founded on a circular, zero-carbon economy. In 2016, the emphasis was on mobility. During a 24 hour “climathon”, students worked in several groups to find innovative solutions to reduce climate impact through mobility and transport (for more, see climate-kic.org and Ingeborgrud, Lagesen & Sutcliffe, 2016).

implementation of increased data gathering ICT infrastructures, test the trust-relationship with the municipality and in turn private stakeholders if Trondheim becomes a smart city? Before continuing with answering for whom the smart city is, it may be important to understand why the majority of the respondents have not yet heard of smart cities.

Trondheim municipality has been active in the pursuit of Horizon 2020 funds, and during the BalanCities application, the consortium worked on different aspects, e.g. demonstration projects, business opportunities, and citizen engagement. I have thus far showed that the business opportunities are appealing for the municipality to create projects but also for the possibility for funding. As I discussed in the previous sub-chapter, there seems to be a gap between how citizens want to be engaged and informed in smart city development and what the municipality actually uses its resources on. To continue the emphasis on citizen engagement, Charles shared his thoughts on the citizen engagement work package for the BalanCities application:

I was part of a work package on citizen engagement and participation with other actors from different cities and external consultants. I thought we got far in creating a good package. Ultimately, it was pretty much taken apart due to budget issues. They (the consortium) interpreted, how shall I say, the call text a bit stricter which made them argue for that that and that part might not be as important in the end. So for example citizen engagement was relatively stripped and integrated into other parts and didn't get a clear enough profile as I had hoped.

The disassembling of the citizen work package seem to be due to several reasons. However, could there be reason to believe that the disassembling of the citizen work package may have been influential in the applications rejection in the end, since citizen engagement is an emphasized dimension in the SIP? Although the citizen package, according to Charles, was not the only work package being down prioritized, there seems to be more emphasis on other aspects of smart city development, as some of the innovative business concepts and models were regarded by the evaluators as “very good” and “excellent”²⁹, whereas feedback on the citizen engagement work package is not included in the presentation. Thus, some form of exclusion of work packages took place within the consortium. Charles continued by saying that time was of essence in the final stages of the application:

²⁹ Taken from slide 9, “Lessons learnt from BalanCities”, in the municipality’s CityXchange presentation (<https://sites.google.com/trondheim.kommune.no/smart-city-trondheim/presentasjoner>). This website is the official site for CityXchange in Trondheim where one can follow its progress.

I was a bit on the outside (of the decision process regarding the work packages) and didn't have a full overview over the decisions and what kind of assessments they made. But we experienced time trouble with our application, and it was because of the budget from each single partner was in place very late in the process. So, the responsible people sat too long reviewing and confirming these numbers.

Time management, then, seems to be central for the application process, and for it to be completed. Both informants viewed the time scale as challenging as the application had to be completed in roughly nine months. It is thus far unclear what kind of role the citizen engagement package will play in the CityXchange application. However, it can be interesting to shift the focus towards what potential consequences an almost absent or decentralized citizen work package may have on the development of smart cities and for their inhabitants. And by looking at how the approaches between the citizens and the municipality, what does that mean for whom the smart city is for? Is it for the already aware actors who follow technological and societal development closely such as through participation at Technoport, or is it for the ordinary citizens and the end-users whom will be using the new technologies and infrastructures, whom yet seem to be absent in smart city development?

FOR WHOM IS THE SMART CITY?

According to the informants in the municipality, being part of smart city development seems to entail new networks, knowledge, and possibilities to create a better society. But for whom? Charles understands it as such:

That was a very good question, and I ask myself the same. Trondheim municipality and NTNU puts a lot of work into this, and it is obvious that the smart city should be an advantage for how the municipality of Trondheim works on the transition, and how the involved partners continue to work [...] The smart city is directly for those involved as partners, the municipality and NTNU, who receive the possibility to develop projects and implement them.

He regards the primary stakeholders as those who will benefit mostly from the smart city, but is this understanding missing a social relevant group? However, the question for whom the smart city is, puzzled Charles further:

But what, then, about the citizens? If Trondheim became a smart city, it would have consequences for how we relate to mobility day

to day, our buildings through new technologies, ICT applications and solutions which we otherwise might not be exposed to [...]. Indirectly, the city's population will receive benefits through the realization of the projects of course.

