PUBLIC EMPOWERMENT THROUGH SMART URBANISM

CURRENT AND POTENTIAL FUTURE PRACTICES IN GATE 21

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ABSTRACT

This thesis explores the practices and potentials for strengthening public empowerment in Smart Urbanism projects. Smart Urbanism is fundamentally about deploying digital technologies in the urban fabric, management and operation, with the aim of increasing efficiency. The concept is often praised for engaging the public and cultivating public empowerment. Simultaneously, it is critiqued for being technocratic and for public empowerment to remain empty words. This thesis looks at Smart Urbanism projects in the organization Gate 21. Through case studies, the organization is positioned within the Smart Urbanism paradigm including elements of both Dashboard, Platform and Empowerment Urbanism. An intervention with project managers in the organization suggests that the organization and their existing practices holds potential for strengthening the public dimension and cultivate public empowerment. However, they remain hesitant to deploy strong public empowerment strategies. The reasons for the hesitation can be contributed to two main points. First Strong public involvement in technically complex projects is challenging, and outcomes of for example demonstration projects or workshop do not necessarily benefit from extensive public involvement. Second, Gate 21 works as a partner organization with the demands from the municipalities as a driving factor for project development. There is a strong culture of triple helix innovation, including municipalities, private corporations and knowledge institutions. The responsibility for public involvement and empowerment is thought to reside with the municipalities, as they represent the public in our representative democracy. Finally, public empowerment in Smart Urbanism projects is discussed in relation to idealism, understandings and deepening of democracy, and to sustainability. There can be challenges of finding a balance where public empowerment is at the core of smart urban development, while sufficiently reaching for sustainable cities.

CONTENTS

1 INTRODUCTION

More than half of the people in the world live in cities. This number is expected to keep growing, at least for another 30 years and in 2050, two thirds of the world's population will be urban (Ritchie & Roser, 2019). There are generally two opposing conceptions of the city. One sees it as the ultimate human achievement, the creation of a human habitat of economic, social and technological progress. The other as an **environmental** crisis waiting to happen and caused by the extensive consumption of natural resources and "pollution metabolism of human activities" (Cashmore et al, 2019, p. 1). Even though attitudes towards the concept of the city differs, the attitude towards whether we can stay on the current tracks of urban development seems more aligned. We need to change the way we live in cities in order to achieve the urgent necessity of sustainability. While urbanization is a main driver of the urban lifestyle, which contributes to environmental degradation and climate change, urban development is also key to achieve sustainable and livable urban areas for a growing urban population (Kacyira, 2020). Urban planning plays a vital role in this transition, in dealing with the facilitation of urban life. Practitioners are key players in the battle towards climate change and for a better urban environment (Cashmore et al, 2019).

Smart Urbanism, or varieties hereof, are often mentioned as a solution to urban challenges. In Smart urbanism digital Information and Communication technology (ICT) are central to urban development, management and operation. While cities all over the world embraces Smart Urbanism initiatives (Lee et al, 2014), e.g. to monitor environmental qualities or to control traffic or energy flows. Some cities are entirely based on smart urbanism principles (For example, Masdar (Madakam & Ramaswamy, 2016) or Songdo (Mullins, 2017)) and are referred to as smart cities. On one hand, the smart urbanism concept largely takes pride in increasing efficiency in the control, management and operation of urban systems through real time monitoring and data collection, which allows for optimization of systems towards more sustainable operation. According to the European Commission "*A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business*". (European Commission, 2020a), placing efficiency at the very core of the smart urbanism objectives.

On the other hand, smart urbanism is often referred to as a mean for public empowerment. For example, the OECD includes in their definition of smart urbanism (smart cities), that it is "*part of a collaborative, multi-stakeholder process*" (OECD, 2020, p. 8) and the European Commission claims that their Horizon Europe program for "Climate neutral and smart cities' will be "*helping cities become more resilient and smarter by empowering citizens in digital social innovation*" (European Commission, 2020b).

Mostly, in connection to urban development and transition, public empowerment revolves around public involvement in the planning processes. Power in urban development is an enormous topic in itself and take various forms. However, in this relation in can be defined as "*capacity of actors to mobilize resources and institutions to achieve a goal*" (Avelino, 2017, p. 507). In other words, public empowerment is a capability endowment to the public to establish a direction for and drive development towards a certain goal for their urban environment (Hölscher et al., 2018). In this case, the public can be empowered by granting them the capability to influence planning processes and utilize the potential of specific initiatives to drive urban development towards a desired future. Empowerment is the process through which this happens.

While the first, technology deployment for efficient urban management is often criticized for being a technocratic form of urban governance out of step with the complex, social and wicked nature of a city and its challenges. The latter, public empowerment in smart urbanism is criticized for not emerging in practice (Cardullo & Kitchin, 2019). Thus, the smart city concept is simultaneously praised for enabling more democratic urban development and criticized for being too technocratic.

This thesis explores these seemingly contradictory appraisals and critiques of Smart Urbanism. The concepts of smart urbanism and public empowerment are explored in Greater Copenhagen based organization Gate 21. Gate 21 is a non-governmental organization aiming to drive and support sustainable development in the Greater Copenhagen Region. It is a partner organization with 71 partners, including city authorities, private companies and knowledge institutions (Gate 21, 2019).

1.1 PROJECT DESCRIPTION

This thesis takes its starting point in Gate 21 and their Smart Urbanism activities. Based on a theoretical framework, distinguishing between different forms of smart urbanism concerning the perception of the city and of the public, Gate 21 is positioned within the concept. The organization is assessed through a case study, including three Smart Urbanism projects. Further the future potentials for Gate 21 to cultivate public empowerment in Smart Urbanism projects is explored. This is done through an intervention with a number of project managers working with Smart Urbanism in Gate 21. As a whole, the thesis seeks to answer the following questions.

- Where does Gate 21 currently position themselves in terms of the form of smart urbanism? How do they perceive the city, and the public and which methods are deployed?
- What (if any) practices are currently in use for public involvement and empowerment through smart urbanism in Gate 21?
- What alternative practices could be brought into play, that would potentially strengthen the public empowerment part of smart urbanism in Gate 21?

2 METHODOLOGY

The methodology section of this thesis includes a scoping of public empowerment through smart urbanism as a researchable phenomenon, a description of the research design as well as a few reflections on the project process, and an insight into my point of view in creating the thesis as well as the obstacles and limitations causing continuous rearrangements of the research methods and problem definition .

2.1 SCOPE OF THE THESIS

This thesis deals with the seemingly paradoxical concept of public empowerment through smart urbanism. This concept is paradoxical as it is often praised for generating options for better public empowerment approaches while also criticized for being technocratic, exclusive and out of sync with the public. This section serves to define the boundaries of the thesis' subject. It describes the choices made concerning the definition of these boundaries. It includes descriptions of the methodological approach, the geographical scope, and consequences concerning the choice of the organization Gate 21 as the subject of interest within the topic of public empowerment through smart urbanism. Further, it reflects on the advantages and potential drawbacks caused by this scoping. Together, these descriptions form the topic as an empirically researchable object and reflect on the advantages and drawbacks on the scoping choices.

This thesis is positioned at the intersection of smart urbanism and participatory urban planning approaches for greater public empowerment in urban development. As the theoretical framework deals with the characteristics of smart urbanism and the potential for strengthened public empowerment within this concept, smart urbanism is where the project takes its starting point. Thus, even though this thesis also deals with participatory approaches, it does not include theory or arguments around public participation itself. Furthermore, it is to some extent presumed that participatory approaches are the way forward to create inclusive, democratic, and sustainable cities. The arguments around this topic are outside the scope of this thesis.

2.1.1 A case study approach

In analyzing Gate 21's position concerning public empowerment through smart urbanism, this thesis takes a case study approach. In doing so, it produces context dependent knowledge, which can be highly valuable and contribute to the field of knowledge around the topic. It allows for a closer examination of specific cases (projects) within the organization. Detailed examination of a narrow sample can

produce a depth of knowledge to a broad problem statement (Flyvbjerg, 2006). The thesis aims to gain insight into the approaches of Gate 21 as a significant player in the field of digital development. The case studies will provide in-depth insight to a few projects, which can be utilized for assembling a generalized conception of the organization's position within the field. The cases chosen for analysis here are all projects within Gate 21 that have a substantial smart element. Gate 21 is a central actor in the field of societal sustainable transitions. Looking at projects from Gate 21 as critical cases (Flyvbjerg, 2006), it is likely that findings and conclusions are relevant for similar organizations. The cases and the selection of them are further described under research design.

