Smart and Social Sustainable Neighbourhoods at Stigsborg Havnefront

A research of how to create smart and social sustainable neighbourhoods at Stigsborg Havnefront, Aalborg Denmark

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Preface

This thesis marks the final project of the master of Urban Planning and Management at Aalborg University. This thesis is as written by Eline Vereide Kongsvik in the period of 1th of February until the 7th of June. The reason for writing this thesis was to understand how social sustainability can be more integrated in urban planning through the concept of the smart city.

I would like to thank my supervisor Rasmus Nedergård Steffansen for helpful guidance and feedback through this process. To my interviewees, Louise Studstrup from Aalborg Municipality, Karoline Birkeli-Gauss from Asplan Viak, Oslo and Håkon Iversen from Cowi, Bergen, for your time to participate in the interviews. To my friends and family, for support and guidance. Lastly, a special thanks to Mira, for your criticism, support, help, motivation and guidance during these months.

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Summary

Our societies and cities are becoming digitalised as new devises and tools are developed to make the cities more effective, and accordingly digital technologies becomes an important factor in urban planning. The smart city has in the last years gained a lot of attention because the smart city has a strong focus on creating cities that are prepared for the digitalisation that comes in the future. However, literature indicates that there is a lack of focus on the citizens in the smart city, and consequently this thesis aims to understand how citizens can gain a stronger focus in the smart city through social sustainability. The goal of this thesis has therefore been to understand how to create a bridge between social sustainability and the smart city to ensure that there is a stronger focus on citizens.

To gain a practical perspective on this thesis, the case of Stigsborg Havnefront (Stigsborg) in Aalborg Municipality is chosen as the municipality has a strong focus on creating smart and social sustainable neighbourhoods. Since, Stigsborg is a neighbourhood development project, this thesis looks at concepts in a perspective of smart neighbourhoods. Accordingly, the main goal of this thesis has been to answer the research question: *"How can the aspects of the smart city create social sustainability in neighbourhoods, and how can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?"*

The theories that have been used in this thesis are the concept of the smart city, smart neighbourhoods and social sustainability, these concepts have been divided in to two aspects, where the smart city and smart neighbourhoods are looked upon as physical aspect and social sustainability into social aspects of the smart city. These theories are used as a theoretical framework for analysing the case of Stigsborg. The empirical data that is used in this thesis is interviews with urban planners with experience in social sustainability and smart city as well an urban planner from Aalborg Municipality that works with the project of Stigsborg. Document analysis has also been to gather knowledge about the project of Stigsborg.

There is a strong focus on smart and social sustainable neighbourhoods in Stigsborg Havnefront, however these concepts are looked upon separately, therefore contributes this thesis by creating a bridge between the concepts. This thesis identifies how to use smart solutions to increase social sustainability in smart neighbourhoods. The aim is to discover what possibilities there lies in creating Stigsborg into smart and social sustainable neighbourhoods. This thesis has therefore given solutions and examples of how Aalborg Municipality can use smart solutions to increase social sustainability, such as creating digital platforms and to increase participation and communities and create a strong infrastructure that can provide increased liveability.

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Chapter 1: Introduction

The United Nations (UN) predicts that 68 percent of the world population will live in urban areas by 2050 (United Nations, 2018). As humans create extensive ecological footprint on natural resources it has caused enormous pressure on the planet, and consequently we are facing loss of biodiversity, rising sea level, extreme weather and pollution. Climate change and population growth are therefore some of the most complex challenges of our planet, and it will demand rethinking how we live our lives, but not at least how we use and build our cities. This means that the changes that needs to be made needs to be implemented both on a global and local scale to create a more sustainable world, and therefore cities have a great responsibility to create solutions to solve the problems of our planet and be a driver for change (Baccarne et al., 2014; Colding and Barthel, 2017; Dameri and Rosenthal-Sabroux, 2014; Macke et al., 2018; Soyinka et al., 2016).

The term sustainable development was first defined in 1980 by the Brundtland Commission. The definition of sustainable development is defined as; *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (Brundtland Commission, 1987). In the beginning of the 1980's there was a strong focus of the environmental aspect of sustainable development, but today sustainability has developed to be divided into environmental, economic and social sustainability (Jamieson, 1998). Resultingly, sustainability is implemented as a goal and a vision of most urban planning projects, however to reach sustainability is difficult (Jamieson, 1998). In order to make sustainability more tangible the United Nation created in 2015 seventeen Sustainable Development Goals (SDG) to *"address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice"* (United Nations, n.d.). The SDGs have created global awareness and engagement in defeating the problems of our planet by bringing sustainable development on the map (United Nations, n.d.). However, sustainability is still wicked, it broad, and complex, and how sustainability is understood and how to reach it varies from person to person.

1.1 The concept of the smart city

There exists a fluster of buzzwords in urban planning that aims to solve the challenges of sustainability, and the smart city is one of them. The smart city has in the last ten years gained a lot of attention because the smart city has a strong focus on creating infrastructure, digital technologies and information and communication technologies (ICT) (Baccarne et al., 2014). Baccarne et al (2014) argues that it was the combination between technological solutions and the challenges of the cities that drove the initiative to create the concept of the smart city. Consequently, there are today a rapid speed in the development of smart solutions and by 2020 it is estimated that the world budget for smart city development is going to reach 16 billion dollars, and this indicates how the smart city has developed to become a world spread buzzword (Colding and Barthel, 2017; De Jong et al., 2015). The popularity and the vast use has resulted that the concept has been reshaped and redeveloped differently depending on aim and visions of the projects, or in which country it has been used (Lopes and Oliveira, 2017).

The foundation of the smart city is innovation, creativity and production of smart solutions, with the aim to find new solutions to the problems of our cities (Iversen, 2019). The smart city has accordingly created opportunities to rethink how to plan and create cities, and resultingly there lies a great potential in exploring new and smart solutions. Accordingly, the smart city has consequently created trends of becoming high-technological cities, develop smart energy solutions, create digital platforms and autonomous cars, the list of innovation of smart solutions are long and there are constantly new and innovative solutions that are released into the market. To illustrate how the smart city concept has been adapted into various urban planning field Figure 1 illustrates the spectre of what the smart city can be. As the figure shows, the smart city consists of a cluster of under categories of the smart city and consist of many visions and goals.

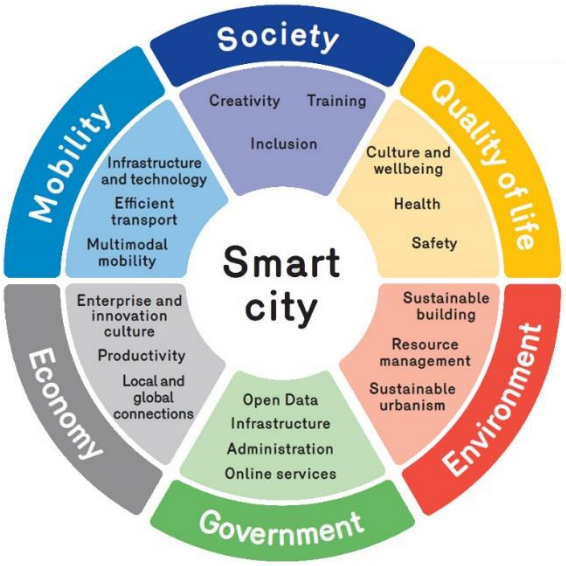

Figure 1: Illustration of the Smart City Source: Brussels Smart city

The foundation of the smart city lies in creating solutions to improve health, infrastructure and sustainability (De Jong et al., 2015; Ghaffarianhoseini et al., 2018). The smart city contains many promises to create cities for the future and solve the problems of our planet and the initial aim of the smart city is to "*promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' solutions"* (MoUD, 2015: 104). Therefore, a strong emphasis on the smart city lies in creating technologies that creates a greener and more liveable city, and therefore sustainability is an important factor of the smart city (Baccarne et al., 2014; De Jong et al., 2015; Ghaffarianhoseini et al., 2018). Sustainability are in the light of the smart city achieved when *"there are presumed positive feedback loops between a high-tech business and the resulting public benefits, denoting to that smart technologies and the IoT serve social and public ends*" (Colding and Barthel, 2017). This means that smart city solution aims to contribute to sustainability when technologies are used to optimize the systems of the city (Colding and Barthel, 2017; De Jong et al., 2015).

Even though the smart city is *"the fastest growing discourse within the wider umbrella of urban sustainability"* (Colding and Barthel, 2017) sustainability is often neglected in the smart city because there is a tendency that there is a higher focus in creating digital technologies than securing sustainability (Baccarne et al., 2014; Colding and Barthel, 2017; De Jong et al., 2015; Hollands, 2008).

De Jong et al. (2015) points out that the smart city goes further than intelligent, technological and informational cities as they argue that it is necessary to look at the physical and social systems of the smart city, this means that the smartness that is being implemented should benefit citizens, business and the government (De Jong et al., 2015). Accordingly, it is clear that there needs to be a stronger focus between the smart city and social sustainability to provide the needs of the citizens, because a city without people is not a city, and if the city becomes to technological and does not provide the basic needs of the citizens, people do not want to live in the city (Iversen, 2019).

1.2 Creating a bridge between the smart city and social sustainability

"Smart neighbourhoods strongly rely on citizen: they are the ones who can enliven the smart technology" (Toth and Reith, 2015)

Literature indicates that there is a gap between the smart city and social sustainability, this means that the citizens often get neglected in the smart city (Baccarne et al., 2014; De Jong et al., 2015; de Waal and Dignum, 2017). Since our societies are becoming more digital this thesis argues that it is important that the implementations benefit the citizens, and that the citizens get to participate more in the smart city. Therefore, this thesis will investigate in some of the challenges that comes about implementing social sustainability and discover the possibilities by implementing social sustainability in the smart city. The motivation behind this is to make more awareness of the citizens in the smart city. Accordingly, the goal of this thesis is to build up a theoretical and practical understanding of how the smart city and social sustainability is integrated in urban planning. To do so, this thesis has narrowed down the smart city into looking at smart neighbourhoods and aims to investigate in the case of Stigsborg Havnefront (Stigsborg), Aalborg Denmark. The project of Stigsborg is driven by Aalborg Municipality and they have a strong emphasis on creating Stigsborg into smart and social sustainable neighbourhoods. The end goal of this thesis is to understand to create neighbourhoods that is both smart and social sustainable. To carry out this thesis the thesis will answer the following research question and the following sub questions will be answered:

Research Question:

How can the aspects of the smart city create social sustainability in neighbourhoods, and how can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?

Sub 1	**Sub 2**	**Sub 3**
What are the challenges of creating smart and social sustainable neighbourhoods?	How can Aalborg Municipality create a bridge between smart solutions and social sustainability in the neighbourhoods of Stigsborg?	How smart should a smart and social sustainable neighbourhood be?