Here, similar to the interpretation of the Minister of climate, Charles changes his position slightly by going from a broader view of the smart city through networking and business development, over to resemblances to that of the technical fix. To clarify, the general understanding of smart cities, as seen in the definitions in the introductory chapter, technology plays a key role. However, removing deterministic understandings of technology could play a vital part in creating a truly smart city where social and cultural dimensions are included in smart city development, as Nickelsen (2016) points out. There seems, however, to be uncertainty towards the realisation of more inclusive approaches, as Charles emphasizes:

I am uncertain to what extent the citizens would be involved in the development of the solutions. Some would get the opportunity to provide input on the development of the solutions, and if not early in the process, but a bit later in the technology development process.

His elaboration on if citizen engagement in the development of the solutions to city development, seems to be characterized by uncertainty, where what role the citizens should play in the smart city seems to be unclear to the consortium. Could it be that the municipality regards the events Technoport and Climate-KIC, along with their web site on city development to be sufficient engagement with the citizens in smart city development? Maybe looking back at the interviews with the public, one could find an indication? I showed that the majority of the respondents were unaware of the phenomenon smart cities, thus implying that they have not yet heard of Trondheim municipality's vision of becoming a smart city either. Charles reflects further on participatory processes:

If [...] for example Kari and Per at Bromstad or Tiller (areas in Trondheim) doesn't know what the smart city is, or hasn't been involved at all and are completely unaware before we one day have the smart city status. That may indicate that we have not taken their input into the development. Are these solutions developed for us (the citizens) when this is not the case? [...] Some may say that we

want to develop good solutions for people in general without necessarily having an inclusive process.

Being unaware of potential major changes to the urban environment in terms of new technical and organisational infrastructure, are clear indications that citizen engagement is absent in the development process. What the involved partners envision and believe is the best solution, is not necessarily shared by the public. Whom are then the people who are saying that we (the municipality/consortium) want to develop the good solutions without an inclusive process? The reflections above does amplify the impression received by the public respondents, that citizen engagement processes in the municipality's smart city development are scarce, and to some even absent. By applying Jasanoff & Kim's (2009) conceptual framework here, it may be clear that the municipality and the BalanCities consortium as a whole have through certain decisions justified the down prioritizing or exclusion of citizens as an important actor.

Maybe the critique addressed by Heidenreich et al. (2016) and Ingeborgrud et al. (2016) is of relevance here? The findings suggest that the municipality is good at creating arenas where one can learn about technological and societal development, and places where people can engage in relevant societal issues such as mobility through Climate-KIC. Participants at these events are already aware of technological development, issues threatening society, and the potential solutions to these issues, and they come from private and public sectors where technology, digitalisation, and city development are key areas. The issue is therefore that the municipality should engage broader to reach people who are not similarly interested in technology or city development, so that they can understand and come to terms with what these potential changes may mean for them. In light of recent events, where data security related issues are increasing, and the public's trust towards tech-companies is being tested, it is especially important to engage with the citizens, because the increased implementation of ICT and even the Internet of Things³⁰ (IoT) that the smart city brings, may affect people negatively, as depicted with the Facebook scandal.

Although Charles described that citizen engagement processes were mostly disassembled due to time and budget issues, and the fact that the majority of the informants never have heard of smart cities. He does, however, believe that a more open dialogue with politicians and the public would be positive, although it could affect their ability to submit the application on time:

I think that it would have been positive if we could have a more open discussion on what the smart city can mean. The politicians

³⁰ IoT is the network of physical devices and everyday objects embedded with software, electronics, sensors, and connectivity. This may enable such objects to connect and exchange data through internet connectivity.

are important in that discussion. So, I think it would help to anchor it (the smart city vision) in the population, and make positive and negative aspects of it visible. Just simply a discussion so we could identify different opinions. There has probably not been a public discussion around it. [...] But overall I would think that a broader discussion in society would be good for the application.

It is clear, then, that the municipality would like to engage with the public in a broader sense than until now. Politicians, he says, are important in reaching out to the public and incorporating it into society. He continues to say that there probably has not been a discussion about Trondheim's smart city application publicly, thus partly confirming some of the tendencies I presented earlier with people not being aware of smart cities as a phenomenon. The EIP-SCC emphasizes a social dimension in their vision, and it would possibly be positive for Trondheim's application if a broader discussion in society would take place. It could be possible for Trondheim as a city to witness more participatory processes in the foreseeable future if the social dimension of sociotechnical imaginary is clearer. The CityXchange consortium is attempting to build the smart city increasingly from bottom-up approaches, where more emphasis is on participation than in BalanCities, according to Charles.