A deeper understanding of public empowerment practices in project processes is gained through the aforementioned case studies. The empirical research of the cases is based on formal descriptions of the projects in combination with conversations with project managers. As all Gate 21's projects are based on broad partnerships, the perspectives of the partners might differ substantially within a project. As this thesis deals only with the perspective of Gate 21, the descriptions, examinations and conclusions here are correspondingly only the perspective of Gate 21 and does not account for other partners included in the projects.

2.1.2 The organization Gate 21

The organization Gate 21 and their approach to smart urbanism and public empowerment is the subject of interest. Gate 21 is a Danish NGO working to promote sustainable societal transitions. The organization consists of 71 partners including regional and municipal authorities, private companies, and knowledge institutions, with Gate 21 serving as the central general office. Thus, the triple helix innovation model and public-private innovation have been strongly emphasized in the way the organization has worked since it morphed into an independent organization born out of Albertslund municipality, in 2009 (Gate 21, 2019).

Project development in Gate 21 takes its starting point in the demand from regions and municipalities. This demand is connected to their struggles towards urban sustainability and creates a natural rendezvous for developers and manufacturers of, among other things, smart technology and city authorities, who are potential customers of these solutions. The organization is characterized by its broad interface of collaboration and its experience with creating collaboration across sectors, including private companies, city authorities and academic experts. Further, a close and strong relationship with the Danish municipalities is at the core of Gate 21's identity.

The smart urbanism agenda is a big part of Gate 21, as one of its four focus areas is 'Smart cities and communities'. Gate 21 is especially interesting in this case due to their extensive work with smart urbanism initiatives and their experience with facilitating collaborative forums.

Public empowerment through smart urbanism can be dealt with at different phases of a development project. With empowerment defined as a capability endowment to establish a direction for and drive

development towards a certain goal, it can occur at every stage, from the definition of the issue, to the choice of approach and implementation hereof, to the operation of the final solution. As Gate 21's work, including project development and project processes, is based on the demand from the municipalities, the sustainability challenges, which the organization deals with are defined at the municipal level and hence outside the scope of the organization and of this thesis. Even though, empowerment in the definition of problems and potential solutions are touched upon, mainly from a theoretical perspective, the main focus of this thesis is on empowerment in the project process, rather than in definition and operation.

The single organizational focus constrains the thesis within certain boundaries. The specific business model deployed in the organization is bound to influence the way they work and hence the way they approach smart urbanism. Gate 21 strongly depends on the partnerships of both city authorities, private companies, and knowledge institutions; and they must attend to the interest of their partners. The organizational perspectives described above can influence the subsequent analysis.

As mentioned, the physical location of the organization is in Greater Copenhagen, and this is also their main geographical area of interest. However, the organization is not strictly limited to projects within greater Copenhagen and the urban sustainability challenges occurring there, but also to those on a wider and even international scale. Projects subject to analysis in this thesis range from NEMO, operating at European scale, to hyper local projects in FIMO, including intelligent mobility solutions in the village Horslunde on Lolland.

2.1.3 Pre-existing practices in Greater Copenhagen

With Gate 21's location in Greater Copenhagen and their announced focus on the area, they position themselves within a pre-existing framework and practices of urban development, participatory approaches, and public empowerment. This is also the case for this thesis. Smart urbanism initiatives are nothing new in Greater Copenhagen. There are multiple organizations in the area also working within a similar smart urbanism paradigm (e.g. engineering consultants & governmental institutions). It is within this landscape that Gate 21 exists and is contributing to shaping the landscape around smart urbanism while simultaneously being shaped by it (Law, 2004).

The Greater Copenhagen region holds a strong social and democratic sense of planning. Andersen & Pløger (2007) describe urban governance in Denmark as a dual concept. On one hand, there are strong participatory traditions and a focus on empowering communities and creating an inclusive city through strong welfare strategies. This is based on notions of a quite direct democracy model and has inclusion, social justice, and public empowerment at its core. On the other hand, urban governance in Denmark is market driven and based on strategies of growth, drawing inspiration from the entrepreneurial city, where urban development becomes a product of an overall neoliberalist governance approach (Andersen & Pløger, 2007).

Smart urbanism is nothing new and is already a central concept in the region. Several municipalities are already working with the concept as a central strategy. For example, Copenhagen municipality states that they are "*proactively working on smart-city IT solutions*" (Copenhagen municipality, 2020) and in Albertslund *"smart city technology makes the city a better place to live*" (Albertslund municipality, 2020). Thus, there is quite a strong culture around both smart urbanism and participatory approaches in urban governance in greater Copenhagen and in Gate 21. Both the corporate market and the social dimensions are strong in Greater Copenhagen. Both the theoretical framework and the analysis stands on the shoulders of these urban development traditions and practices and influences the starting point as well as the outcomes of it.

2.2 RESEARCH DESIGN

This section describes the approach taken in conducting this research. It briefly describes the procedures concerning the establishment of a theoretical framework and moves on to describe the twofold analysis approach. This includes both a multiple case study of selected projects in Gate 21's smart portfolio and an intervention. The intervention took the form of an online workshop, discussing potentials for strengthening the connection between the public and their increasingly smart surroundings through participatory approaches facilitated by the smart initiatives. The two parts of analysis take on distinct temporalities as the first part looks back at previous and existing practices of the organization and the second part looks into the potentials of the future in terms of strengthening public empowerment through smart urbanism. The research design is illustrated in figure 1.

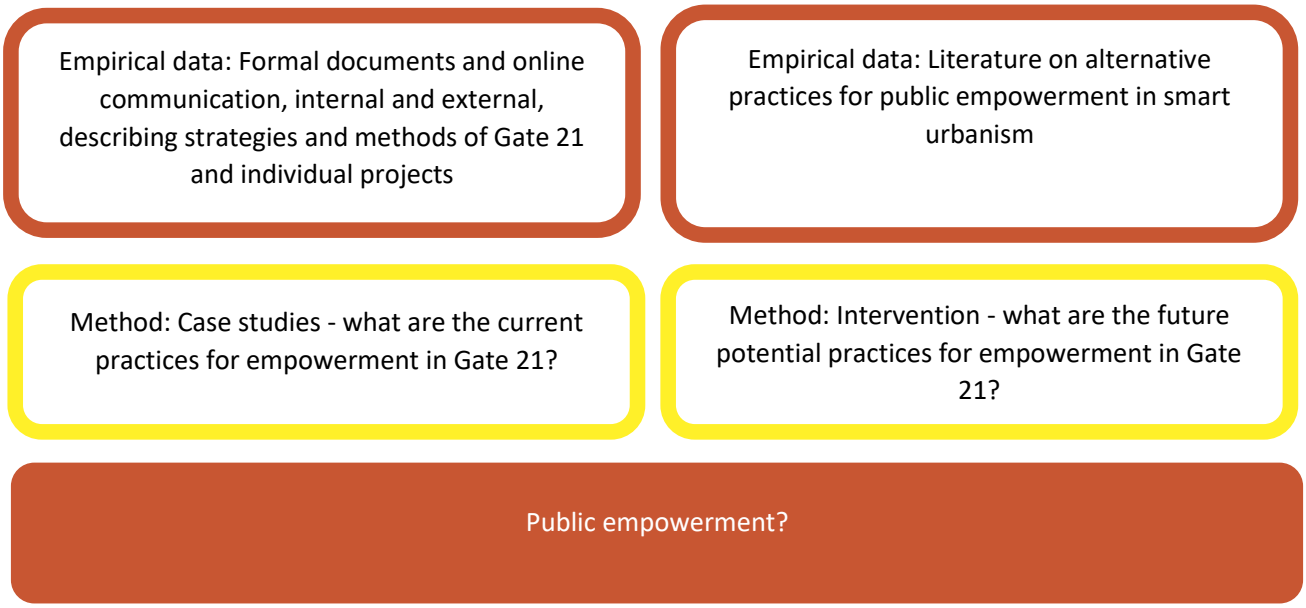

Figure 1 Research design and methods

2.2.1 Establishing a theoretical framework

First, a theoretical framework was established based on an extensive literature review. Both academic and commercial sources have comprehensive descriptions of smart urbanism, its objectives, and its potentials. Often these two types of sources are distinct in their perspective of smart urbanism. The tension between the very proactive, positive, and often corporate narrative of smart urbanism and the more hesitant and critical perspective presented in scientific literature is central to the problem of interest here. The literature review forms the basis of a conceptualization of smart urbanism as a threefold concept, distinguishing between three subcategories of smart urbanism: Dashboard Urbanism, Platform Urbanism, and Empowerment Urbanism. The distinction is mainly based on the perception of the city and the public as well as the typical methods or practices deployed. Each of the smart urbanism forms also holds a distinct level or type of public involvement and empowerment.