1.3 Structure of this thesis

This thesis consists of seven chapters, this section will present how this thesis is structured and introduce what the chapters contain**.** Firstly Chapter 1: Introduction presents the empirical problem of this thesis. The aim of this chapter is to build up an empirical understanding of some of the complex challenges of urban planning and introduce the concept of the smart city. The goal of this chapter is to build up the readers interest and motivation for further reading and to present the importance of why conducting this thesis. Chapter 2: Theoretical framework aims to build up a theoretical understanding of the smart city and social sustainability, and the goal is to build up a framework are going to be the basis for the analysis. Chapter 3: Research Approach and Methodologies, presents how this research is conducted and what philosophies that underlie this thesis. The aim is to illustrate how this thesis is going to be conducted and present the methods that are used. Chapter 4: Smart and social sustainable neighbourhoods is the first analysis and it aims to investigate the challenges of implementing smart and social sustainable neighbourhoods. Chapter 5: Aalborg Municipalities visions for creating smart and sustainable neighbourhood in Stigsborg, the aim of this chapter is to present the case of this research that is Stigsborg Havnefront, the aim is to investigate what strategies Aalborg Municipality and the developing companies have to create Stigsborg into smart and social sustainable neighbourhoods. The aim is to investigate how Stigsborg can create smart solutions that has a strong emphasis on social sustainability to secure social sustainability in the project. Chapter 6: discusses the results of this paper and reflect upon them. Chapter 7: Conclusions, presents the conclusions of this paper.

Chapter 2: Theoretical framework

This chapter aims to create the theoretical baseline for this thesis. The goal of this chapter is to define the concept of the smart city and social sustainability to gain an understanding of what should constitute neighbourhoods that are both smart and social sustainable. By doing so the aim is to build up a literature review that will be the base line for the analysis. The aim of the first section is to investigate how the smart city has been defined in literature to build up an understanding of what the smart city is and what a smart city can be, since there are many understandings of what a smart city is, this section aims to conceptualise how this thesis looks at the smart city. Accordingly, the second section aims understand what social sustainability is and define some social sustainability goals that will help increase social sustainability in smart neighbourhoods. The last section summaries this chapter and defines what smart and social sustainable neighbourhood is.

2.1 Defining the smart city and smart neighbourhoods

"A smart city can be understood as a community in which citizens, business firms, knowledge institutions, and municipal agencies collaborate with one another to achieve system integration and efficiency, citizens engagement, and a continually improving quality of life" (Snow et al., 2016: 92)

Up until today there are no universal definition of the smart city, therefore, the smart city can be said to be everything but nothing at all as the concept has been reused and reshaped in multiple ways (Kitchin, 2015). Resultingly, there are a cluster of definitions of the smart city, Finger and Razaghi (2017) defines the smart city as *"a combination of urban infrastructure systems on the one hand and digitalisation, on the other,"* while Snow et al., (2016) defines the smart city as a city that *"uses digital technologies to enhance performance and well-being, reduce cost and resource consumption, and engage more effectively and actively with citizens."* de Waal and Dignum (2017) defines the smart city as a city *"whose economy is increasingly driven by technically inspired innovation, creativity and entrepreneurship, enacted by smart people," and* Kitchin (2015) looks at a smart city as a city *"whose economy and governance is being driven by innovation, creativity and entrepreneurship, enchanted by smart people."* By looking at these various definitions, it is clear there exists various understandings, focus points and interpretations of what the smart city is. As the understanding what a smart city is and what a smart city ought to be varies from person to person it is hard to define the concept, accordingly, it is important to understand the core of the concept.

This thesis categories the smart city into five categories, digital technologies, infrastructure, buildings, energy and citizens. These categories can be understood to be the building rocks of the smart city as they build up the foundation of what a smart city is. By establishing the understanding of what a smart city is, this thesis argues that these five categories can define what a smart neighbourhood is, as a neighbourhood is a according to Jenks and Dempsey (2007) *" residential/mix-use area which is bounded by, or enclosed by, physical features such as transport infrastructure including roads and railways, and waterways and other natural borders."* Accordingly, the categories will provide examples from a neighbourhood perspective, however they will be more elaborated upon in Chapter 5: Aalborg Municipalities visions for creating smart and sustainable neighbourhood in Stigsborg.

Digitalisation (digital technologies) and technologies

This thesis looks at digitalisation and technologies as the baseline for the smart city, the reason that lies behind this statement is that the smart city is centred around digitalisation and technologies to create the future city (Crooks et al., 2017). This means that digital technology is core for building infrastructure, buildings and create a simpler life for citizens (Crooks et al., 2017). Digital technologies can be everything from internet of things (IoT), big data, apps and sensors that are part of making the city more effective while technologies are meant by larger technologies such as autonomous vehicles that uses digital technologies to make the infrastructure smarter. This means that digitalisation could be to create neighbourhoods that are high technological neighbourhoods or provide apps that can increase social sustainability within the neighbourhood.

Infrastructure

This thesis argues that infastrucutre is the fundation of the smart city as it conncets the smart city together. This can be illustrated through Soyinka et al. (2016) definition of infrastructure, as they defines it as *"a system of connected utilities, basic facilities, and services of that city, from the smallest units of the community (houses) to the significant city structures and buildings that render services such as electricity, sewage and sewerage and water supply."* This means that in a neighbourhood infrastructure can consist of amongst mobility, citizens, environment, economy and human living conditions (Soyinka et al., 2016). An example of infrastructure can be smart grid systems that brings the energy that are needed around the neighbourhood, or a mobility infrastrucure for autonomous cars or walking or biking.

Buildings

Ghaffarianhoseini et al. (2018) explains smart buildings as *"buildings which integrate and account for intelligence, enterprise, control, and materials and construction as an entire building system, with adaptability, not reactivity, at its core, in order to meet the drivers for building progression: energy and efficiency, longevity, and comfort and satisfaction".* This explanation shows that smart solutions can create possibilities to make buildings much more digitalised that what they are today, more efficient and more sustainable. From a neighbourhood perspective it can provide more environmentally friendly buildings or buildings that have a high standard of technologies (Iversen, 2019).

Energy

Energy is in this thesis argued to be the main challenge of the smart city, the reason lies in the argument that there is a high demand in providing enough energy to support the use of the smart solutions as they are depending on energy as they consist of a range of digital technologies. Therefore, it is important to provide a range of energy resources in a neighbourhood (Iversen, 2019).

Citizens

This thesis argues that citizens is the core of the smart city, however literature indicates that the smart city aims to be centred around citizens, however the role of the citizens are often unclear (de Waal and Dignum, 2017). Vanolo (2016) argues that the voice of the citizens are often replaced with digital sensors. Snow et al (2016) argues that the smart city should engage and act more closely with citizens than what they do today. Accordingly, this thesis argues that the smart city should aim to empower citizens and provide services that gives citizens the possibility to participate in debates, influence how the smart city should look like and create policies (De Jong et al., 2015). As de Waal and Dignum (2017) *highlights, "technologies could provide citizens with new means to define collective issues and organize themselves around these,"* there lies a great potential in creating solutions that benefits citizens and can make them more active in their neighbourhood. It is important to state that the citizens focus of the smart city is strongly correlated to social sustainability, accordingly when talking about social sustainability in this thesis, it is strongly correlated to the category of citizens of the smart city, if it is not stated otherwise.

2.2 Citizens in the smart city – social sustainability

"The concept of a 'smart city' is a container of promises. It holds the belief that citizens can and should act as smart collaborative ecosystems enabled by state-of-the art technology. It envisions cities as laboratories and drives for social change. In reality, however, a lot of the promises and the potential of a smart city still remain to be proven on multiple levels" (Baccarne et al., 2014)

The previous section illustrated the smart city has a strong focus on technologies and infrastructure and resultingly citizens does not have the strongest focus in the smart city development (Baccarne et al., 2014; De Jong et al., 2015; Vanolo, 2016). Hollands (2008) argues that in order to be smart there lies a need to distribute power, tackle the challenges of inequality. Hollands (2008) further argues that there are too much focus on creating new technologies and questions about social justice and sustainability are hidden. Therefore, this section aims to understand the core of social sustainability in order to understand how to implement social sustainability into the smart city.

"The smart city has a strong emphasis on creating quality of life and therefore is social sustainability an important factor in smart city development, if there is a focus only on the technological aspect of the smart city the social aspect may be overlooked." (Trivellato, 2017)

There is no clear definition of what social sustainability is, regardless, there are many that have tried to define what social sustainability is. Colantonio et al. (2009) defines social sustainability as *«social sustainability concerns how individuals, communities and societies live with each other and set out to achieve the objectives of development models which they have chosen for themselves, also taking into account the physical boundaries of their places and planet earth as a whole."* While, Trivellato (2017) argues *that "social sustainability characterises those policies, programmes and projects that produce improvements at the individual as well as societal level, such as skills development or reduction of spatial inequalities, but also, increasingly, issues such as participation, well-being, and*

quality of life." Therefore it is arguable that social sustainability often works as a umbrella category for other concept such as social cohesion, social inclusion and social inequity (Høyland et al., 2018).

Since social sustainability is a wide and multi-dimensional concept, there is a need to make the concept more comprehensive. Consequently, social sustainability is often defined and answered through social sustainability goals (Dempsey et al., 2011). The most known sustainability goals are the United Nation Sustainable Development Goals (SDG), and an important goal in urban plan is particularly the SDG 11 that contains the goals of 'Sustainable Cities and Communities.' To make the social sustainability goals more comprehensive it is normal to look at social sustainability at various scales (Dempsey et al., 2011). This means that it is possible to look upon social sustainability from a global scale such as a global, national or local scale (Dempsey et al., 2011). Dempsey et al (2011) argues that the scales shows that there are various dimensions to social sustainability, and hence it is difficult to separate the social activities that takes place in one physical setting to another (Dempsey et al., 2011). In this thesis the focus lies at a neighbourhood scale.

To secure social sustainability in the smart city this thesis argues that it is important to define sustainability goals and values. Accordingly, this thesis argues that the goals and values can help to define what a smart and social sustainable neighbourhood is. Dempsey et al. (2011) argues that social sustainability goals are excepted on a broad scale and consequently it means that the sustainability goals has not been defined or agreed upon. This shows that it is important to define social sustainability goals to create smart and social sustainable neighbourhoods. The next paragraph will define a number of social sustainability goals to define how to reach social sustainability in neighbourhoods. The goals and values are drawn out from various theories that exist in literature of social sustainability, the aim is to create an understanding of what the social sustainability is. Consequently, this thesis defines the social sustainably goals as participation, community, mixed housing /mixed use, social interaction and social networks and social equity. How these social sustainability goals collaborate will be elaborated upon in Chapter 5: Aalborg Municipalities visions for creating smart and sustainable neighbourhood in Stigsborg.

Participation

Participation is about involving, engaging and taking part in activities, and ensuring communication between citizens (Batty et al., 2012). Participation gives citizens the chance to be a part of making decisions and be a central part of public life (Simonofski et al., 2018). Forrester and Kearns (2001) defines participation as *"people take part in social and community activities" and that "local events occur and that they are well attended."*

Community

A community is looked upon through the aspect of social and affective componements, the social apects looks into what types of social interactions that accurs in a neighbourhood of social netwoks and emotional support, and the affective is what physological and emotional responses that comes out of the social interactions (Talen, 2002). "Sense of community and neighbourhoodness are

engendered by having small-scale, well-defined neighbourhodds with clear boundaries and a clear centre."