EXPECTATION VS. REALITY

To better understand the expectations the municipality has for the smart city development and Trondheim as a future smart city, it may broaden the perspective if we also are familiar with some of the challenges the municipality faces. Sociotechnical imaginaries are active in helping policy makers and city planners envision certain situations or futures (Jasanoff & Kim, 2009). In the case of the smart city as such an imaginary, it is by scholars, politicians, and municipalities recognized as way to develop cities, but also how to reach broader climate policies as depicted in Trondheim's climate and energy plan (Kommunedelplan, 2017). Stephen addressed a challenge concerning the way people may understand smart cities: "*what I think is [...] a challenge for us when it comes to smart city is that [...] it is still very tech focused*". He continues with emphasizing the municipality's approach:

But we are in an early phase where we are constantly working with communication with the term (smart cities) and trying to make it meaningful. It is clear that we have a very big responsibility for it, because Trondheim municipality has chosen not to take a top-down approach [...], but a bottom-up one.

Stephen finds it important to communicate the smart city as something broader than something high-tech, and he emphasizes the municipality's responsibility towards giving the smart city-term meaning. Interestingly, he continues by stating that the municipality has taken a bottom-up approach instead of a top-down one, which may somewhat challenge his own understanding and interpretation of smart cities, where he understands it as something very close to business development. For a translation to be successful, it is important that all relevant social groups are enrolled (Callon, 1986). Maybe there is an answer to Stephen's perspective in how Charles addresses one of the issues? One of the challenges Charles points out is closely connected to a broader political discussion citizen engagement, but also time:

I think maybe the focus was on other things for a very long time, so even if there was an ambition to drive a bigger and wider anchoring, there was not time. There were so many other essential elements that should be in place for the application to be completed, such as budget items, number of partners, the right lighthouse cities and follower cities, things like that. It is simply a terribly demanding process for a city to follow through.

Charles suggests that even if the municipality would like to engage broader, there was no time to do so. The municipality seems to have prioritized finding partners, LHCs and follower cities, and focusing on budgetary aspects instead of communicating their smart city development ambition in a broader political context, thus maybe affecting the municipality's wish to engage the public closer to their project. Having focus on internal processes and tasks such as finding partners, it may be understandable that by looking back at how the vision and imaginary of the smart city is understood, it is clear that the imaginary is mostly confined to the people working directly with the application, as described by Charles. The general public will allegedly receive benefits indirectly through the realisation of good smart city projects without the municipality necessarily having an inclusive participation process.

By using the term sociotechnical imaginaries, where Jasanoff & Kim (2009) write that it can justify the inclusion or exclusion of different actors, one could argue that there are tendencies pointing to the justification of the exclusion of citizen engagement processes and in turn the citizens by the BalanCities consortium. Furthermore, according to previous research, e.g. Kommune- og Regionreform (2015), citizens are an important actor, however, citizens do not seem to be interested, enrolled or mobilized in Trondheim municipality's smart city development process, even though the municipality want to be inclusive. In Callon's (1986) terms, this could point to an unsuccessful translation process.

Because the BalanCities consortium seems to have taken a bottom-up approach, as Stephen said, without necessarily having citizen engagement

processes although the municipality would like a broader discussion, as Charles stated, the citizens are not part of the alliance (the consortium), and therefore the alliance is not fully stabilized. This is of interest as smart city projects will likely bring with it new forms of ICT, which will collect information from urban areas in Trondheim as depicted in figure 2 “the knowledge axis”. However, the interviewed citizens were sceptical to private as well as public bodies collecting and using their data.

Translation is a process before it becomes a result (Callon, 1986). It may therefore be acceptable to understand an approved SSC-1 application and LHC status as the result. Thus far, we can therefore say that Trondheim municipality and the BalanCities consortium did not have a successful translation of the Horizon 2020 or the EIP-SCC vision of the smart city. However, since the EIP-SCC and Horizon 2020 program emphasize business development as a key strategy to create smart city projects, and since Stephen and Charles interpret the smart city as closely related to business development, the consortium could possibly have had a successful translation of parts of the EIP-SCCs smart city vision. And since it, according to Charles, is for the people directly involved in smart city development, they would still regard “unsuccessful” applications as successes, because they have managed to create interest and enrolled stakeholders which without the smart city platform would be difficult. Translation is the mechanism where social and natural worlds continuously take shape (Callon, 1986), which result in a situation where some control others. If Trondheim municipality, based on the BalanCities consortium and the case with citizen engagement, received funding and became a LHC, they would have control over the public in terms of implementation of projects that could be in opposition with the public’s wishes or preferences. Trondheim municipality has a great task ahead to enroll the citizens. If the municipality fails to enroll them, potential risks for that the translation fails arise. Therefore, it is important that all relevant social groups are enrolled for the translation to be successful (Callon, 1986).