2.2.2 Gate 21's current practices – case studies

Second, the analysis was performed with the aim of positioning Gate 21 within the field. Gate 21 and their work related to smart urbanism was examined through a review mainly of official publications and online strategic communication from the organization itself. This exploration positions Gate 21 within the diffuse concept of smart urbanism.

Three projects were chosen for a case study to gain in depth knowledge of the practical experience with public empowerment (or lack hereof) in the projects of the organization. The case study approach makes it possible to explore projects in depth in terms of specific elements. Rather than shallow investigation of all smart projects, three relevant projects are selected to form the basis of the analysis. This amount of case studies makes it possible to go sufficiently into depth with each case, while also getting a sense of the more general practices of Gate 21 as an organization. Alongside the analysis of official documents of the projects, formal and informal interviews with project managers have informed the mapping of the projects in terms of the topic of public empowerment. This kind of interview seeks to bring forward intentional and unintentional approaches taken in the smart urbanism initiatives in Gate 21 and to qualitatively deepen the understanding of the individual projects, as understood by the project managers (Kvale & Brinkmann, 2009).

The selection of these projects is based on the inclusion of a smart agenda and not on their approach to public empowerment. The approach to public empowerment will vary considerably over the projects, and this is exactly the subject of interest here. The differentiated approaches from project to project will together establish an overall idea of the approach in Gate 21 as an organization, even though not all projects in the organization are covered. A greater coverage of the organization's project portfolio could have strengthened the conclusions. However, the projects included here are estimated to bring forward a reasonably general image of the organization and generate valuable knowledge and reflections, within the timeframe of this thesis.

The three projects included in the case study are FIMO, DIANA, and NEMO. FIMO (Intelligent Mobility of the Future), is a project where a number of Gate 21's partners, including municipalities and technological experts, work with deployment of data and smart technological solutions, promoting and supporting sustainable mobility development, mainly dealing with multimodal transport, intelligent traffic information, and public transport. DIANA (Applied data), aims to reduce energy consumption in buildings. The project focuses on communication concerning behavior, as it is observed that a large part of the potential energy savings from installing smart systems are lost due to behavioral factors. NEMO (*Noise and Emissions Monitoring and radical mitigation*) aims to develop novel technologies to measure air and noise pollution from individual vehicles in real time.

Potential future practices - intervention

Third, an intervention has been conducted in which practitioners within the Smart urbanism field in the organization are challenged in terms of their current methods in project processes. The intervention also seeks to uncover the potential to move towards a greater level of public empowerment in smart urbanism. The purpose was to have the participants reflect on current practices and to brainstorm about potential future practices which could strengthen public involvement and empowerment in smart urbanism projects. Grounded in theory, these reflections could create more valuable smart projects, reducing the issues of solutionism and exclusion of the public in the development of their urban environment. The intervention took the form of an online workshop for three senior project managers all working with smart urbanism projects in Gate 21.

The workshop was structured as follows. First each project manager was asked to choose a project they were working on and describe the main methods deployed as well as the perception of the city and the role of the public, from their point of view (this also informed the case studies described above). This formed the basis of discussions around public involvement in these projects. Second, a number of known current practices in the organization, such as living labs and demonstration projects were discussed in terms of their degree or ability to generate public empowerment and how they could potentially be tweaked to be more open and involve the public to a larger extent than they do now. Finally, alternative approaches to public empowerment through smart urbanism were discussed in terms of the potentials for Gate 21 to facilitate and drive the advancement of empowerment.

The workshop with the project managers generated valuable insight into the approaches to public empowerment, where they occur and where they do not. However, in framing the workshop, fractions of the theoretical framework were introduced leading the participants to take on the perspective of this thesis, rather than the perspective of the organization and their projects. This ensured relevant discussions but might also have excluded valuable discussions and insight into the actual practices in the individual projects.

2.3 POINT OF VIEW

It is important to note that my point of view is from within the organization. Alongside my master studies, I have been employed at Gate 21 as a student assistant and will continue my employment with the organization after ending my studies. The bias that might follow from this relation is acknowledged.

The projects that are subject to analysis in this thesis are selected based on, first of all, their relevance to the subject. They are also, however, based on my access to information about the projects, a factor which has relied and benefited from my position and knowledge of internal relations between practitioners in the organization. Two of the cases included in the analysis, FIMO and NEMO, reside within the department with which I am associated, namely the Sustainable Mobility department. Further I ama project assistant for NEMO, meaning that I work closely with the project managers handling Gate 21's part in this project. However, NEMO is a major European project including 18 partners from across Europe, and my relation to partners outside of Gate 21 remains limited. As FIMO also belongs to the Sustainable Mobility department, informal conversations with colleagues assigned to the project have been fairly accessible throughout my work. The last project included in the analysis is DIANA, a project residing in the smart city department of Gate 21. A more formal relationship with the people working with DIANA may affect the level of insight and amount of accessible information.

Throughout the project I have continuously had informal conversations with colleagues in Gate 21, both specifically about this project and about the smart urbanism topic on a more general level. These conversations have informed and qualified the work done in this project. The outcomes and conclusions, however, are still characterized by the internal nature of this thesis, as both interviewer and interviewees are affected by internal culture and practices.

External circumstances, highly precluding interaction with external practitioners, have limited the scope of the thesis as described below. This thesis thus considers a concept, which in reality would include a wide range of different actors, all with their pre-existing methods and reflections on urban development, from only one side of the relation. This of course limits the direct transfer of results or conclusions made based on the present analysis to real world situations. However, it remains relevant to the organization Gate 21, even if only to spark reflection within the organization on potential future development of practices or to inspire an engagement in dialogues on the topic with other actors in the field in the future.

Finally, this project has been conducted in the fall of 2020, during the Covid-19 pandemic. This has led to several obstacles along the way, especially in terms of the accessibility, availability, and interaction with external sources. My position within Gate 21 made it possible to interact closely with in-house practitioners, which has resulted in a deeper, but one-sided field work.

3 THEORY

The aim of this thesis is to explore Gate 21's current practices around smart urbanism and public empowerment and search for approaches and techniques for exploring the empowerment potentials of smart urbanism projects. This chapter contributes by providing a theoretical framework of smart urbanism and public empowerment, from which the discussions in Gate 21 can take their starting point. The theoretical framework of this thesis relies on a combination of Smart urbanism, public empowerment, and technocratic governance theories. In the following, a conception of smart urbanism, which is a concept of varying, overlapping definitions, is formed based on academic as well as corporate descriptions of the notion. Subsequently, empowerment, namely public empowerment, an equivocal term, is described and conceptualized as it is presented and discussed by both advocates and critics of smart urbanism and its public empowerment potential. Some tension is found in the intersection of these topics. This tension will form the basis of the analysis and discussion of the approaches to smart urbanism initiatives in Gate 21 and their potential (or lack hereof) for public empowerment.

3.1 SMART URBANISM

One of many potential strategies to tackle urban environmental problems is smart urbanism. The concept increasingly gains ground as a primary approach to urban development through which we can tackle major current problems such as resource scarcity and climate change. Overall, smart urbanism conceives digital Information and communication technology (ICT) as key to achieving a sustainable urban environment. While many cities include various smart urbanism initiatives (Lee et al, 2014), for example to monitor environmental qualities or to control traffic or energy flows, a few cities are entirely based on smart urbanism principles from their very beginning (e.g., Masdar (Madakam & Ramaswamy, 2016) or Songdo (Mullins, 2017)) and are referred to as smart cities. Smart urbanism is the concept of utilizing ICT and embed digital technology-based interventions in urban structures, including transport, energy, environment etc. (Borkowska & Osborne, 2018). In doing so, smart urbanism places itself "*at the intersection of visions for the future of urban places, new technologies and infrastructures*" (Luque-Ayala & Marvin, 2015). While technology in the city is by far not a new concept, recent digital technological development and the increasingly widespread internet of things has enabled real-time monitoring and control of various urban systems to an extent where digitally controlled cities can become reality.