Mixed Housing / Mixed use

"A mixture of housing […] encourages random personal contact between personal contact between people of different social classes. Communities become more nearly complete and integrated and, as a result, sense of community is established" (Talen, 1999). Accordingly, it is important to facilitate a mixed use in what housing and various range of price categories within a neighbourhood (Talen, 2002). Talen (2002) further argues that another important factor is to provide various facilities such as business, schools, retail and public areas in a neighbourhood.

Social interaction and social networks

Dempsey et al. (2011) defines social networks as *"social support system, indicating that the people we know and feel we can depend on can influence other aspects of life such as feelings of safety and sense of well-being."* Talen (1999) highlights that architecture plays an important factor in creating social interactions, while she in Talen (2002) argues that social interaction *"leads to a stronger, affective type of community".* (Forrest and Kearns, 2001) highlights that social interactions leads to social networks.

Social equity

Dempsey et al. (2011) highlights that social equity *"has its foundations in social justice, distributive justice or 'fairness in the apportionment of resources,' and equality of foundation."* Social equity is to create fairness in a community and across classes, it is also about how resources are divided, this indicates that social justice is closely interlinked with social and environmental exclusion (Dempsey et al., 2011; Talen, 2002).

2.3 Summary

This section summaries this chapter and aims to define what smart and social sustainable neighbourhoods are. As shown, the smart city is in this thesis defined by categories that consist of digital technologies, infrastructure, buildings, energy and citizens that depend upon each other, but can exist on their own. While social sustainability is defined through participation, community, mixed housing/mix, social interaction/social networks and social equity. This chapter has also argued that the smart city has a stronger focus on the built environment than the social. Therefore, this thesis argues that smart and social sustainable neighbourhoods should be defined through physical and social aspect which are presented in Figure 2. This means that the physical aspects refer to the built environment, while the social factors are the non-built environment meaning social sustainability. This thesis argues that the physical and social aspect needs to be fulfilled to create smart and social sustainable neighbourhoods. The physical and social aspect can also be used as a tool to create a more practical understanding of what a smart neighbourhood is, where the smart neighbourhood focus lies, but not at least how to create smart neighbourhoods. The following analysis chapters will look into the physical and social aspect of smart neighbourhoods to understand how to connect the

physical and social aspects together in order to understand how to create smart and social sustainable neighbourhoods in practice.

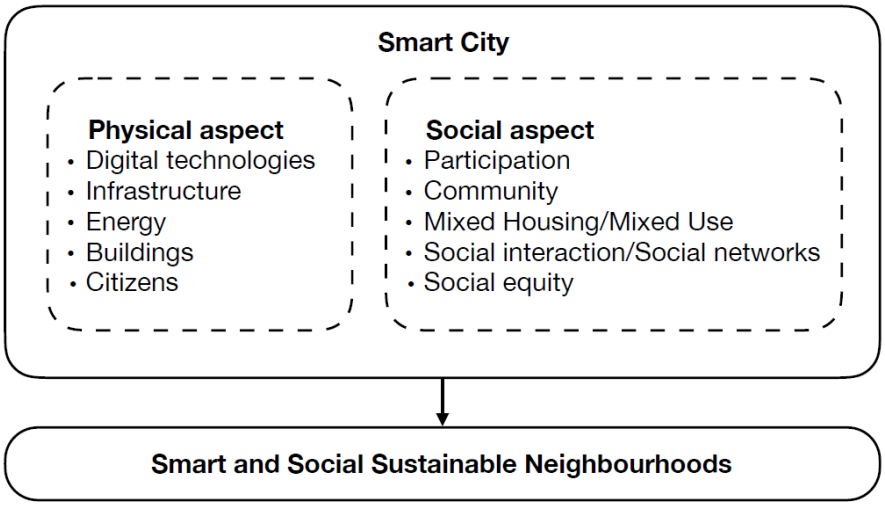

Figure 2: Defining smart and social sustainable neighbourhoods

Chapter 3: Research Approach and Methodologies

This thesis is a qualitative research that draws upon the concept of the smart city and social sustainability. This chapter presents how this research is conducted, what philosophies that underpins this research and what methods that are used. The first section of this chapter presents the ontological and epistemological assumption of this research, they are important to highlight because they shape and influence how the research is conducted and accordingly they present what philosophies that lies behind this thesis. Further on a research design is developed to present the empirical problem of this thesis, it also presents the sub questions that aims to underpin the research question, but not at least illustrate how the research is structured. Lastly, the methods that are used to conduct the necessary data are presented in the last section of this chapter.

3.1 Scientific Approach

Behind every research there are assumptions of what the word is composed of (ontology) and what knowledge to bring from those assumptions (epistemology) (Farthing, 2016). The ontological and epistemological assumptions will vary from whom is conducting the research as people have various views of how the world is constructed and how they experience the world (Berger and Luckmann, 1967). Farthing (2016) argues that the values a researcher has on a personal level does often lead the research to focus on specific topics or issues that exist in the world. Since there are many ways to understand the world, there are also many ways to gain knowledge. Pedersen (2014) argues that there exists no single truth, and consequently, this thesis takes the standpoints of social constructivism.

Social constructivism means that knowledge can be constructed and created by questioning the knowledge that already exist (Pedersen, 2014). By being critical and questioning why things are like they are, it is possible to create new knowledge because it challenges the way society is constructed (Pedersen, 2014). When looking at social constructivism in the view of epistemology and ontology, epistemology claims that the world cannot be looked upon as objective, while from an ontological point of view, there exist no truth (Pedersen, 2014). This thesis draws the question to why the smart city does not have more focus on social sustainability, it creates a critical view of the smart city and challenges the concept to become more social sustainable. By posing this critical view of the smart city, it aims to gain new knowledge of how to implement more social sustainability into the smart city. The epistemological assumption in this thesis is that smart neighbourhoods needs to become more social sustainable, while the ontological assumptions of this research claims that there is no single truth of how to create smart and social sustainable neighbourhoods, because neighbourhoods will always be different from another, and hence there is no single truth in how to create a smart and social sustainable neighbourhood. This means that what the truth depends on the person and hence it exists many truths and many solutions.

On the basis on the philosophies that underpins this research, it is clear that this thesis cannot give the absolute truth of what smart and social sustainable neighbourhood is or can be. With the understanding of the philosophical assumption this research takes, it has affected what methods and literature that have been used in this thesis. While the literature seeks to understand various sides of the coin of the concept, it has been important to conduct various interviews with professional urban planners that holds various expertise on sustainability and the smart city to understand various perspectives and viewpoints of what the concepts might be. With the understanding of what philosophical standpoints this thesis takes, the next section of this chapter will present the research design of this thesis.

3.2 Research Design

To create an overview on how the research is conducted a research design is developed, see Table 1. The research design clarifies how this research is conducted and how it aims to answers the research question, it also presents what type of methods that needs to be conducted to answer the research questions. The aim of the research design is to illustrate how the research is going to be performed and create reliability of the research findings (Farthing, 2016).

Firstly, the empirical problem is presented to relate the research to complex and wicked challenges that are connected to urban planning. The emphasis lies in the rapid development of digital technologies and it relates closely to how slow urban planning moves compared to the digital technologies. The empirical problem creates the base of the research, and build up to the main research question of this research which is *"How can the aspects of the smart city create social sustainability in neighbourhoods, and how can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?"* The background for posing this research question is to build a bridge between social sustainability and the concept of smart neighbourhoods. To gain this knowledge, the emphasis on this research lies in how Stigsborg Havnefront can be a part of increasing smart city and social sustainability in the neighbourhoods of Stigsborg. To make the research question more comprehensive, three sub questions are presented to make the thesis more structured and make sure to gain knowledge to answer the main research question. The aims and goals of the sub questions are presented to deliver the understanding of why the sub question are asked. The methods that are used to conduct the necessary data are also presented in the table. Since the concept of the smart city and sustainability is broad and complex the concepts needs to go through a selection process to riddle out what is important for this research, firstly to make this study more tangible and secondly it is not possible to study the full range of the concepts because they are too broad and complex (Farthing, 2016). This means that not all aspects of social sustainability and the smart city are taken in consideration in this thesis because there are various dimensions of the smart city and social sustainability. To make this thesis more comprehensive, this thesis narrows down the smart city focus to smart neighbourhoods and aims to contribute to create a more practical understanding of the smart city and social sustainability in scale of neighbourhoods.

Research Design		
Empirical problem The development of digital technologies is increasing rapidly and consequently the world needs to take on board the digital development and become smarter. Digitalisation creates new and innovative solutions to solve problems of health, infrastructure and sustainability, however, since the digitalisation is increasing rapidly, it makes it hard to keep up with the speed of the constantly changing digital technologies. A tendency in the smart city is that the focus is primary on digital technologies and the citizens are often neglected, however the smart city development should be positive for its citizens instead of something negative, therefore it is necessary to create a bridge between the smart city development and the people that lives in the city.		
Research Question: How can the aspects of the smart city create social sustainability in neighbourhoods, and how can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?		
Sub 1	**Sub 2**	**Sub 3**
What are the challenges of creating smart and social sustainable neighbourhoods?	How can Aalborg Municipality create a bridge between smart solutions and social sustainability in the neighbourhoods of Stigsborg?	How smart should a smart and social sustainable neighbourhood be?
The aim of posing the sub question	**The aim of posing the sub question**	**The aim of posing the sub question**
The aim of this chapter is to understand and identify challenges and possibilities to create smart and social sustainable neighbourhoods.	The aim is to investigate the visions for the Stigsborg project and investigate how Aalborg Municipality can create smart and social sustainable neighbourhoods	The aim of this chapter is to take a critical look at smart and social sustainable neighbourhoods to understand the core of smart and social sustainable neighbourhoods.
Method	**Method**	**Method**
Literature review Interview	Literature review Interviews Document analysis Case study	Literature review Interviews

Table 1: Research Design

3.3 Case-study

The initial aim of choosing to do a case study is to understand what smart and social sustainable neighbourhoods are, what they can be, but not at least how they have been implemented and what issues they bring about. To understand how the concept of the smart city and social sustainability can be transformed from theory to be implement in practice, it is relevant to look into a case that has a strong focus on the smart city and social sustainability. There are many cases that brings up smart

neighbourhoods and social sustainability, however there are not that many that looks upon them together, therefore it is interesting to look into Stigsborg as a case study. Since conducting a case study gives the opportunity to study and examine the phenomenon in a practical light, it is relevant to look at a case such as Stigsborg to understand how smart neighbourhoods can be more social sustainable (Flyvbjerg, 2001). The case of Stigsborg is presented in Chapter 5: Aalborg Municipalities visions for creating smart and sustainable neighbourhood in Stigsborg. The chapter will describe what visions, goals and strategies of Stigsborg.