SUMMARY

To conclude this chapter and to summarize, the answer to the question of how citizens in Trondheim want to be informed and engaged in smart city development, is that they would like to be informed through social media and web pages, and not as much through active participation as workshops such as the municipality thus far has done.

Secondly, I answered the sub-research question for whom the smart city is, with that Charles sees it as for those directly involved as partners, however, he continues by stating that the citizens will indirectly receive the benefits from smart city development. The expectations the EUs smart city initiative bring to

the municipality created optimism and motivation to do good smart city projects to meet international and national climate goals. Secondly, to create a platform for better cooperation between private and public sector, and to create business development, was of importance. The way Stephen and Charles interpreted the smart city, is closely linked to those aspects, and therefore may seem to have had an impact on the disassembling of the citizen engagement work package in the BalanCities application. Even though Stephen argued that the municipality took a bottom-up approach rather than a top-down one, and that Charles meant that a broader political discussion would be positive, decisions were made to prioritize other things such as finding partners.

However, it is clear that attempts of citizen engagement has been done and that the informants would like to incorporate or provide the smart city vision with meaning to the public, although according to the responses from the citizens, there does not seem to have been a thorough attempt to engage broader. Time was emphasized as a key issue here, but the “exclusion” of citizen engagement processes may point to other factors as well, e.g. power relations within smart city development. Vanolo (2014) points to that through smart city involvement, new power relations form since it involves private stakeholders, often big technological firms with technologies that are necessary for the realization of smart city projects. Thus, such stakeholders may have considerable influence in decision-making processes within local urban spaces, which in turn may raise questions of democratic nature. Finally, the smart city is for the people involved directly in the process, according to Charles. But the citizens will receive benefits through the realization from smart city projects. Based on Stephen and Charles’ interpretations and experiences with smart city related work, and the municipality’s attempts of engaging with the public, we can thus far see that there is a gap between the way Trondheim municipality envisions itself and how they can aspire to become a smart city, and the reality of how the responses from the citizens were. The gap may indicate that there is still much work left for creating an inclusive smart city development, and that maybe future consortiums need to take a broader stance instead of the narrow high-tech business development perspective that currently seems to influence the exclusions of different aspects of smart city development in Trondheim, in order to secure a successful translation process.

CHAPTER 7 – SUMMARIZING CONCLUSION

This thesis is a result of a mixed-methods design, where I have used qualitative and quantitative methods to capture a broad perspective on smart cities. To understand why and how the European smart city has become a popular choice for taking initiative to mitigate the climate impact and other societal issues, I answered, in chapter 4, the question of how the European smart city became a solution to climate and societal issues. Through *Europe 2020* and *An Energy Policy for Europe*, where elements such as sustainability and innovation are prominent, the EIP-SCC inherit similar goals where it also emphasizes sustainable development and accelerated innovation. The EIP-SCC, then, seems to be influenced by these documents as they stake out directions for the EU to take. The EIP-SCC seems to have been successful in interesting and enrolling European cities to the Horizon 2020 program, and the Horizon 2020 program may be regarded as the OPP (see figure 4) for the involved cities, as the program has funds, networks, and knowledge.



Figure 4: Depiction of the Horizon 2020 program as an OPP.

Figure 4 shows that for cities and communities to accelerate innovation, they have to create networks including local, national, and or international businesses, and R&D institutions. The European smart city initiative along with Horizon 2020 provide a platform that can enable that transition, which makes them the OPP in a European context. However, as these visions and opportunities enter cities, local translation processes take place, and the OPP leads to something in terms of networks and local interpretations of smartness, as depicted by Stephen and Charles. The European smart city is a sociotechnical imaginary because it contains technical dimensions concerning innovative solutions, energy and materials, and a social dimension where systems of people are interacting with the technical dimension, but also through social needs of society.