The smart urbanism concept largely takes pride in increasing efficiency in the control, management, and operation of urban systems through real time monitoring and data collection, which allows for the

sustainable optimization of systems. According to the European Commission "*A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business*" (European Commission, 2020a). In this way, efficiency is placed at the very core of smart urbanism objectives.

Recent technological development allows for extreme levels of data collection; and today, a sound data foundation is in many respects viewed as a prerequisite for good, purposeful, and sustainable urban planning and for so-called evidence-based planning and decision making. Data obtained directly from the environment or community which planning initiatives concerns is especially perceived as crucial for successful urban interventions (Grey et al., 2017).

3.1.1 Three conceptions of smart urbanism

The term, smart urbanism has been around for about three decades (Borkowska & Osborne, 2018). Some researchers argue that the concept is much older than that, as it resembles the notion of cybernetics, which already emerged more than 70 years ago (Goodspeed, 2015). However, three forms of smart urbanism can be identified in recent literature, including Dashboard Urbanism, Platform Urbanism and Empowerment Urbanism (Fig. 1). The different forms all utilize digital technology to enhance and refine existing practices, however they vary in their function and in their perception or definition of the city and the public. Each has an inherent idea of who has "*authority and ability to make decisions about how people live, the places where they live and the things that direct their lives (e.g. law, policy, technology)*" (Sadowski, 2020, p. 8). The three forms of smart urbanism are described below.

First is the Dashboard form of smart urbanism, which is hosted by the field of traditional top-down urban planning. Urban planning practice has always sought to quantify urban life and environment in order for the seemingly chaotic organism of a city to become neat and tangible socio-technical knowledge objects that can be governed (Cashmore et al., 2018). Dashboard urbanism focuses on digital technology as a tool to govern the urban environment and population. It does so through the application of measured, modelled, and mapped (real time) data, which can inform planners about the state of the city for them to take action on (Kitchin, 2014). The automated digital system is often promoted by large tech companies and promises ways of creating efficient, convenient, and liveable cities. This could for instance include monitoring sensors, measuring the state of urban space and activity, and sending information to central data hubs, dashboards, or control rooms (Kitchin, 2014). This allows for outsourcing of the creation of urban overview to private corporations who can act as partners or consultants in directing urban governance and development (Sadowski, 2020). In bureaucratic smart urbanism the public is someone you plan *for*. The public thus remains passive and communication is limited to seeking public acceptance for the roll out of urban interventions based on digital technologies. Promising liveability and increased quality of life, this form of smart urbanism takes on a paternalistic form of governance (Cardullo & Kitchin, 2019). An often referred to example of a large-scale Dashboard Urbanism initiative is the Rio Operation Center. It is a central entity to which all

information collected in the city is fed and from which the city can subsequently be controlled accordingly. The intention with the operation center is to increase the safety and efficiency of urban services such as water, waste, electricity etc. (C40, 2012). Dashboard urbanism mainly includes IT or tech companies and they mainly target municipalities or other city authorities (Söderström & Mertmet, 2020).

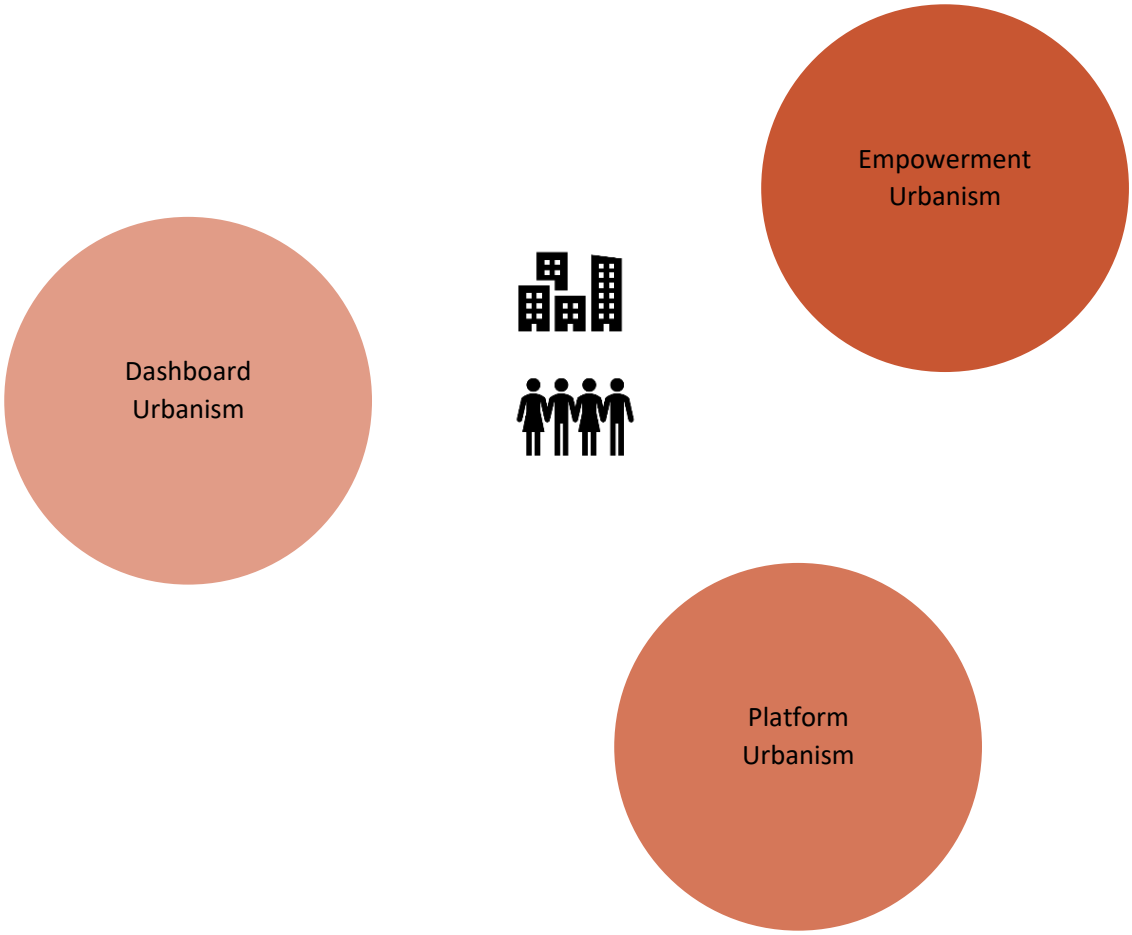

Fig. 1 Three types of Smart urbanism are identified in recent literature. Dashboard, platform and empowerment urbanism. Each has a distinct perception of the city and the public and applies certain methods for urban planning and development

Second is the Platform urbanism form of smart urbanism. It is concerned with digital platforms and their influence on urban life, economy, infrastructure, and politics. Highly powerful platforms include, for example, Facebook, Uber, and Airbnb (Söderström & Mertmet, 2020). The city has been a primary

target for digital platforms that seek to gain territory or market share in the field of urban services and the very practices of urban life. This form highly impacts the ways in which we '*consume*' urban services, through the use of digital applications. Platform Urbanism includes a wide range of corporations and they target the public as individual city dwellers and perceive the public as customers or consumers. The platform society redefines urban life and activity as ever-present services to consume and to share among us rather than to own individually (Sadowski, 2020). This form perceives the city as a corporate led marketplace in which the public live as consumers, digital platforms take over essential urban life services, and the public has no way of opting out of this market.

The final form of urbanism, Empowerment Urbanism, emphasizes the public empowerment effects which can emerge through smart urbanism. This form utilizes digital technologies to engage and involve the public throughout political and planning processes. Here, open data principles and methods for public organizations around shared concerns are at the core of smart urbanism, encouraging the public to take part in societal debates and to hold responsible entities for urban services accountable. Thus, the public is perceived as an active co-constructor of urban space, life, and development. Public empowerment is often seen as essential to drive societal transition as the commitment and willingness of the public is necessary for change. A main principle of public empowerment through smart urbanism is that of openness. As described by Mulder (2015), this includes, among other things, open data, open collaboration, open community, open governance and an open mind. The concept of public empowerment is described in further detail in the next section.

The Dashboard form of smart urbanism is so far the most dominant form. The practices around this top-down type of urban governance are probably also the most well-established among the three. The platform society is increasingly and rapidly gaining ground as we see more and more digital tools and applications on the market, allowing the public to consume urban services seamlessly and constantly. Smart urbanism for public empowerment is up there with the other two forms in terms of rhetoric and smart urbanism imaginaries. However, this form remains largely unfulfilled in practice. The three forms of smart urbanism are summed up in table 1.