This thesis does only have Stigsborg as a case study, resultingly this thesis carries out a single case study (Flyvbjerg, 2001). Flyvbjerg claims that there are five misunderstanding by preforming case studies, the second misunderstanding of preforming case studies consider single case studies, the misunderstanding is that *"one cannot generalize on the basis of a single case and that the case study cannot contribute to scientific development"* (Flyvbjerg, 2001). As this thesis only investigates a specific case, it can be debated that it is not enough since it only provides knowledge about Stigsborg, however, the aim of this thesis is to gain a practical understanding of how to implement smart solutions that increases social sustainability. It is important to stress that the concepts of social sustainability and smart neighbourhoods are content dependent, this means that what is social sustainable and smart in one neighbourhood varies from neighbourhood to neighbourhood, therefore it would not be certain that the smart solutions would function at another given location.

3.4 Interviews

To understand how urban planners work in practise with the smart city and social sustainability, interviews with various urban planners have been conducted, and they have been important sources to gain knowledge for this research. The interviews have created an understanding of how the concepts correlates in theory and in practice, and therefore interviews have been a vital part of collecting data to be able to answer the sub question of this research. In total three semi-structured interviews were held, and the goal of conducting these interviews was to gain different perspectives on the smart city and social sustainability. Semi-structured interview was chosen as an interview format because semi-structured interview is more open and gives the interviewee more freedom to come with other insights and perspectives. Regardless, to maintain somewhat a structure of where the interview was going, an interview guide was sent out to the interviewees. The, the aim of sending the interview guide out was to make sure that the interviewee had time to prepare for the interview, but also helped to ensure that the important questions were asked and keep a structure during the interview. The interview guides will be found in Appendix.

The first interview was a telephone interview that were held on the 3th of May with Karoline Birkeli-Gauss from Asplan Viak. On the basis of Karoline Birkeli-Gauss knowledge and expertise on social sustainability and her working specific on the project of investigating how to increase social sustainability in urban planning she was chosen to be interviewed. She works as the project manager of Asplan Viaks research and development project that focuses on creating new methods on applying more social sustainable in urban planning. The goal of conducting this interview is to get an understanding why there not more focus on social sustainability in urban planning and what needs to be done to increase the focus. The second interview was held the 8th of May with Louise Christina Studstrup from Aalborg Municipality. She works with the smart city aspect of the Stigsborg project,

and the aim of interviewing her was to gain a deeper understanding of the Stigsborg projects, what visions they have, how far they are in the process and what they aim for. The interview played a vital part to understand where the focus on the smart city and social sustainability lies in Aalborg Municipality, but not at least to build up an understanding where they want to go with the project and how this thesis can contribute to their work. The last interview was held on the 22th of May with Håkon Iversen from Cowi Bergen. Iversen works as the District Market and Developer Manager for Cowi Bergen and he has many years' experience in smart and sustainable development. He is considered one of Norway's smart city experts and has a broad knowledge of the field of the smart city and sustainability. The goal of conducting the interview with Iversen is to get an insight where the smart city development is today and where focus on sustainability lies in the smart city. Even though the interview was planned as a semi-structured interview it turned out to be a more open, however he managed to answer the questions I had.

The interviewees from Norway were chosen because they are experts in their fields, they have a broad knowledge of what is currently happening in their field both in Norway and around the world. They do not have any relation to the case of Stigsborg, however they were chosen to get a neutral perspective on the field of the smart city and sustainability in the light of Stigsborg. It is interesting to have a view on a case that is not involved in the planning process to get other viewpoints and perspectives of the smart city and social sustainability. The aim was also to get other perspectives than what they have on Stigsborg to get a broader perspective. Lastly, it is important to stress that the interviews were conducted in Norwegian and Danish, and therefore quotes that are presented in the text are translated to English. The names of the interview will be presented in the text such as Iversen (2019), or when quotes from the interviews have been used it will appear in the text whom speaks, with the hour, minute and second to show where the person speaks e.g. (Iversen, 03.03).

3.5 Document Analysis

In order to conduct information for the case study and the analysis, document analysis has been an important part of gathering background knowledge for this thesis. Farthing (2016) argues that documents that are produced by such as governments, municipalities, policy statement are important sources for planners. As the project of Stigsborg is still in the planning process it has been important to look at various case and possibility studies that have been created Aalborg Municipality and by various companies Aalborg Municipality has collaborated with. The documents have been important to understand the values and vision that the project of Stigsborg, but also to understand where the smart city focus of the municipalities lies. As the Stigsborg project have been ongoing for quite a few years there have been many people involved in the project and hence there are various thoughts, understandings and viewpoints that have been carried out in the various documents. Therefore, a vital part has been to analyse the documents to find out how to guide the documents along my focus in the thesis. Table 2 presents the documents that have been analysed to give an overview of what documents that have been analysed and who has been a part of creating them. The data that has been collected has created the ground knowledge about Stigsborg and hence been important sources of information for the analysis. The documents consist of the same foundation of visions and goals, they are just formulated and presented differently according to who wrote them, therefore the sources that are used in chapter 5 referred back to the documents presented in this section, if not else is mentioned in the text. The documents have been used to analyse what values

and strategies Aalborg Municipality and Aalborg Havn A/S has to develop Stigsborg into smart and social sustainable neighbourhoods.

Document	Type of Document	Year	Authors
Stigsborg Havnefront - En ny bydel på solsiden	Possibility study	2019	KCAP, CFBO, EFFECT, ARUP (architect firms)
Smart City – Smart Aalborg	Report from municipal meeting	2014	Aalborg Byråd Magistraten
Stigsborg Fjordby -Forslag til udviklingsplan for Stigsborg Havnefront	Possibility study	2016	Tegnestuen Vandkunsten
Stigsborg Havnefront- Udviklingsstrategi	Development Strategy	2016	Aalborg Municipality and Tegnestuen Vandkunsten
Stigsborg – En bæredygdig og smart bydel	Report	Unknown	Aalborg Municipality
Stigsborg Havnefront – Vision 2030	Rapport	2014	Aalborg Municipality
Værdi- og kvalitetssikring for Stigsborg Havnefront	Report	2016	Aalborg Municipality and Aalborg Havn
Stigsborg Havnefront – Visjon 2030	Report from municipal meeting	2014	Aalborg Municipality
Program for Parallelopdrag	Report	2016	Aalborg Kommune, Aalborg Havnefront A/S, et al.,

Table 2: Documentsanalysis

Chapter 4: Smart and social sustainable neighbourhoods

Smart neighbourhoods have in the last couple of years gained an increased focus in the smart city (Toth and Reith, 2015). Walters (2011) argues that digital development and ICT's will challenge and eventually change how neighbourhoods are used and how people will live within their neighbourhoods. Accordingly, neighbourhoods have re-emerged as an important arena to increase social sustainability (Colantonio et al., 2009; Dempsey et al., 2011). Another aspect is drawn forward by Walters (2011), he argues that neighbourhoods aim to improve the physical design and create social equity. While Forrest and Kearns (2001) argue that neighbourhoods are important setting for shaping identity and increase liveability, and they further argue that how the neighbourhoods evolve over time are important factors for social sustainability. These examples illustrate that there lie great opportunities to create neighbourhoods that are smart and social sustainable, however this thesis argues that creating smart and social sustainable neighbourhoods does not come without challenges. Therefore, this chapter will answer the sub question: *"What are the challenges of creating smart and social sustainable neighbourhoods?"* This chapter is built upon the theoretical framework, and the first part of the chapter will analyse various challenges by implementing social sustainability. The second section aims to understand the core of smart neighbourhoods, and therefore will the five categories of smart neighbourhood be presented in more details to gain an understanding of what smart neighbourhoods are and what challenges they bring about. The last section will summarise this chapter.

4.1 Social sustainability

"There is a consistent and basic need to belong somewhere, and there is no reason to believe that this need will disappear as a result of increased electronic connectivity." (Walters, 2011)

Talen (2002), argues that urban planners often avoid to focus on social sustainability because it can be difficult to define how the common good can be created. Dempsey et al (2011) highlights there are various dimensions to social sustainability and this result that there are many challenges to create social sustainability. Dempsey et al (2011) further argues that a vital challenge with creating social sustainability is that society is a dynamic concept that is constantly under change, this means that, what is considered to be social sustainable in one neighbourhood can be different to another. This is also expressed by Talen (2002), she explains that it is difficult to create a bridge between the physical design of a place and social sustainability goals, firstly because the social sustainability goals are often defined in one place and can be hard to transfer to another area, and secondly, a design cannot always create social interactions regardless how well designed it is. Resultingly, this thesis acknowledge that it is difficult to find a solution that has both a good physical design and at the same time increases social sustainability. Dempsey et al (2011) argues that another important factor correlates with what people need, desire and require, these factors are also changing along society, this means that the need people have today are most likely not going to be the same in the future. This shows that to obtain social sustainability is challenging because there is no city or place that are

alike, and every city comes with various challenges and goals. This indicates that if a neighbourhood creates initiatives to become social sustainable, it does not mean that it will function in another neighbourhood (Dempsey et al., 2011). These examples illustrate that to create social sustainability is not easy, and to be able to achieve social sustainability it is important to think of social sustainability in a given area or given context. These examples also illustrate that social sustainability is an aspect that needs more attention in urban planning, and accordingly there lies great potential in finding solutions to increase social sustainability and rethink how to implement features that will ensure social sustainability.

Talen (2002) points out that neighbourhoods can be used to increase use of public spaces and create social interaction. She questions if it is possible to create social interaction that leads to creating social bonds through physical design. Ghel and Svarre (2013) explain that architecture is important to create life between buildings, but they argue that architecture is often forgotten in the process. They debate that a reason lies in the argument that it is easier to work with the physical and communicative aspect of architecture than the social aspect, they do also argue that urban life changes within the seasons, years and decades, and highlights that this is also a vital factor why it is difficult to ensure urban life. Ghel and Svarre (2013) emphasis that it is important to observe how people use urban spaces to understand how the space is used or not used. They further argue that it is difficult to understand the interactions that happens because it is difficult and complex to gain the full picture of how social interactions occurs. These examples illustrate that there lies a great potential, but also a need to rethink how to implement social sustainability. This further illustrate that the social sustainability goals are important to increase the focus on social sustainability.

"Plans are subject to the way urban sites are inscribed in the promises and powers of urban planning, and how resulting visions of the 'good city' are negotiated and contested. Importantly, as plans come to implicate a diversity of urban lived realities, they spur new critical activities that seek to render place-based attachments to urban ecologies relevant to common concerns."

(Blok and Meilvang, 2015)

Birkeli-Gauss (2019) from Asplan Viak highlights that another issue regarding social sustainability is that developers and municipalities think that vibrant and liveable cities will be created by itself, meaning that social sustainability will occur automatically from the zooning plans or vision or goals in planning processes, she argues that this is not the case. She brings forward an important aspect, and resultingly, this thesis argues that it is important to rethink how to implement social sustainability. Birkeli-Gauss (2019) further argues that a solution can be to rethink where the social sustainability focus lies, so instead focus on informal and temporary processes through zoning plans, she argues that it needed to create hands on processes and with this she means contemporary processes. She further explains that it is difficult to create hand on projects because some municipalities and developers does not want to rethink how they are doing their planning processes and therefore they want to go on with their regular planning processes. Birkeli-Gauss has a strong point in when she says there needs to be done rethinking in how to engage these processes, accordingly there lies responsibility for municipalities to put these ideas on the agenda. These examples indicates that there lies a great potential being innovative and use smart solution to rethink how to implement social sustainability.