In chapter 5, I answered the sub-research question of how Trondheim municipality became involved with the EUs Horizon 2020 program. Here, I found that Trondheim municipality became interested and involved through the

Smart Sustainable Cities cluster led by NTNU, where competence and expertise on smart cities and Horizon 2020 were built. The municipality was then “pushed” to partake in that program. When the municipality became involved, networks and local interpretations of smartness took place, as depicted through the insights of Stephen and Charles. However, before the municipality can call Trondheim a LHC, it is interesting to see how the public understands smart cities. Additionally, it is interesting to add that the Norwegian government seems to be interested and enrolled in the EUs smart city vision, as it addresses the smart city and the Horizon 2020 program in *St. Meld 27* as an opportunity to solve climate as well as other societal issues. The Norwegian Minister of climate and environment also recognizes the possibilities the smart city brings to use technologies and the diversity of information to better solve tasks in the city (Elvestuen, 2018).

In chapter 6, I shifted my focus from national and local perspectives to the public in Trondheim, and answered the question of how citizens in Trondheim want to be informed and engaged in smart city development. The citizens response pointed to tendencies that they have not been informed or included in the municipality’s smart city application, although few attempts through Climate-KIC and Technoport has been done. However, these events seem to mostly have engaged already interested actors in technological and societal development (Heidenreich et al. 2016; Ingeborgrud et al. 2016). The sociotechnical imaginary that is the smart city, has seemingly, according to the publics’ response, not yet entered and been introduced to the public. Thus, the expectations within the consortium BalanCities and the municipality are not equal to that of the citizens, who seemingly are unaware of the municipality’s smart city goal for Trondheim. A possible reason for that unawareness may also be found in the responses from the citizens. According to the majority of them, they would like to be informed and engaged via social media, the news, and through their workplace, but not through workshops, as the municipality thus far has done. Therefore indicating their unawareness. Additionally, there were tendencies of scepticism from the citizens regarding private and public bodies collecting, using, and potentially misusing that data. This raises topics I shall address later.

I answered the second question, for whom the smart city is, with showing how Charles described that the smart city first and foremost is for the partners involved in the application, and that the citizens indirectly will receive the benefits. Furthermore, to create a platform for networking and business development was of great importance, as it otherwise would be difficult without the smart city platform. What the citizens’ unawareness may imply, is that they have not yet been successfully enrolled into the translation process by the municipality, which may reflect how the municipality workers understand the EIP-SCCs vision of smart cities.

Before the Horizon 2020 program can officially call Trondheim a LHC, the municipality must successfully interest and enrol all relevant social groups to its smart city development. Thus far, Trondheim municipality is translating the sociotechnical imaginary that is the European smart city into local networks and interpretations of smartness, which connects to the main research question of how do municipality workers in Trondheim municipality interpret and translate the EIP-SCCs vision of the smart city. I answer that question by showing that the municipality workers created networks and interpreted the smart city vision, where they understood it as closely related to business development. However, Stephen and Charles wanted a broader anchoring of the smart city in Trondheim through participatory processes. However, as I showed in chapter 6, a successful broader enrolment and engagement of the citizens seem absent and unsuccessful. The informants understood the smart city as a toolbox and a great opportunity for business development and creating and deploying projects to make the city smart. It was also important to be able to brand Trondheim as a technology and University City. Through the smart city platform, the municipality would access funds and business opportunities that otherwise would be difficult to get.

The unsuccessful enrolment of the citizens raises then interesting topics. The responses from the citizens point, as I mentioned, towards a form of scepticism to private and public bodies collecting, using, and potentially misusing the personal generated information to improve services. A paradox becomes evident, as the smart city bases itself on the collection of user generated data to create better services. This paradox leads the discussion about climate change and business development towards challenges concerning privacy and data security issues.

FROM CLIMATE CHANGE TO DATA SECURITY

The European smart city is launched as a solution and a response to climate change, financial instability, and other societal issues depending on the local context. What the smart city will bring and how it will affect the way people interact with technology, people, and institutions are yet unknown. However, one could speculate that cities attempting and aspiring to become smart cities will focus on innovative solutions and open data to find solutions to everyday challenges. There is great emphasis through the EIP-SCC (2012) and the Norwegian government (2016) that ICT is a key in solving issues. What could that mean for continued commitment to smart city development?

What did those who signed up for Facebook think when they checked off the “I Agree” box? One can assume that they probably did not give the user agreement much thought before giving Facebook permission to own their pictures, preferences and comments for all eternity. They probably trusted it.