All forms of smart urbanism and visions around it are often put forward by tech-companies. Technology corporations are often highly proactive in promoting smart urbanism solutions. Cisco, a major tech company, promotes a smart city as one that "*uses digital technology to connect, protect, and enhance the lives of citizens*" by means of "*IoT sensors, video cameras, social media, and other inputs*" for people and urban operators to "*make informed decisions*" (Cisco, 2020). Arup, a major international engineering company, states that "*technology can be used to help cities thrive*", that smart urbanism contains "*tools for urban development, with people at the heart of the process*" and that "*the 'smart city' approach might fundamentally transform the way that cities are governed, operated, interacted with and experienced*" (Arup, 2020). Smart urbanism development is additionally supported by many city administrations. The municipality of Copenhagen has engaged in smart urban development and believes the implementation of information technology solutions will contribute to making "*the city*

cleaner and healthier and make it work even better" and they view technology as "*a means to promote quality of life, economic growth and the development of a vibrant, responsible and bold city*" (Copenhagen municipality, 2020). Thus, the focus within smart urbanism remains centered around the Dashboard and Platform Urbanism, which is driven by its most pro-active advocates, technology corporations, and city administrations.

Table 1 Perception of the city and the public in different forms of smart urbanism

Form of smart urbanism	Perception of the city	Perception of the public	Methods
Dashboard Urbanism	A *socio-technical system* to be managed and controlled as efficiently as possible for optimization of the use of resources and for creation of sustainable city systems.	*Passive inhabitants*, for whom experts can provide sustainable urban environments to enhance their quality of life, based on their own activities in the city as data points.	*Models, simulations, economics, cost-benefit analysis,*
Platform Urbanism	A *marketplace* for urban services and sharing economies.	Highly digitally literate *consumers* of urban services	*Consumer services, mobile applications*
Empowerment Urbanism	A network of people and communities, with shared needs and common goals for their surroundings.	Politically engaged, organized, and informed *co-constructers* and guardians of urban space, life, and development.	*Hackathons, local public organization, Living Labs, anthropological studies, digital grassroot innovation, citizen science, Fab Labs, timebanks*

To sum up, smart urbanism today applies information technology and the internet of things to monitor urban activity, producing knowledge objects that can be used to manage and control urban systems. It holds promises of system efficiency and enhanced quality of urban life. Finally, it holds a social dimension by promising facilitation of public empowerment by feeding real time information to the

public and to support public involvement in political and planning processes, ensuring citizen-centered or even citizen-driven urban development. The social dimensions, here perceived through the concept of public empowerment in smart urbanism, remain secondary. As the European Union states themselves in their 'Report of the Mission Board for climate-neutral and smart cities', "*The main obstacle to climate transition is not a lack of climate-friendly and smart technologies, but the capacity to implement them*" (European Commission, 2020c p.5). Below, the concept of public empowerment is reviewed as a potential catalyst for generating this capacity.

3.2 PUBLIC EMPOWERMENT

The concept of 'public empowerment' takes slightly different forms depending on context. In the dictionary, empowerment is defined as "*Authority or power given to someone to do something*" (Oxford learner's dictionary, 2021). In connection to urban development and transition, however, it mostly revolves around public involvement in planning processes and in the utilization of urban resources and services. It implies a shift in power from the ones currently holding it (Certomá & Rizzi, 2017). If power is the "*capacity of actors to mobilize resources and institutions to achieve a goal*" (Avelino, 2017, p. 507), in order to empower a group or an individual, they must be given (or independently obtained (self-empowerment)) this capacity. Overall, empowerment can be described as a capability endowment to establish a direction for and drive development towards a certain goal (Hölscher et al., 2018). In this case, the public can be empowered by granting them the capability to influence planning processes and utilize the potential of specific initiatives to drive urban development towards a desired future. Empowerment is the process through which this happens. It requires resource accessibility, mobilizing strategies, and a willingness to exercise the power obtained (Avelino, 2017).

Different urban planning approaches can hold different levels and forms of public empowerment. Often it entails the involvement of public stakeholders in planning or operation processes of the urban environment. Ideally, public stakeholders are involved at all stages, from the definition of the problem, to the identification of potential approaches and solutions, to the implementation and operation of chosen initiatives. Furthermore, involvement ideally goes beyond formal consultation without impact, or what Arnstein (1969) has termed tokenism.

It is important to note that when planning and developing the city towards new paradigmatic forms, such as sustainability or smartness, empowerment may seem promising, but disempowerment is equally likely. Power related to the capacity to change or preserve certain conditions held by one actor, might also entail a corresponding decrease in capacity for someone else (Avelino, 2017). As empowerment requires a shift in power structures, the empowerment of one group or individual can disempower another. Some even argue that the very act of empowerment is disempowering, as it emphasizes those who have the power to give and enforces dependence on the already powerful to pass on power, by the less powerful (Boje and Rosile, 2001). In urban development, this mechanism

holds the risk of reinforcing city authorities as the dominant actor, as others, for example, citizens, depend on them for their empowerment (Hölscher et al., 2018).

For some groups, smart urbanism can add to a sense of powerlessness. First, due to the intangibleness of the technical complexity or lack of techno-literacy, especially among socially vulnerable groups, conversations around development becomes reserved for experts who have the skills and knowledge to make sense of and utilize data (Gleeson & Dyer, 2017). The impending risk of excluding certain groups from participating in the conversation, through the deployment of technology for essential urban development, can result in a reinforcement of the power structures already in place (Gleeson & Dyer, 2017, Hölscher et al. 2018). Second, information, which is rendered visible through, for example, smart sensors and mapping technologies, is not necessarily beneficial for all, as, for example, data on noise, air quality, or flood risk can substantially influence property value (Beckwith et al., 2019). Further, the perception or awareness of poor environmental conditions can increase the risk of negative health impacts (Orru et al., 2018).

Public empowerment in urban development can occur at different times throughout a development project and to different extents. It might take distinctive shapes, depending on in which phase of the planning process it appears. Ideally, the public holds significant capacity to influence the planning process at all stages. Overall, two perceptions of empowerment are distinguishable: empowerment in planning and empowerment in operation. In the following, empowerment is described in relation to smart urbanism and the distinctions of empowerment forms are described and exemplified.

3.2.2 Public empowerment through smart urbanism

On the face of it, there are two contradictory framings of smart urbanism and its social dimensions. On one hand, technology and the comprehensive data collection is praised for empowering civil society and driving participatory urban development. Smart urbanism holds positive potential to support and improve local urban development, but only if it stays in touch with local community and citizens. Empowerment of the public is key to ensure meaningful smart urbanism throughout the development process and subsequent operation of solutions (Luque-Ayala et al. 2014). Thus, as mentioned, smart urbanism initiatives, which often focus on technology embedded in the physical environment and on human interaction with it, must not lose its social dimension. Social integration and acceptance are keys to successful adaptation and integration of these technologies in society. Giving the public the power or capacity to define and drive smart development can facilitate exactly that. On the other, it is criticized for bringing technocratic forms of urban governance to the center of decision-making (Kitichin, 2014). This dual and somewhat paradoxical nature of the concept has been a topic discussed within academia since the early forms of technology-aided urban management (Goodspeed, 2015). Here, the arguments for both views on data-based urban management are reviewed.

Public empowerment, in addition to the technological, economic, and regulatory expertise of businesses, academia, and government, throughout development and deployment of a project can be a main driver for technological innovation to support sustainable transitions. Public empowerment can offer the possibility and capacity for meaningful technological innovation to become publicly accepted tools to address urban issues and move towards a more sustainable urban life. If properly carried out, it can encourage and enable people to engage actively in a community (Borkowska & Osborne, 2018) and establish a community of practice, in which people can gather around shared concerns, construct and refine knowledge, and collaborate on potential solutions (Wenger, 1999). Smart urbanism can support this knowledge construction, refinement, and community collaboration and action. It offers massive data collection and information retrieval as well as ways of communication, which would not be possible without the integration of, for example, smart sensors or internet-based communication (between hardware, software, and people). If the social dimension is preserved and cared for, by providing the capacity for public stakeholders to work towards their shared or individual goals, smart urbanism has the potential to improve local urban development for the benefit of all urban populations. (Luque-Ayala et al. 2014). The success of technological projects requires that "*citizens are empowered through the active and democratic contribution and participation in the development, implementation and evaluation of smart initiatives*" (Borkowska & Osborne, 2018, p. 366). The characteristics of participatory smart urbanism can be defined through posing questions such as what kind of participation is promoted, who initiates and defines the projects, and is data openly accessible. Participatory smart urbanism can promote public empowerment through these characteristics for better management and for developing inclusive and democratic urban areas (Boni et al., 2019).