4.2 Smart Neighbourhoods

This thesis has pointed out that it is hard to define what a smart city is and what a smart city can be. As the smart city is a cluster of innovative and creative solutions it can be hard to navigate through the concept. Both Studstrup (2019) from Aalborg Municipality and Birkeli-Gauss (2019) from Asplan Viak states that they find it hard to define what a smart city is and how to navigate through the concept. When looking back at the theoretical framework it is clear that it is no clear definition of the concept. This indicates that it can be hard to work with the smart city and resultingly and highlight how important it is to understand what the concept can be. Therefore, this his section aims to dig deeper into the five categories of smart neighbourhoods to understand what challenges that comes about when wanting to create smart solutions. This section will therefore give examples of what the category can consist of, what challenges that comes about, what possibilities there lies and examples from various projects.

Digitalisation and digital technologies

"Cities are more than just wires and cables, smart offices, trendy bars and luxury hotels, and the vast number of people who live in cities deserve more than just those things" (Hollands, 2008)

Iversen (2019) from Cowi argues that digital technology is the category of the smart city that gains most attention in the smart city. Since the 1990's the digital development has increased rapidly and accordingly cities have become more digital (Finger and Razaghi, 2017). Digital technologies affect how we live our lives as we can be connected to the world within a heartbeat and consequently digital technologies have become a more important factors in our daily life. An example that can be how people use their phone in public spaces, when looking around there would be people on their phone or multitasking by being on their phone at the same time they are talking with their friends or being on their phone instead of observing the world around them. Iversen (2019) further argues that the use of digital technologies makes people introverted because we are constantly on our phones than the wold around them. Iversen (2019) further argues that digital technologies are a challenge in urban planning because the urban planners need to compete with the digital technologies to gain attention from the citizens. These examples illustrate how digital technologies are changing the way we live. Since the digital technologies are moving in a rapid speed it results that the digital technologies are being replaced it is important to question where the smart city development is going and how we want the digital technologies to influence our cities.

However, technologies are not enough to build the smart city because the technologies does not say anything about how people will use the technologies or how they will act smart (Toth and Reith, 2015). Toth and Reith (2015) are therefore arguing that it is important that citizens participate and engage in the neighbourhood. Baccarne et al (2014) highlights that there lies a high potential in ICT to create communities and foster communication with other citizens. ICT's have therefore created new opportunities for the smart city to create communities where citizens can participate actively in making design and decisions, and accordingly ICT play an important role in creating platforms of participation (Batty et al., 2012). A possibility is to use digital technologies and the internet to create forms and platform where citizens can connect with another, another aspect is to create digital

platforms for the shared communities (Iversen, 2019). Resultingly, thesis argues that smart solutions and digital platforms can play a vital role in increasing participation and social sustainability.

Infrastructure

Macke et al., (2018) argues that it is important to create infrastructure not only for economic and politic efficiency, but more importantly to create social inclusion and liveability. Infrastructure plays therefore an role to increase social equity amongst the neighbourhoods can facilitate public life in the neighbourhoods by creating good architecture (Ghel and Svarre, 2013). Birkeli-Gauss (2019) highlights that it is important to create something solid physical structures that are able to last for a long time, she argues that the more homogeneous the physical structures are it will last for a shorter period of time. So, she argues that it is important to create flexibility and variation because it makes the structures more solid. Accordingly, the neighbourhoods should facilitate use for all ages, backgrounds and cultures as people does not have the same economical foundations and physical abilities. Even though these examples might not occur to be smart since they are not digital or uses technologies, sometimes it is enough to think smart and don't implement smart digital solutions, this will be deliberated more upon in the discussion.

Buildings

Buildings does not have a strong focus in this thesis as it is not the most relevant aspect of the case study that are presented in the next chapter, however it is mentioned briefly as it is still an important aspect to create smart neighbourhoods. As the theoretical framework highlighted the category of building is broad and there lies a great potential in making buildings more sustainable and rethink how to design architecture. Iversen from Cowi argues that there lies a great trend in creating buildings that are highly technological to optimise the buildings and make them more affective. An example is the building the Edge in Amsterdam that was the worlds smartest building, but smart buildings can also be to have digital systems that regulates the temperature in the building.

Energy

> "The smart city is depending on how much electricity the city can produce" (Iversen, 2019).

Energy is a vital part of the smart city because digital technologies are depending on energy to function. This means that when there get more digital technologies in society there is a demand for more energy. This means that there will constantly be a need to provide more energy for the smart city (Iversen 2019). Another aspect of energy is that energy closely interlinked with infrastructure as energy needs a strong infrastructure foundation to provide energy, this means that energy needs to be transported through the infrastructure in a neighbourhood. When having this knowledge, the then the question rises where should the energy come from, and how to secure sustainable energy? This thesis argues that there lies a great potential in creating energy resources that are renewable and efficient. Energy does not have a strong focus in this thesis, however it is mentioned because it is an important factor for the smart city and resultingly it is important to mention this category.

Citizens

Citizens are the most important category of the smart city however the citizens are often not represented in the presentation of the smart city. When searching on smart city on the internet a fluster of pictures occurs, but it is not often that a picture with a person is illustrated, instead it can be graph or illustration of what the smart city is. This is only one example that illustrates that there are other aspects with the smart city that gains higher focus points than the citizens. Iversen (2019) argues that urban planning is dividing into two directions of urban planning, where a direction goes to the traditional urban planning where aesthetic and the qualitative factors and the other direction is the smart city direction. The traditional way of planning does often have the citizens in mind, however, Iversen argues that it is mostly engineers that plan the smart city and they do not have their expertise with social sustainability and accordingly this is another aspect why the citizens does not have a great focus (Iversen 2019). This thesis argues that citizens needs more focus in the smart city categories and consequently social sustainability is important. This can be illustrated in De Waal and Dignum (2017) arguments, as they argue that citizens do not have a clear role in the smart city and hence they are often left out in the planning processes. This is also illustrated by Ahvenniemi et al. (2017), as they argue that there is a need to understand how the smart city and sustainability relates to each other and look at the relationship between people, their activities and the environment they live in. Ahvenniemi et al. (2017) further argue that the technologies that are being developed and implemented should benefit both citizens wellbeing, economic and environmental sustainability. Every smart city project should have social dimension as a central focus area because technologies is not enough to create a smarter city (Baccarne et al., 2014). These arguments illustrate that it is important to rethink how to increase social sustainability and it also highlights how important it is that citizens take a part and engaging in in society.

4.3 The role of the urban planner

This section aims to discover some of the roles of the urban planner has when in creating smart and social sustainable neighbourhoods. The goal is to understand how the urban planner can increase social sustainability.

Marketing and branding

The smart city is often argued to be used as a marketing and branding tool by developers, companies and cities to promote and envision the smart future city (Baccarne et al., 2014). The smart city is often branded through digital technologies, as digital technologies are envisioned to solve the various challenges of the cities such as growing population, climate change and create more liveability (Baccarne et al., 2014). Iversen (2019) explains that politicians are often taken onboard on this envision as the digital technologies are versioned to make the city for efficient and this can affect the economic aspect, therefore the smart city works well as a branding tool (Iversen, 2019). A reason for this is according to Iversen (2019) that urban planning is most often are driven by economy and the market (Iversen, 2019). This shows that the tendency is that there is a lot of focus on digital development, profit, innovation and marketing purposes, and consequently the sustainability goals of the smart city are often neglected (Vanolo, 2016; Yigitcanlar and Kamruzzaman, 2018). (Colding and Barthel, 2017).

Storytelling

Söderström et al. (2014) argue that the smart city is a world of storytelling where the smart city has become a part of the *"contemporary language game around urban management and development"* as they argue that the smart city is a game that involves *"experts, marketing specialists, consultants, corporations, city officials",* they further explain that the factors shape and frame how the city are understood, planned and conceptualised. They illustrate that storytelling makes an important factor to open to the smartness of the city and it is frequently used to promote the smart city, but most importantly they highlight that it works because it creates a picture of how the cities can be shaped into better cities. If social sustainability was branded better, it would give possibilities to gain more funding and put social sustainability on the map. Birkeli-Gauss (2019) argues that storytelling is an important tool to promote social sustainability, however she points out that who tells the story is vital for the branding because there lies much power in storytelling. These examples show how important marketing and storytelling is to promote social sustainability in the smart city. An issue that Birkeli-Gauss (2019) draws up is how important it is to have someone that pays for social sustainability, she highlights that it is difficult because urban planning is driven by the marked.

This thesis argue that the urban planner plays an important role in the smart city by being a facilitator and a storyteller. As the cities becomes more digital there is an increasing gap between the traditional urban planning. Iversen (2019) argues that urban planning has started to be divided into what he calls "traditional planning" which means the urban planners and the architecture that focus on the aesthetic aspect of urban planning and the "technological urban planning" which means that it is the engineers that are the urban planners. He argues that the engineers are becoming the urban planners because they are the ones that knows how to build the cities, because when the cities become more technological the urban planners and the architects do not have the knowledge. Therefore, the role of the urban planner becomes more as a facilitating role in the smart city. This means that the urban planner plays an important role as a story teller.

4.3 Summary

This chapter has elaborated further upon the concept of social sustainability and smart neighbourhoods. The goal of this chapter has been to identify various challenges regarding implementing social sustainability and provide a better understanding of what smart neighbourhoods can be and what challenges they bring about. This chapter has shown that it can be challenging to implement social sustainability. An aspect is brought up by Talen (2012) and Dempsey et al (2011), they argue that it is difficult to create social sustainability and transfer it to another area. This chapter has also pointed out that there are many that thinks that social sustainability will occur by itself and this is not the case as social sustainability is challenging to implement. Accordingly, this chapter has identified that it can be hard to implement social sustainability, However, this chapter has also identified that here are many possibilities to implement social sustainability through smart solutions. Therefore, has the section of smart neighbourhood looked at challenges and possibilities regarding social sustainability. The last part of the smart neighbourhood section draws forward the argument that the smart city is often branded and market through digital technologies and this illustrates that this can be a reason why technologies are more in focus than the citizens. Accordingly, it is discussed what the role of the planner is to create smart and social sustainable neighbourhoods. The next chapter will create a bridge between the physical and social aspects to understand how to create smart solutions that are social sustainable.

Chapter 5: Aalborg Municipalities visions for creating smart and sustainable neighbourhood in Stigsborg.

This chapter will present the case of Stigsborg Havnefront (Stigsborg). The aim is to investigate the visions for the Stigsborg project and understand how Aalborg Municipality aim to create smart and social sustainable neighbourhoods. As presented in the methodology, document analysis and interviews have been used to conduct information of the visions and strategies. The documents that are used are presented in Chapter 2: Theoretical Framework. When analysing the documents, the goal has been to discover, firstly what are the main smart and social susainability visions of Stigsborg. Accordingly, it has been important to identify the main visions since the documents consist of a cluster of visions and aims. Secondly, it has been asked what are the strategies to secure social sustainability in the smart city development to be able to understand how the Municipality wants to achieve these goals. The case of Stigsborg is chosen because Aalborg Municipality and the developing companies has a strong focus on creating Stigsborg into smart and social sustainable neighbourhoods. Therefore, the aim of this chapter is to answer the sub question: *"How can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?"* The first section will present the case of Stigsborg. The following section will analyse the smart city strategies Aalborg Municiplity has for the Stigsborg project in order to understand where the smart focus lies, and this is important to understand because then it is easier to understand how Aalborg Municipality want to ensure social sustainability. The following section will present the social sustainability goals of the Stigsborg project and create a bridge between the smart city to understand how social sustainability can be correlated with the smart neighbourhoods. This means that the social sustainability goals are presented, and it is given examples of how the smart city can be a part of increasing social sustainability. While the last section will summaries this chapter.