Rachel Botsman from the Oxford University calls this the “leap of trust”, or what makes new technology gain traction (Sæther, 2018). Botsman continues by saying that people previously trusted institutions, whereas they now trust individuals. The public’s trust towards banks, politicians, and experts, are at an all-time low, she underlines. What we are witnessing, she says, is a new revolution of trust. This so-called trust revolution may seem to be amplified through the recent Facebook scandal depicted in the spring of 2018. Cambridge Analytica used personal information harvested from more than 50 million Facebook users. The information was used without permission to build a system that could target US voters with personalized political advertisements based on their psychological profile. Facebook knew about this data breach back in 2015, but only suspended the company and the person responsible for collecting the information. Additionally, it has been pointed out that maybe hundreds of millions of users may have had their information used by other private companies in the same manner (Greenfield, 2018).

Data security related issues are made relevant through the controversy between the social networking giant Facebook and the data analytics firm Cambridge Analytica. The aftermath has been significant in many regards, e.g. Facebook stocks have fallen, the campaign #deletefacebook is proliferating, and key political figures have demanded Facebook-founder Mark Zuckerberg to witness in front of the US Congress, which he later did. After the Facebook scandal, questions of ethics and trust are prominent in both Norwegian and international media. Chairman Marcus Wallenberg in Skandinaviska Enskilda Banken (SEB)³¹ said that the Facebook scandal was a wakeup call for society, as focus has increased on tech-giants as Google concerning the use of personal generated data for the purposes of selling ads based on people’s emails. Silvija Seres (2018), technology advisor and president at Polyteknisk Forening, point to that Zuckerberg and Facebook need to reflect on their societal responsibility as over to billion people are registered at the social network platform. Moreover, she emphasizes the irony that Silicon Valley companies talk about visions of how to save the world through enabling technologies with powerful digital infrastructure. However, she continues, that the goal is solely on commercialization of the insights the collected data enables, along with the position of power it results in. She concludes by saying that systemic effectiveness should never overshadow our collective hunt for meaning. Will the smart city become the digital analogue of the Panopticon? (Townsend, 2013: 13).

The Facebook scandal has become an important vehicle in creating awareness regarding data security issues, because it has awoken and showed the public what political and economic power lies in controlling huge amounts of data (Nes, 2018). Catharina Nes continues by stating that this case has illustrated

³¹ SEB is a leading Nordic provider of financial services and offers a comprehensive range of services aimed at business and institutional customers.

that privacy is not just a goal in itself, but moreover a precondition for a well-functioning democracy. An interesting point she raises is that the companies falling behind in the race of data collection, lose the battle of the ads and the profit they create. Herein, there are similar tendencies regarding competitiveness in the EIP-SCCs vision of the smart city. It is important to be competitive in order to stay ahead and secure economic and political power and influence. Furthermore, Nes highlights the trust issue where we no longer can trust companies that are led as black boxes, which means that the majority of us do not know what happens behind the scenes. The internet economy, as she emphasizes, is characterized by asymmetric information, where the market stakeholders know a lot about us, but we know little about them. This creates a power imbalance which make us vulnerable for manipulation, as depicted in the Facebook scandal. A final example of how data collection and surveillance inherit dystopian features, is present in the Chinese government's plan to introduce a social credit system (Sesame Credit³²) in 2020. Here, citizens will be measured on how valuable they are in accordance to the governments guidelines (Sæther, 2018). But there are, however, motions in place for changes in today's surveillance economy (Nes, 2018).

THE GDPR³³

The European Union introduces a new directive of improving the regulations of how to protect and empower all EU citizens' data privacy and to reshape the way organizations across the region approach data privacy (EUGDPR, 2018). The regulation requires stricter specifications to openness about how commercial actors, e.g. Facebook, collect and use data. People should have faith that their data is not used for unknown purposes, and we should have the right to say no to our personal information being used for marketing (Nes, 2018). Bjørn Eckblad (2018) writes that a key demand in the GDPR is that the end-user easily shall understand which data that is collected, why it is collected, and what kind of benefits the user receive in return. Only then can the users make qualified choices if this is something they want to be part of. Ingvild Næss, a privacy representative at Schibsted, says that the GDPR already works, because it brings forth answers to the question if all this data is necessary (Eckblad, 2018). Another point in public and private bodies collecting and using data from users,

³² Sesame Credit collects data from social networks, transactions, and utterances. It is called a gaming version of political and cultural surveillance. If your actions are not in accordance with the guidelines from the government, your personal rating goes down, and raises if actions are in line of the guidelines. Continued low ratings may affect future choices as jobs and travel possibilities (Sæther, 2018).