At a European political level, Smart urbanism is central in urban development, especially in the aim for urban sustainability. The European Partnership on Smart Cities and Communities (EIP-SCC) ideas and rhetoric around smart urbanism includes a strong public focus. This is expressed in, among other things, an intended focus on improving digital literacy, engagement and empowerment of vulnerable groups, implementation of mechanisms that improve public participation all the way from project specification to implementation in a continuous iterative way and to promote open data concepts (European Union, 2017). Whether this is applied in practice in European projects can be questioned (Cardullo and Kitchin, 2019).

As mentioned, in the Oxford dictionary empowerment is defined as "*Authority or power given to someone to do something*", but also as "*The process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights*" (Oxford learner's dictionary, 2021). This aligns well with the conceptualizations found in academic literature of empowerment through smart urbanism. Overall, there seems to be two perceptions of the notion. One is based on empowerment of the individual by information provision from data collected by smart technologies (for example, on air quality, congestion, or household energy consumption), for the individual to make personal decisions about their own behavior and thus control their own life. The other is a more collective empowerment through the same types of information, but with an intention of further engaging and involving

communities and individuals that are a part of the local development in the political and technical processes. Where the former empowers people to make personal decisions about their life on a scientific basis, the latter empowers them to control (or at least impact) the way we approach our surroundings as a community. Smart urbanism can provide a framework on which communities can base collective political requirements, directly participate in processes concerning the development of their city or neighborhood, and finally hold authorities accountable to their responsibilities.

Through massive dissemination of the internet along with easy-to-use software and extensive digital social networks, the communication and information accessibility has never been as prevalent as it is today. This can be key in creating agency in public accessibility and engagement with the knowledge resources provided by smart technology, and with a collective public innovation in connection with other people of the online community (Baccarne et al., 2014). For smart urbanism advocates that this technological access to urban organization and management, alongside the continuous increase of technological literacy, leads to the empowerment of the public (Certomà & Rizzi, 2017).

There are indicators that the innovation ecosystem is changing and bottom-up approaches to local urban development gains ground. The public is increasingly involved in creation as well as dissemination of technologies and their application. They "*provide substantial input for developing a more accessible, information based, interactive and participatory urban environment*" (Baccarne & Schuurman, 2014, p. 162), indicating that traditional power distribution is shifting. Bottom-up social innovation, however, needs top-down support from an open-minded political environment, financial support and technological support, again referring to open data principles. Interactions between the public and city authorities can foster inclusive and participatory innovation by opening up the collection and application of data and smart technology. It is possible to imagine a democratic smart city as a people-centered space, where an active population and community-led innovation are highly valued in rhetoric as well as in practice (Mulder, 2015)

Thus, public empowerment through smart technology can have the potential to support people in their own private decision making as well as supporting them in their participation in democracy and actual involvement in urban development processes rather than merely being informed about them. While many researchers acknowledge issues around the, often corporate, visions of smart urbanism (Goodspeed, 2015, Hollands, 2008, Kitchin, 2014), many also search for ways in which the smart urbanism concept and its subsequent technological systems devices and data collection can contribute to democratic urbanism. Hence, smart technologies might contain core building blocks to make up a system of public knowledge accessibility which did not exist in the pre big data society and enable better and more direct communication between city authorities and civic stakeholders.

In the following, the two different conceptions of public empowerment (and potential disempowerment) through smart urbanism are elaborated and exemplified.

Individual empowerment through information

One way of conceptualizing public empowerment through smart urbanism is as empowerment through information services that enable citizens to make informed individual decisions in their everyday lives. For example, about their movement in the urban environment or consumption of products, services, or cultural events. The individual empowerment through information highly relies on sense making of captured or modelled data. From an empowerment process perspective, this sense making can happen both in the design of data production (what to measure and how to measure it), in the visualization of data (what to bring forward, what to hide and how to do this), and in the use of the data and resulting information retrieved from the data processing.

Most often, smart urbanism services focus on the use of visualized data. Enabling people to see invisible urban environmental elements such as air quality, which would otherwise be reserved for technical experts, can empower them to act accordingly when faced with everyday choices to make, for example to reduce exposure to urban environmental hazards and protect their own health by walking through less polluted or less noisy streets. While passive information provision allows citizens to make informed and evidence-based decisions about their own behavior, smart urbanism can also drive behavioral changes, for example by informing people of the environmental impact of their own behavior and suggestions for changes.

An example of a service providing public information on urban air quality for citizens to base personal decisions on are Rambøll's Shair concept. Via an app, citizens and planners alike can access detailed information on air pollution levels and geographic distribution in real time. The mapping is based on a combination of i.a. real time data from static air quality monitoring stations, real time traffic monitoring, register data about emissions from the average vehicle fleet, meteorological monitoring, and a theoretical pollutant dispersion model. The explicit intention behind the tool has been to "*provide reliable, science backed information on local air quality trends to empower a wide variety of users to devise and implement effective and defensible air quality interventions*". The mapping service can be utilized both by city authorities, planners and designers to gain detailed granular knowledge of distribution of urban air pollution geographically and source specifically. Citizens can access the maps and make decisions on movement around a more or less polluted urban environment accordingly (Rambøll Shair, 2020).

Similar to the Shair application is the Air-view project in Copenhagen, a collaboration between Google and Copenhagen Solution Lab (a part of Copenhagen municipality), which maps air pollution in all streets in the city. It deploys Google's street-view concept, where a car continuously drives around the city, this time only with an air quality sensor mounted on top instead of a camera. As Copenhagen Solution lab states, the purpose of the project is to enable "*a mother of an asthmatic child to find the heathiest way to the playground*" and "*bicyclists and runners planning the least polluted route for their trip*" (Copenhagen Solution Lab, 2018).

While data visualization and other smart services enables people to make informed decisions in their everyday lives there are potential backsides to the concept. First, data and the visualization hereof are not neutral. Smart urbanism is often praised for its argued capability of stripping management approaches of politics, ideology, or cultural value, as data captured through technological devices are perceived as neutral and objective. Hence basing urban management initiatives on objective data, presenting the truth about urban events or actions or urban environmental condition can be viewed as a commonsensical and pragmatic and rational approach.

In a seemingly rational and politically neutral framework of data collection, processing, analysis and visualization, urban environmental data provide evidential basis for urban development and policy. It is a "*powerful realist epistemology that not only shapes how we understand cities, but also is easily translatable into a means for assessing and formulating how cities are managed and governed*" (Kitchin et al, 2015, p. 13). But data are generated through instruments and through practices and pre-existing knowledge and social and political contexts. They do not exist out there, independently of these structures. The way in which data are generated is highly relevant to the outcomes of data itself and of subsequent analysis since it may provide different results. Hence data is not the neutral, technical process it sometimes appears to be, but part of the socio-technical systems, which simultaneously describes the world and creates it as we know it (Kitchin et al., 2015).

Second, indiscriminately open data availability or deliberately bringing forward certain information, such as geographic distribution of health hazards, while empowering some it can have negative consequences for others. For instance, making visible noise or air pollution can impact property values can impact the perception of certain neighborhoods and the people living there and finally, the perception or awareness can increase the risk of negative health impacts caused by poor environmental conditions (Orru et al., 2018). The distribution of the information obtained through smart technologies can lead to unfortunate distribution of power, especially in places with uneven technological literacy. As an extreme example, city authorities in Bangalore, India, made available all property data on the internet for efficiency purposes, enabling people with higher educations and better technical means to take advantage of those with limited technology access, lower educational levels and in this case with weaker legal rights to property, and basically steal land from them (Raman and Benjamin, 2011). Another example is that of an American suburban community who initiated collection of data on flooding events, in order to hold infrastructural changes in a town upstream accountable for increased flooding in their area. This data and the open circulation of it made it possible to solve the flooding issue, while it simultaneously decreased their property value, and increase insurance costs, as they were now, based on their own data, situated in a flood prone area (Beckwith et al, 2019). Thus, the consequences of fully open data, might change according to the perspective from which it is viewed.