5.1 The case of Stigsborg Havnefront

Stigsborg is located by the Limfjord on the north east side of Nørresundby, Aalborg, in the region of Northern Jutland, Denmark, see Figure 3. Stigsborg was earlier an industrial area and today the area consist a mix of built area and undeveloped land. Stigsborg is going to be revitalised into three new neighbourhoods, and the neighbourhoods will amongst other consist of mixed housing, infrastructure and retail, see Figure 4. Resultingly the project will be the largest development project in the city of Aalborg.

The Stigsborg project is a collaboration project between Aalborg Municipality, Aalborg Havn A/S and various developing companies. Aalborg Municipality owns 50% of Stigsborg, while the rest is owned by various development corporations, she further explains that development firms can bid on various sections of the building areas (Studstrup, 2019).They are today in the early process of develop the neighbourhoods and the focus of today lies in creating solutions of the visions and strategies that will last until 2035. Resultingly, the transformation of the neighbourhoods will take many years, and since

it is difficult to plan for the future, it is difficult to predict what the future will look like, what the needs are, what type of housing is needed, how the technological development has evolved and how climate changes have affected the climate. The overall vision and ambitions for Stigsborg is to be a forefront on smart solutions, social, environmental and economic sustainability.

Figure 3: Aalborg from a global perpective, source (Tegnestuen Vandkunsten et al. (2016)

Figure 4: Illustration of Stigsborg Havnefront (Tegnestuen Vandkusten et al, 2016)

5.2 Aalborg Muncipalities vision of creating Stigsborg into smart neighbourhoods

This section aims to investigate the strategies and visions that exist to create Stigsborg into smart neighbourhoods. The aim of this section is to go through the smart neighbourhood categories to understand what visions there exist of creating Stigsborg into smart neighbourhoods. The goal is to gain an understanding of where the smart vision lies to understand how to increase social sustaianabiltiy. To understand where the smart city focus lies within the project of Stigsborg the next sections will present how Stigsborg aims to solve the smart development through the physical aspects that was defined in the Chapter 2: Theoretical framework.

Studstrup (2019) from Aalborg municipally explains there is a great focus on private-public partnerships in the project of Stigsborg. This is according to Holland (2008) a great opportunity to create smart solutions because the power gets distributed, and resultingly this can be an important factor to maintain various interests of social sustainability. Birkeli-Gauss (2019) points out that without private-public-partnerships it can be difficult for a municipality to set demands to the

developers because the developers can say that they do not want to the project, and then the municipality does not have the possibility to develop, however she points out that it depends on how powerful the municipality is. Nevertheless, Studstrup (2019) explains that there is a strong collaboration between the Municipality and the development corporations in Stigsborg because they work together and discuss what visions, qualities and strategies they want to have. Studstrup (2019) points out that this kind of collaboration is special to Stigsborg, because normally Aalborg Municipality would set the strategies and vision themselves. Since the developer corporations takes a part in the early stages of the planning at Stigsborg they are more involved instead of if they had bought the area after the regulations were set. This means that the developers are part of creating the decisions of what Stigsborg is going to look like. These arguments indicate that Aalborg Municipality and the developing companies have a strong private-public partnership.

The project of Stigsborg has as like many other projects around the world a vision to become smart in order to plan for the increasing use of technologies in society and simultaneously tackle the challenges of the future. After analysing the documents of Stigsborg, it is clear that there are two main focus point of the smart city, the first focus of Aalborg Municipality lies in creating various smart solutions that can secure a smart city for the future, and the second focus are directed towards the citizens and increasing social sustainability. Studstrup (2019) explains that the smart city development is challenging because the smart city concept is fuzzy and diffuse to work with, and hence there are many interpretations of the concept. To make the smart city more comprehensive and tangible there is a need to define what a smart city is to be able to create strategies to make a smart city. She explains that to make the smart city more tangible Aalborg Municipality takes inspiration of the UN's STGs to define Aalborg Municipality's challenges and issues, and from there they aim to define the exact problem and how to solve them.

Digital technologies

"Digital technologies and sensors are a resource and creates an infrastructure for its citizens, engaged citizens, activists, businesses and local organisations, that can strengthen social communities, engage social innovation and give ownership" (Aalborg Kommune et al., 2016). This quote from Aalborg Kommune et al. (2016) illustrates that there is a high focus in using digital technologies to create smart solutions, and it is clear that data gathering, and sensors are going to be used to understand how the citizens will use Stigsborg to optimise the functions of the city. There are however no strategies or plans of how to use the data or where to place the senor, therefore this thesis argues that it is important to start the planning at an early stage and set strategies for how to use the data and where to place the sensors. Sensors can be used to track how many that bikes in Stigsborg, it can regulate lightning to make it feel safer to walk at night. Data can be used to gather information form the citizens when they participate in voting, understand how citizens use the neighbourhoods. There is a fluster of opportunities, however there are not many strategies of how to put these smart solutions into life, and therefore it is important for Aalborg Municipality to start to plan or create partnerships with companies that can provide the smart solutions.

Another vision for Aalborg Municipality is to use digital technologies to be a part of creating experience for the citizens, and the goal is that the digital technologies can be a part of creating liveability in the city. This thesis argues that there is a possibility to use digital technologies to create

visual arts in urban spaces. There is a fluster of innovative solutions that can be part of creating experiences for the citizens in Stigsborg, it can be about creating digital art, rethinking how to create architecture, create activities on an app where citizens can download. When looking back to Iversen's (2019) argument of how digital technologies changes how people use urban spaces, it is important to rethink how to design public spaces, these examples illustrates that digital technologies can also be a positive factor in urban spaces and create liveability. This indicates that this is a topic that is very relevant in the smart city development.

The last strategy Aalborg Municipality has regarding digital technologies is to provide solutions for the future. Aalborg Municipality acknowledge that society is becoming more digital and accordingly a vision is to "create collaborations that works toward developing smart solutions and technologies that does not exist today" (Aalborg Kommune, 2014). As the digital development is moving in a rapid speed, digital technologies will be replaced and new technologies that we do not know of today will come, this means that it is important to have a vision of how to implement new technologies. This means that Aalborg Municipality needs to create a solid infrastructure in Stigsborg. Another important aspect is that Aalborg Municipality needs to know the market lies by knowing where the digital development is going in the future. Accordingly, it is important that Aalborg Municipality has a strong focus on private-public partnerships between the municipality and various developer companies and IT companies.

Infrastructure

The vision for infrastructure is to *"establish optimal traffic conditions for its residents, users and other stakeholders, the mobility should act accordingly to modern urban planning principles and create close coherence and integration with the rest of the city's infrastructure"* (Aalborg Kommune, 2014). Aalborg Municipality has a strong focus in creating an infrastructure for mobility to create a mix use of vehicles, public traffic and increase walkability, Figure 5 shows how the mobility infrastructure is planned. Iversen (2019) highlights that there is a strong trend in focusing on creating infrastructure for autonomous vehicles, however project of Stigsborg does not have such visions. Nevertheless, there are visions of creating opportunities for carpooling and implementing a "Fjord bus" that will connect Stigsborg to the city centre of Aalborg. Another focus Aalborg Municipality has is to create infrastructure that provide public spaces, this is as argued to be an important factor to create social inclusion in the neighbourhoods. This is already argued in this thesis as a good factor to increase social sustainability. A third focus point lies to create digital infrastructure to give citizens and developers the possibility to use digital technologies.

As the theoretical framework indicated, the smart city is a complex cluster of digital technology, energy systems, infrastructure and buildings it is important that there exists a solid system that connects the smart city together. Infrastructure plays therefore a vital part in the smart city. Resultingly, it is important that Aalborg Municipality has a strong focus on infrastructure in the planning of Stigsborg. This thesis highlights that it is important to think of infrastructure from the ground and up. Iversen (2019) calls it "the upside-down city," he argues that it is important to plan the city firstly from what is under the ground, then what is on the ground and lastly what is over the ground. He argues that it is important to create a solid infrastructure system that is under the ground that is prepared for the technological changes that happens over the ground. He argues that it is

important to think of this as it is much easier to do this before than later. As Stigsborg is under developed this is a central part in preparing Stigsborg to become smart, because if the infrastructure is not prepared for the future it is hard to do the changes afterwards, therefore it is important to think of the “upside-down-city”. This thesis argues that it can provide benefits for Aalborg Municipality as it gives an opportunity to plan for the technologies that comes in the future and resultingly it gives the opportunity to easily change the infrastructure in the future. As the technological development is renewed rapidly and replaced it is important that the infrastructure is created to be able to be prepared for these changes. This makes it easier to connect the physical features that are over the ground and lastly what is over the ground such as the internet and digital apps. This thesis argues that this is important because when planning from the ground and up it is possible to think of all the sections at the same time, because it is challenging to implement the changes if it is done the other way around.

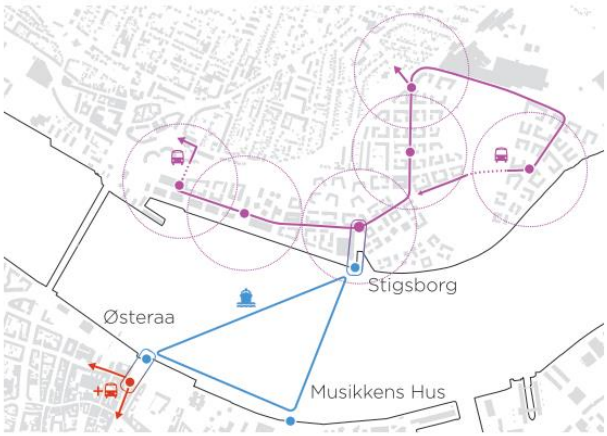

Figure 5: Mobiility plan for Stigsborg (KCAP et., al (2019)

Buildings

Aalborg Municipality does not have a strong focus in creating smart buildings in the development of Stigsborg. The visions of Stigsborg mentions that there are strategies to ensure mixed housing and to create energy efficient and environmentally friendly buildings. However, as building is not a strong strategy of Aalborg Municipality, this thesis wants to highlight that Aalborg Municipality should be a greater focus in creating facades and architecture as it can be used to increase social sustainability.

Energy

The main focus on energy solutions in Stigsborg lies in creating renewable energy resources, however what type of energy resources that are going to be used are not stated. It is stated in the vision documents that it is needed to be prepared for the energy challenges that are coming in the future, however, it does not say how or how much energy capacity that is needed. What is clear is that the focus lies mostly in energy effective housing and buildings. Therefore, it is concluded in this thesis that energy is not a strong focus point, at least not at this stage of the development.