³³ The EU General Data Protection Regulation (GDPR) is the most important change in data privacy regulation in 20 years. The GDPR is enforced on May the 25th 2018 (see more at <https://www.eugdpr.org/>).

is that of how much a state should know about us in a democratic society, Veronica Buer, from the Norwegian Data Protection Authority, argues (Campo, 2018). She furthers her argument with that Norwegian governments are close to exceed the limit of data collection. A lot of the registers have good purposes, but Norway is among the top countries of how registered the population is. Many of those registers are law bound, which mean you have no right to choose to consent or not. Campo concludes with that we should have better opportunities to give consent, which should be as easy as to withdraw or reject it. As a consequence of the GDPR, one may potentially witness a shift towards giving some of the power back to the people by giving them the choice what data and with whom they choose to share. Lastly, when speaking about falling trust towards institutions, the GDPR may be viewed as way for EU to show its relevance in a time of political instability (Wiedswang, 2018). Is it, then, based on the case of Trondheim municipality's involvement and aspirations to become a smart city and that data security and privacy are highly relevant today, possible to engage the public on a level beyond the flash of technologies?

ENGAGING THE PUBLIC ON A LEVEL BEYOND FLASH?

The European smart city includes technical and social dimensions (EIP-SCC, 2012). However, what we thus far have learned from the valuable insights from the informants and the citizens, is that the social dimension seems to be down prioritized due to prioritizing business development. In smart city initiatives, Castelnovo (2016) argues, that the collaboration between designers (in this case the partners) and the users (the citizens) is the essential condition for yielding the desired results, and these may vary from location and context. It is in other words called co-production, which can be considered as enhanced forms of participation (Castelnovo 2016; Jasanoff 2004). When citizens are given back the power to decide whether and how to take part in the implementation of public programs, they may become informed co-producers in implementing smart city initiatives (Castelnovo, 2016). For instance, if citizens of Trondheim become more informed about the plans of the municipality, as they indicate they would like to be, they would perhaps become co-producers and making the smart city development more responsible and in line with the wishes of society. Citizen engagement does create better solutions and decision-making according to the Norwegian government. Charalabidis et al. (2013) and Linders (2012) argue in Castelnovo (2016: 106) that *citizen sourcing* is a way of gathering citizens' knowledge, ideas, opinions, and needs in order to address societal problems. Citizen sourcing may be a possible way to reduce the potential mistrust between public and private bodies and the citizens, and as a way to have citizen engagement – a fundamental aspect in the process of cities becoming truly smart cities (Schurman et al., 2012 in Castelnovo 2016). By

giving citizens back control over their data, could give them the power to decide whether to allow the smart city to collect and use the data (Castelnovo, 2016). This will be an interesting connection to the GDPR, where the goal is to give the user more control over what, how, and for what purpose their data is shared. The EU has also an approach called Responsible Research & Innovation (RRI) that *“anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation”* (EURRI, n.d.). RRI is included in the Horizon 2020 program, and by implementing this approach, it is possible to engage broader and develop and co-produce a sustainable and desired society. Through more participatory and engaging approaches to smart city development, it could be possible to engage the public on a level beyond technological flash.

Lastly, the controversy between Facebook and Cambridge Analytica raises important questions. However, despite the recent events, it is perhaps positive that this scandal created much needed awareness and attention, as cities around the world and in Europe are trying to become smart cities. Hence, timely that the Norwegian media has shifted the attention towards data security and privacy issues. The great discomfort the Facebook scandal has left us thus far, is the acknowledgement of how invisible the ethical challenges are in our current digital age, and that we do not yet know the long term effects of the scandal (Stavrum, 2018). David Nye (2007) argues that every society ideally should give citizens the opportunity to take part in the construction of technological development, and that in the future, citizens are likely to demand more transparency and debate in technological decision making. It is therefore important to continue addressing smart city related topics and development, and since it is a new phenomenon, we still do not know the effects of what the smart city will bring. All these described aspects and scenarios of surveillance and misuse of personal data, have clear dystopian features, which is a paradox, as the smart city is often depicted as a utopia, or a place that has yet to be. Finally, it will be interesting to follow how data security and privacy issues will affect Trondheim's further work with smart cities.

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