While this type of potential individual empowerment through smart urbanism can enable individuals to make evidence-based decision about their personal behavior, it does not allow them to participate in the development of their surrounding environment. One thing is choosing not to walk down a highly

polluted street to avoid too much exposure to protect your personal health. Another is to be involved in the decision-making process concerning air pollution and how to improve environmental conditions in the city on a political level. Research on public empowerment in the sense of involvement in urban development processes, forming the basis of public political collectives, is reviewed in the following.

Collective empowerment through involvement and accountability

A different conceptualization of civic empowerment puts the public in a position where they can substantially influence more general structures of the urban environment and political or planning decision concerning it. Public involvement in politics and practices around urban development is crucial, and as Arnstein (1969) argues, "*citizenship participation is a categorical term for citizen power. It is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future*" (Arnstein, 1969, p. 24).

Going beyond power over personal everyday choices as described above, technological devices, big data collection, and its public accessibility, together constituting the concept of Open Data, can enable civic empowerment in the sense of power given to the public to influence and drive the urban development on matters concerning them. Open Data can provide several positive effects, enhancing public involvement and engagement. It can create a special arena for local public participation, local public management, and local public government accountability (Beckwith et al, 2019). Open data principles for smart urbanism initiatives can contribute to further social innovation and drive city authorities from a position of governance to one of facilitators for the public to drive development (Mulder, 2015).

Access to reliable environmental data can enable citizens to meaningfully engage in political discussions and to demand action. Data accessibility is frequently emphasized as a good way for people to group around common concerns, organize themselves and form part of political collectives, holding authorities or those in power accountable (Beckwith et al, 2019). The collective political empowerment enforces the "*active engagement of citizens, as custodians of public life, in collective affairs. Public deliberation and political participation and contestation are an essential part of establishing common values and goods, which in a pluralistic society requires accommodating*" (Joss et al., 2017, p. 33), what Joss et al. terms the civic-republican regime. In this sense, smart urbanism and the resulting knowledge creation can provide people or communities with a scientific language about environmental conditions, to use in the societal or political conversation on matters that concern them (Zandbergen & Uitermark, 2020).

As an example, in a Dutch Citizen Science project on 'Smart Citizenship', a sensor kit was handed out to participants for them to collect data on environmental conditions in the city of Amsterdam. It was expected that the sensors could generate data, which could be utilized as scientific evidence with the strength to influence political decisions on environmental concerns. While some of the participants

wanted to gather data in order to document pollution from tour boats, to induce stricter regulation, others were seeking to gain a strong argument for the implementation of a low emission zone (Zandbergen & Uitermark, 2020). Thus, data collection was thought to empower the citizens, giving them a stronger voice, if their ideas and desires for development could be backed up by scientific data, rather than feelings or experience.

In Milton Keynes, a large and rapidly growing English town, keen on deployment of smart technological solutions to reach urban sustainability, a project called MotionMap was developed as a part of the city's smart development. The town is highly car-dependent and issues around congestion, and limited options for physical capacity expansions are of concern. As a result, a smart urbanism initiative, the MotionMap application, was developed to explore how real time data could be applied and fed to the population and help make the existing infrastructure more efficient. The original idea of the project was to empower citizens to make decisions on their travel behavior based on real time data and thus create a more efficient use of the transport network, e.g. individual empowerment. However, this notion of empowerment did not correspond well with the users' perception of the usefulness of the application. They did not find the information on for example congestion to have a significant impact on their choices, as they already had obtained this knowledge of the system through experience and it did not change their needs for travel at specific times. Although the idea of individual empowerment of people to make behavioral decisions maximizing efficiency of the system did not seem to work as desired, other types of public empowerment was at play. People saw the application as a means of holding public service providers, and city managers accountable. Based on the open data principle applied in the project, public ownership and control of data could be utilized to shift the existing power relations between the public and city authorities or service providers (Cook et al, 2019).

A different example is the EU funded Open4Citizens Project. It aims to develop a commons framing of open data, within which data is utilized by members of a community to create services to empower people in their everyday decisions, through information based on real-world dynamic data. Overwhelming amounts of data, from sensors and from social networks already exists. However, what is lacking to consider these data a common public resource, which is actively utilized by a community, is a commons framework, in which awareness of the potential use of the data along with shared practices and a form of stewardship of the resource to ensure sustainable use of it. The use of data requires 'technical skills', 'creative capabilities' and 'data literacy', which might only be held by a few stakeholders. If such a commons framework can be established, open data holds the potential for the public to define, design and use public services, build on the shared data resource. Through Hackatons, the Open4Citizens Project seeks to create a forum for idea generation establishment of commons practices around the utilization of open data. Including the public in a hackaton format, which is traditionally reserved for information technology experts, can be a way of preserving the required skills for utilizing data, without losing touch with, or completely exclude the public from the development of the data-driven applications that claims to empower them (Morelli et al, 2017). In engaging the public in the data-based development, it is important to "*lower the barriers to participation, so that*

contributing to this work isn't dependent on mastery of information technologies" (Morelli et al, 2017 p. 221).

3.3 THE BACKSIDE OF SMART URBANISM

While public empowerment as described above is a part of the smart city vision of many advocates for the technological solutions to future urban sustainability, the idea of smart urbanism as the key create, sustainable, democratic and just cities has received much critique.

From this critical viewpoint, the smart city vision of public empowerment remains unfulfilled. The desired and anticipated engagement of civil society by means of open data provision and internet-based participatory methods, has not emerged on levels of the mainstream. There can be many reasons for the absence of civic involvement, despite that all means for it might be present as described above.

First, cities often consist of many complex and technical structures, and can be intangible for many, especially if they do not deal with urban issues or similar subjects in their everyday lives. The data foundation and data-based information and analysis thus becomes restricted to experts, who have the skills and knowledge to make sense of and utilize data, excluding less techno- or data-literate people (Gleeson & Dyer, 2017). a major concern about smart urbanism is the risk of technocratic and centralized forms of city governance. Smart urbanism visions might have a tendency to view complex structures, such as a city, or specific parts of it, such as transport or air quality, as a system which can be fully understood and subsequently, efficiently managed through comprehensive data and algorithms. This can lead to solutionist or reductionist approaches which does not consider the wickedness of urban problems (Rittel & Webber, 1973). This might further result in a narrow focus on the manifestation of the issues, which can be captured and analyzed within smart computational models, and fails to address, or to look for, more fundamental structural underlying challenges (Kitchin et al, 2016). Similarly, in their depiction of a platform society, Andersson Schwarz & Larsson (2018), call into questions whether the turn towards smart urbanism and data-driven urban management provides a "template for technocratic control and administration of society". Further, they present concerns on democratic accountability and whether some groups, and if so, which, can become left behind and disadvantaged as a result of a digitalization of urban management as people and their everyday lives and its consequences become quantified and analyzed through somewhat incomprehensible, black-boxed smart devices, computers and algorithms (Andersson Schwarz & Larsson, 2018).

Second, a general imbalance in the distribution of power and neoliberalist ideas or discourses of urban development skews the perception of public power and limits it to forms of tokenism, where the public is merely consulted with matters of concern, but inputs are not taken seriously (Arnstein, 1969). In their review of public participation in the projects conducted under the European Innovation Partnership for Smart Cities and Communities, Cardullo and Kitchin (2019) finds extremely limited practices of public empowerment and influence in the projects. They argue that the public body of the theoretical

quadruple helix innovation process, is largely passive and that city administrations and companies mainly drive projects in a way where they can decide what is best for the public. Public participation in the projects is reduced to tokenism (Arnstein, 1969), if present in any form at all. Technocratic forms of government can also be reflected by a tendency for city governance and planning to mainly work with a small circle of partners and the broader participation in democracy is limited to occasional information on already defined political proposals or decisions already made (Gleeson & Dyer, 2017).

Finally, and closely related is the corporatization and privatization of urban governance, where the functioning of the urban space becomes dependent on a few major private firms and subsequently driven by economic interests rather than public interest. This corporate and neoliberal approach to urban development or future urban visions largely lack concern for democratic processes and decision making. It leaves the urban population deprived of participation and control and remains led by technology and its corporate producers. Rather than taking its departure in public needs, Hollands (2016) argue that the main purpose of many smart projects is one of branding and marketing, perceiving the city as a product and its development as advertising to attract people and businesses (Hollands, 2016). This often results in a "lack of concern with democratic decision-making and real citizen involvement, participation and control" (Hollands, 2016, p. 175). In his critique of the corporately led smart urbanism, Hollands point to alternative smart urbanism approaches, proposing "*more modest and small-scale socio-technological interventions that contrast with the corporate smart city, and which might begin to help us envisage a different way of thinking about and 'doing' smartness*" (Hollands, 2016, p. 176). Within these alternative interventions, he exemplifies ideas on public ownership of the city, defined as engaged and empowered citizens, who take action on collective problems in an increasingly complex urban setting.