Citizens

Studstrup (2019) highlights that the citizens are a strong focus for Aalborg Municipality for the development of Stigsborg. She highlights that technology should not become as technological that it does not create any social interaction, therefore she underpins that it is important that the smart solutions create social sustainability. However, it is clear that the citizens focus lies more in social sustainability goals than in the strategies of developing smart neighbourhoods. Therefore, it can be argued that the strategies to create smart solutions that are social sustainable are rather fuzzy and there needs to be done further research on the plans for creating social sustainability.

5.3 Bridging social sustainability with smart neighbourhoods

This chapter aims to investigate how Aalborg Municipality works with integrating social sustainability in the neighbourhoods of Stigsborg. The visions will be looked in the aspect of the social sustainability goals that was presented in Chapter 2: Theoretical framework. This section will also look into how social sustainability can be more integrated in the smart city by bridging the concepts, accordingly this section will present examples of how smart solutions can be used to increase social sustainability, some of these examples are given are given by me and others are drawn from theories or the interviewees. This thesis argues that if the concepts are bridged together it will be easier to understand how to create smart and social sustainable neighbourhoods. To understand how to create a bridge between the concept, Figure 6 shows how this thesis argues how the concepts can be bridged. This chapter will explain how they correlate. However, as buildings and energy does not have a strong focus in the case of Stigsborg, they are not taken in consideration in this chapter.

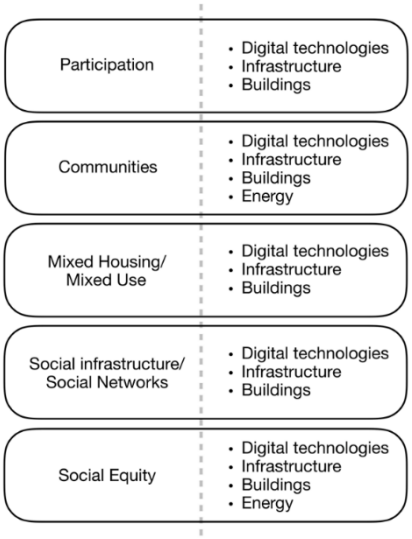

Figure 6: Bridging the smart city and social sustainability

5.3.1 Participation

Participation is an important factor to achieve social sustainability (Birkeli-Gauss, 2019). Aalborg Municipality has a focus on creating workshops where citizens can participate in meetings and be

part of making decisions that are going to be made (Studstrup, 2019). Studstrup (2019) from Aalborg Municipality highlights that the citizens of Aalborg want to engage and participate, Studstrup (2019) from Aalborg Municipality highlights that Aalborg Municipality sometimes invite various professionals to come and present a lecture or a case, while other times it is more about mapping out what the citizens need and want, accordingly, they let the citizens participate in the decision making. Aalborg Municipality gives therefore the citizens in Aalborg on a general basis the possibility to engage and involve in the society. However, there lies a great potential in using digital technologies to increase participation. Accordingly, this thesis argues that there should be a great focus in creating solutions that will increase participation.

Simonofski et al. (2018) argues that participation is important in the smart city because it gives the citizens a voice to influence the decisions that are going to be made. By using smart solutions, Stigsborg can increase participation in their neighbourhoods by facilitating digital platforms where the citizens can be a part of making decisions or create opportunities to participate. A solution to increase participation in Stigsborg can be to create a neighbourhood app where people can be part of decision making, arrange events, and share knowledge of what happens in the neighbourhood and so on. Another solution can be to implement benches or other facilities with QR generators where people can give feedback on how they like the public space or maybe learn about what fauna that exist around them. This thesis argues therefore that digital technologies play an important part in creating participation in smart neighbourhoods.

5.3.2 Communities

Baccarne et al. (2014) explains that community engagement goes further than participation and involvement because an important aspect of gaining community engagement is to draw attention of the citizens by focusing their efforts. Baccarne et al. (2014) highlight that there are various forms of community engagement and how much communication there is within the community, examples that they draw out are community involvement, collaboration within the community or empowered communities through participation. Birkeli-Gauss (2019) from Asplan Viak points out that it is important to crate public places where people can meet their neighbour to strengthen the social network within a neighbourhood, she also points out that it is important to facilitate activities at an early stage to create communities as contemporary solutions can help to build communities.

Aalborg Municipality has accordingly to Studstrup from Aalborg Municipality a strong focus in creating sharing communities, she highlights that they have plans of creating carpooling, places where to repair things or use public buildings for meeting places and activities (Studstrup, 2019). A possibility is to use digital technologies and the internet to create forms and platform where citizens can connect with another (Iversen, 2019). thesis argues that smart solutions and digital platforms can play a vital role in creating communities, arrange meetings, share information and create engagement though out the neighbourhood. This thesis argues that digital platforms make it easier to connect and engage in society, share knowledge, equipment or gain help in one form or another. Some examples that exist today and are bobleberg.dk where people can find new friendship, or the digital platforms nabohjelpen, which are an app where people can get help by people in their neighbourhood. These factors are therefore argued to be solutions that can increase a sense of community. Snow et al. (2016) argues that collaboration is important to increase citizens

engagement. This thesis argues that the facilities in Stigsborg should be organised, meaning that the residents from the neighbourhoods should take a part in running these communities, this thesis argues that these initiatives can increase social networks, create friendships and create community feeling. Studstrup (2019) highlights that collaborations are important to keep the smart solutions running. Therefore, communities can play a vital role in facilitate the shared communities. To create communities are according to Studstrup (2019) a challenge because people are reserved, therefore they have a focus on creating roots in the community.

5.3.3 Mixed housing / Mixed Use

The Stigsborg project has strategies to create mixed housing for families, students, elderly and studio apartments to create a variation of housing. Studstrup (2019) highlights that Aalborg Municipality does not have the impact of what type of housing Stigsborg will have, therefore they have strong focus on the retail in the neighbourhood. Birkeli-Gauss (2019) highlights that it is important to create initiatives that ensure that there is social housing, student accommodation, studio apartments and various sizes of the apartments that it creates a range of various people living in the neighbourhood. She further argues that it is difficult to secure social mix because urban planners do not have a strong impact on what houses that should be provided. Therefore, she argues that it is important to set regulations for the neighbourhood, examples can be a minimum demand on social housing. However, these examples are not new in urban planning, and they do not necessarily go under the category of a smart building.

An important factor to create social sustainability is drawn by Birkeli-Gauss (2019) from Asplan Viak, she highlights that there is a need to gather more information about the social aspect of who is living in the houses and what they want and need. She further highlights that there is more information about the physical aspect of housing policies than the social. As there are no people living at Stigsborg it is not possible to gather any data at this given date, however it can be part of the strategies when people start to move in. Iversen (2019) highlights that there is a trend in the smart city to create buildings that are highly digital, and the tendency is that buildings are becoming more like a computer that is driven by apps, this should be in mind of the Municipality to think how digital the buildings should be. These are possibilities that can increase the social sustainability focus in Stigsborg.

5.3.4 Social interaction and social networks

Birkeli-Gauss (2019) from Asplan Viak argues that participation is an important aspect of creating social networks, however she also points out that it takes more than participation to create social networks. Birkeli-Gauss (2019) further argues that some areas have a great social network where the citizens know their neighbour, however in other places it does not the case. Therefore, she argues that it is large variation of how good the social networks in neighbourhoods are. She further argues that it is important to facilitate public meeting places to create places where the neighbourhood can meet, she highlights that it can be an important factor to increase social networks in neighbourhoods. These arguments indicate that if there are few facilitates it creates less opportunities to participate, and this might impact the level of participation.

To create social interaction and social networks in Stigsborg there is a focus on creating life between the buildings and increase liveability. The visions are mainly focused on how to create infrastructure to create these facilities, where the focus lies in creating architecture to underbuilds social sustainability and create mix facilities in the urban spaces such as contemporary installations (Studstrup, 2019). It is clear that social interactions and social networks are closely interlinked with communities in the Stigsborg project. Birkeli-Gauss (2019) indicates that there is an extra need to facilitate platforms in new developed areas to ensure social interactions and social networks. She further argues that it is important to facilitate public meeting places to create places where the neighbourhood can meet, she highlights that it can be an important factor to increase social networks in neighbourhoods. Birkeli-Gauss examples gives an understanding of how important it is to facilitate possibilities to engage in the community. However, Dempsey et al. (2011) argues that not every citizens participate, and that there are various reasons why people are not participating in their neighbourhoods. The first reasons lie in social networks, people have various social networks, both inside and outside the neighbourhood, this means that there might not be time to participate in all of the activities that are arranged in the neighbourhood, or some might not have the interest to participate in the activities that occurs. Dempsey et al arguments shows that it can be difficult to make people participate even though the facilities for participation is provided.

5.3.5 Social equity

Jenks and Dempsey (2007) argue that social equity is often debated in politics because it is concerns that affects how social justice is distributed. Iversen (2019) argues that regardless how smart the city aims to be, the city needs people to be attractive as it is the people that creates the dynamics and the vibrant life in the city, this means that the smart solutions should be benefit the citizens. It is important to provide the basic facilities such as service centres, schools, social housing, cultural activities and other basic needs, because if they are not provided people will leave the cities along with knowledge and competences (Iversen, 2019). It can be argued that social equity is the most important social sustainability aspect as it provides

Studstrup (2019) highlights that the most important factor for the Municipality is to solve problems that will benefit the citizens and make their everyday life easier, and that is where the main focus in the smart city lies. They highlight that it is important that the solutions that are going to be made will benefit all citizens. Therefore, the social equity is an important aspect of the all the solutions that are going to be made. This thesis argues that if the other social sustainable aspects are fulfilled it will increase social equity.

5.4 Summary

This chapter has investigated in the vision of Aalborg Municipality of how they aim to create Stigsborg into smart and social sustainable neighbourhoods. Aalborg Municipality has multiple visions of how to create both smart solutions and social sustainability, and the smart city focus lies in creating digital technologies and infrastructure, however there are not a strong focus creating smart buildings nor energy. There lies a strong vision to create smart solutions that benefits the citizens, however there are no strong strategy of how to create the solutions. Accordingly, this chapter has argued that it is important to create a bridge between the smart city and social sustainability,

according this chapter has created a figure of how to bridge the concept and provided examples of how to use smart solutions to create social sustainability. Accordingly, there lies a vast of opportunities to create smart and social sustainable solutions in Stigsborg. This thesis has given some examples and recommendations of how to create the bridge between social sustainability and smart neighbourhoods. However, there lies a great potential for Aalborg Municipality to put these smart solutions into life, meaning how to implement them, this thesis has not taken this in consideration as this thesis argues that these processes lie in creating private-public partnerships with Aalborg Municipality and various IT companies.

Chapter 6: Discussion

Digital technologies are becoming more important in our society, and accordingly it is important to find solutions that benefits citizens and increases social sustainability. This chapter takes a critical look at the concept of the smart city as well as the results that are drawn in this thesis. The aim of doing so is to reflect upon statements and understand the core of smart and social sustainable neighbourhoods. Accordingly, this chapter aims to answer the sub question:

"How smart should a smart and social sustainable neighbourhood be?"

I found out in Chapter 4: Smart and social sustainable neighbourhoods that it is difficult to implement social sustainability because it cannot be touched upon, and consequently the physical aspect gains more attention than the social. Talen (2002) and Dempsey et a., (2011) argues that it is difficult to implement the same social sustainability implementation in various places because it is hard to transfer it to another area, and social interaction cannot be made through design no matter how well the design is. This thesis argues that smart solutions can be an answer to this problem, because if the smart solution works in a given area, it is easy to implement this to another place. It is not easy to build the same infrastructure, or architecture to another place, but to implement the same digital app can potentially create social sustainability elsewhere. However, there are many solutions that can be considered smart.

As the smart city is about innovation, production and creativity there lies a great potential in creating solutions that can increase social sustainability. This thesis wants to draw upon is that smart solutions does not have to be digital at all means. Studstrup (2019) looks at the smart city as a new way of thinking how to solve various challenges and preform them in new ways. She draws forward an example form a school in Aarhus where they have implemented a project called "walking buses" where the older children meet the younger to following them to and from school to reduce traffic around the school area, she claims that smart solution can be as easy, and that it does not have to consist of high-tech technologies. This example shows that solutions does not have to be digital or technical, and that the smart city can also be about thinking smart. Studstrup has a very important statement. This thesis has also given recommendation to implement and focus on amongst colourful facades, it is not a digital solution, however it can increase liveability and social sustainability. The non-digital smart solutions are important aspects, however the smart city has mostly a focus on digital technologies and infrastructure.

However, Iversen (2019) from Cowi argues that it is digital technologies and infrastructure that gains most of the attention in the smart city. He also draws forward that digital technologies are changing how we interact in a city and with each other. This is also emphasised by Studstrup (2019) from Aalborg Municipality argument, as she argues that it is important that the smart solution does not becomes an excuse to be unsocial, with this she means that people should go out and be social instead of be social trough digital devices. When the society is becoming more digital it is important o ask where do we want the smart development to go? Where do we see the future city to look like? But most importantly, what are the relation between the smart city and the citizens?

This leads to answer the sub question of this chapter, and to do agree with Toth and Reith (2015) as they highlight that to create technologies are not enough to build the smart city because the technologies does not say anything about how people will use the technologies or how they will act smart. These arguments show that our society becomes more digital and effective, therefore digital technologies plays an increasingly role in our society, and consequently it is important to think of the social sustainability aspect to ensure that social sustainability is maintained. Therefore, argues this thesis that the social sustainability should always be more emphasis on the social aspect than the physical.

Chapter 7: Conclusion

The aim of this thesis was to understand how to increase the focus on citizens in the smart city. This thesis has presented the case of Stigsborg Havnefront that is a neighbourhood development project in Aalborg Municipality that aims to transform Stigsborg into smart and social sustainable neighbourhoods. The following research question has been answered:

"How can the aspects of the smart city create social sustainability in neighbourhoods, and how can Aalborg Municipality use smart solutions to integrate social sustainability in the neighbourhoods of Stigsborg?"

In order to answer this research question, three other sub-question were asked to support the main research question. The first sub question was:

"What are the challenges of creating smart and social sustainable neighbourhoods?"

The sub question relates to the challenges of implementing smart and social sustainable neighbourhoods, and I found out that there are various reasons why it is hard to implement social sustainability. The main challenge I found about implementing social sustainability was that some developers think that social sustainability will occur by itself. An example can be that people will naturally know their neighbour, however this is not the case. The most important finding was that the smart city has a stronger focus on the physical aspect than the social aspect because it is easier to implement the physical aspects. Due to this, there is not much focus on the social aspect in smart cities, since it is challenging to implement social sustainability. It is, however, argued that there lies a potential in bridging the physical and the social aspects, which is explored in the second sub-question:

"How can Aalborg Municipality create a bridge between smart solutions and social sustainability in the neighbourhoods of Stigsborg?"

This sub-question has aimed to discover how Aalborg Municipality can integrate social sustainability in Stigsborg. To understand where the focus of the smart city and social sustainability focus lies in the plans of Aalborg Municipality an interview with Louise Studstrup from Aalborg Municipality was conducted and municipal documents about Stigsborg were analysed. I found out that Aalborg Municipality has great focus on both smart city and social sustainability in the development of Stigsborg. The result showed that the municipality has a strong focus on the physical factors of digitalisation and infrastructure and has visions of creating smart solutions that would be beneficial for the citizens and create social sustainability. However, after mapping the visions of creating smart solutions and the vision of creating social sustainability, it was found that these concepts are managed separately. The thesis argues that it is possible to bridge the two concepts, and I gave examples on how to create Stigsborg into smart and social sustainable neighbourhoods that combines the municipality's visions for smart city and social sustainability. Accordingly, I gave example with ideas of amongst creating apps to increase participation and suggestions of how to implement smart solutions such as the "upside-down city". However, there exist a fluster of smart solutions that can be implemented and as the digital technologies are moving in a rapid speed there are many opportunities, the third sub-question was:

"How smart should a smart and social sustainable neighbourhood be?"

The sub question aims to highlight that society is becoming more digital, accordingly this chapter aimed to discuss various dilemmas regarding smart and social sustainable neighbourhoods. This chapter has discussed that it there lies a great potential in finding smart solutions to increase social sustainability. However, this chapter has also highlighted that smart does not mean to be digital technologies, it can also be about finding smart solutions that does not include digital technologies. An important aspect is that the digital smart solutions that are implemented in a neighbourhood should not create unsocial activities. However, lastly but most importantly, citizens should always come before digital smart solutions.

To conclude this thesis and answer the research question, this thesis therefore concludes that there lie great potentials in the smart city to increase social sustainability. By creating a bridge between the concepts, it is possible to ensure social sustainability and create smart and social sustainable neighbourhoods. An example of how Aalborg Municipality can use smart solutions to integrate social sustainability is to focus on creating smart digital solutions, infrastructural solutions, such as digital apps where citizens can vote or provide infrastructural facilities such as communal building to increase participation in Stigsborg. Since digital technologies are rapidly developed there will constantly be developed new solutions, it creates many opportunities to continue to create social sustainably in Stigsborg.

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Appendix

Interview with Karoline Birkeli-Gauss - Asplan Viak

Phone Interview held the 3th of May

Presentasjon

1. Hva har du en utdannelse i og hva er din profesjonelle bakgrunn?
2. Kan du forklare hvordan du jobber med sosial bærekraft?
3. Hva er din forståelse av sosial bærekraft og hvordan tenker du at verdiene til sosial bærekraft er?

Sosial bærekraft

1. Hvilke parametere er viktig for å oppnå sosial bærekraft?
2. Hvor ligger dagens fokus på sosial bærekraft i by- og stedsplanlegging?
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3. Hva er utfordringene med å implementere sosial bærekraft?
4. Hvem har ansvaret for å implementere sosial bærekraft?
5. Sosial bærekraft i nabolag?
6. Hva tenker du i sosial bærekfraft i forhold til nabolag?

Utfordringer med sosial bærekraft

7. Hva skal til for at det blir mer fokus på sosial bærekraft i planlegging?
8. Har dere identifisert noen grep i prosjektet deres som kan ivareta sosial bærekraft?
9. Hvordan kan man oppnå sosial bærekraft i praksis?

Mennesker i byen

1. Hvordan skaper man sosial bærekraft i nabolag og hva er det som skal til for at et nabolag er sosialt bæredyktig?
2. Hva tror du løsningene er for å få fokus på sosial bærekraft?
3. Hvordan kan man bygge sosial bæredyktighet når noe er sosialt bæredyktig ett sted, men når det på et annet sted er det nødvendigvis ikke så sosialt bæredyktig?
4. Har du noe kjennskap til smart by konseptet? Hvilke problemstillinger ser du med den smarte by og sosial bærekraft?

Til sist, har du noen spennende caser eller senarioer hvor sosial bærekraft du har lyst å utdype mer om?

Interview with Louise Studsrup – Aalborg Municipality

Interview held at Aalborg Municipality the 8th of May

Presentasjon

1. Kan du fortelle om prosjektet på Stigsborg?
2. Hva er din rolle i forhold til prosjektet på Stigsborg?
3. Har dere laget noen visjoner og mål dere vil oppnå i forhold til smart by og sosial bærekraft?
4. Hvor langt har dere kommet i prosjektet og hva har dere gjort så langt?
5. Hva tenker dere er veien videre?

Sosial bærekraft

1. Hva tenker du at sosial bærekraft er, og hvor ligger fokuset på sosial bærekraft i Stigsborg?
2. Hva ønsker dere å oppnå med å ha et fokus på sosial bærekraft?
3. Hva tenker du er viktig/viktige faktorer når man implementerer sosial bærekraft i Stigsborg?
4. Hva tenker du utfordringene er med å gjøre Stigsborg sosial bæredyktig?
5. Dersom man tenker på Stigsborg i fremtiden, hvordan tenker du at sosial bærekraft vil spille en rolle?

Smart by

6. Hva tenker du på når du tenker smart by?
7. Hvor ligger smart by fokuset deres?
8. Hva mener dere når dere sier at dere ønsker et smart Stigsborg?
9. Hvilke smarte løsninger ser dere for dere på Stigsborg?
10. Hva smart by implementeringer har dere gjort og hva er planen/fokuset videre?
11. Hvordan tenker du at man kan kombinere den smarte by og sosial bærekraft i Stigsborgs prosjektet?

Til sist, har du noen dokumentplaner/rapporter i forhold til Stigsborg som kan være interessant for meg?

Interview with Håkon Iversen – Cowi

Phone interview held the 22th of May

Presentasjon

4. Hva er din forståelse av en smart by, og hvilke verdier mener du er de viktige i den smarte by?

Smart by og Smarte nabolag

1. Hva tenker du på når du tenker på smarte nabolag, og hvor mener du at fokuset på smarte nabolag ligger i dag?

Sosial bærekraft

1. Hva tenker du at sosial bærekraft er?
2. Hvordan er sosial bærekraft integrert i smart by konseptet?
3. Hvilke sosiale verdier mener du er viktig når det kommer til den smarte by?
4. Hvorfor er det så lite fokus på sosial bærekraft i smart by utvikling?

Balansen mellom smart by og sosial bærekraft

1. Hva tror du skal til for at sosial bærekraft blir mer implementert i smart by utvikling?
2. Hvem har ansvaret for å implementere sosial bærekraft?
3. Hvordan kan man få mennesker mer i fokus i den smarte by?
4. Hva skal til for å få borgere mer engasjerte i nabolagene sine?

Teknologi

1. Hvordan tenker du at teknologien kan være med å endre/forbedre hvordan vi lever i et nabolag?
2. Hvordan kan man skape en balanse mellom den teknologiske utviklingen og mennesker?
3. Hvem har ansvaret for å skape balansen mellom det teknologiske og det sosiale?

Til sist, har du noen spennende caser eller senarioer hvor sosial bærekraft og den smarte by er i fokus, eller eventuelt caser hvor teknologien tar overhånd og det sosiale blir utelukket?