In summary, most current smart urbanism initiatives remain in the bureaucratic category of smart, while the platform society emerges and is forcefully gaining ground in cities. However, public ownership of and the public's right to the digital city are crucial to sustainable and democratic urban development but has still not entered the big scene of smart urbanism. Examples of public empowerment through smart urbanism do exist, to a large extent in theory, but also in small versions in urban reality.

In the following analysis, we take a closer look at the practices of public empowerment through smart urbanism project in Gate21 and explore alternative methods of strengthening the connection between the public and their increasingly smart urban surroundings.

4 ANALYSIS

As presented above, projects within the smart urbanism paradigm often lie within the boundaries of Dashboard or Platform Urbanism. Rarely do they enter the field of public involvement and empowerment, as is otherwise often proclaimed in strategic narratives around smart urbanism and noted in theory to be a crucial element to democratic urban solutions. Mostly they remain as paternalistic solutions to symptoms of deeper urban problems (Cardullo and Kitchin, 2019).

This analysis explores the current project portfolio of Gate 21 in terms of their position within the smart urbanism paradigm. The analysis identifies the form of smart urbanism through the projects' perception of the city and the public as well as the methods deployed (as presented in table 1). Further, it looks into the future potentials for the organization to cultivate public involvement and empowerment in the project process of smart urbanism initiatives.

Thus, the analysis is twofold. First, it looks back into previous and existing practices of public involvement in the organization's smart urbanism projects. This part takes a case study approach, and analyses three smart urbanism projects in the organization concerning their perception of the city, their perception of the public, and the specific methods deployed. The case study analysis seeks to answer the following research questions:

- Where does Gate 21 currently position themselves in terms of the form of smart urbanism? How do they perceive the city, and the public and which methods are deployed?
- What (if any) practices are currently in use for public involvement and empowerment through smart urbanism in Gate 21?

Second, the analysis looks into future potentials for the organization to strengthen public involvement and empowerment in smart urbanism projects. This part takes an intervention approach, inviting project managers to discuss how to gain better public anchorage, keep a strong social dimension, and develop sustainable cities and villages with people, rather than for people. The intervention seeks to answer the following questions:

- What alternative practices could be brought into play that would potentially strengthen the public empowerment part of smart urbanism in Gate 21?

This is based on the arguments presented above, that public involvement and empowerment is essential for the success of smart urbanism initiatives. In the following, the results of the case studies and the intervention are presented.

4.1 GATE 21 AND THEIR FORM OF SMART URBANISM

Gate 21 is a Danish NGO working to promote sustainable societal transitions. The organization consists of 71 partners including regional and municipal authorities, private companies as well as knowledge institutions with Gate 21 as the central general office. Thus, the triple helix innovation model and public-private-innovation is strongly emphasized in the way the organization works. It has been this way, since the organization morphed into an independent organization born out of Albertslund municipality, in 2009 (Gate 21, 2019). The triple helix innovation model brings together academia, industry, and government forming a forum for knowledge based technological, social and economic development (Leydesdorff & Etzkowitz, 1998).

Project development in Gate 21 takes its starting point in the demand from regions and municipalities, concerning their challenges towards urban sustainability. It makes the organization a natural rendezvous for developers and manufacturers of, among other things, smart technology and city authorities, who are potential customers of these solutions at a large scale.

The organization is involved in several smart urbanism projects. One of the four focus areas of the organization is 'Smart Cities and Communities', and it defines digital solutions as crucial for sustainable transitions in society. The primary focus is on the utilization of digital data for effective operation of urban systems such as traffic, waste, electricity and heating, lighting, and economy. In these projects, the main emphasis is on the role of regions and municipalities as "*purchasers of sustainable digital solutions*" and "*as data owners*" (Gate 21, 2020a). Further it seeks to position Denmark as a leading country in creating smart sustainable cities and promote danish companies on the international market, ensuring growth. Finally, they claim to be a front-runner in "*creating good, ethical, digital solutions, because we are good at managing difficult collaborations and partnerships*" (Gate 21, 2020a). Even though the organization has a focus area dedicated to smart urbanism projects, the smart projects appear in all focus areas of the organization, including Sustainable Mobility, Circular Economy and Resources, Renewable Energy as well as Smart Cities and Communities.

The projects selected for the case study below reside in Sustainable Mobility focus area (FIMO and NEMO) and the Smart Cities and Communities focus area (DIANA). In the following, brief descriptions of the three projects' main content and methods are given.

4.1.1 Projects included in the case study

Only a few selected projects are included in the present analysis of Gate 21's smart urbanism activities. This includes the projects FIMO, DIANA, and NEMO. They are selected based on accessible and relevant information of the projects and their relation to the smart urbanism paradigm. The selected projects are briefly described below.

FIMO

FIMO, an abbreviation for *Fremtidens Intelligente Mobilitet* (Intelligent Mobility of the Future), is a project where a number of Gate 21's partners, including municipalities and technological experts, work with the deployment of data and smart technological solutions, promoting and supporting sustainable mobility development, mainly dealing with the areas of multimodal transport, intelligent traffic information and public transport in suburban and rural areas.

Several demonstration projects will be conducted throughout the project, which all take their point of reference in local geography, distinguishing between urban, suburban, and rural areas. All the demonstration projects revolve around the topics of future public transport, future stations, and intelligent traffic information. Based on these demonstration projects, FIMO will assemble a set of general recommendations to ensure that smart solutions work towards a more sustainable system of mobility (Gate 21, 2020b).

DIANA

Diana, an abbreviation for *Data i Anvendelse* (Applied data), aims to reduce energy consumption in buildings via smart technologies. The project focuses on communication concerning behavior, as it is observed that a large part of the potential energy savings from installing smart systems are lost due to behavioral factors.

The project consists of communication campaigns aimed at different target groups, testing whether it can cause a change in behavior and subsequently energy savings and higher comfort. In terms of the technical solutions, it is based on data that are already being collected in the buildings of interest as well as additional smart sensors. The project includes four municipal buildings and two social housing complexes (Gate 21, 2020c).

NEMO

NEMO, an abbreviation for *Noise and Emissions Monitoring and radical mitigation*, is a European project, which aims to develop novel technologies to measure air and noise pollution from individual vehicles in real time. The measuring devices are to be coupled with a central digital data platform enabling traffic management and control based on measured values of pollution. The system is developed with a focus on seamless integration into the urban fabric with the objective of massive dissemination in the cities of the European union. The main task of Gate 21 in this project is that of communication and dissemination of the project's progress and results (NEMO, 2020).

4.2 CURRENT PRACTICES OF SMART URBANISM IN GATE 21

In this section, the projects described above are reviewed in terms of their perception of the city, their perception of the public, and the role they take in urban development. In line with the theoretical framework, the main practices of each project are reviewed as well, and finally the projects are assessed in terms of their position within the smart urbanism paradigm.

4.2.1 Perception of the city

For smart urbanism projects in Gate 21, the main objectives are for the urban systems, mainly transport, waste, and energy supply, to become more intelligent and effective. Intelligence and efficiency are directly translated to sustainability and to a better urban environment for the public. In other words, an efficient, digital city is a good and sustainable city. For this reason, it is claimed that cities and communities all across the world are in *need* of smart urbanism for them to create a good, sustainable urban environment for the public to live in (Gate 21, 2019). In this perspective, the city is developed *for* the public rather than *with* the public. As mentioned, the project portfolio in Gate 21 is diverse and deploys a range of different methods and approaches. In the following, the three projects chosen for the case study are reviewed in terms of their perception of the city.

FIMO

The project aims to investigate how existing technologies might be strategically applied to develop efficient and sustainable cities. Innovation in technology application is central to the project. As stated above, the project consists of a number of demonstration projects, also known as use-cases, all searching for digital potentials for the future mobility system.

The demonstration project in the Capital Region of Copenhagen aims to create context-specific smart solutions, but it also aims to develop solutions which are as generic as possible. This is to have the option of replicating the project in other places as well. Even though the project aims to be context-specific, the objective of a generic solution for replication suggests an understanding of cities as rather neutral environments, where the social dimension is not of much importance. In the demonstration project in Lund, it is stated that the area will be an "*object for urban development*", implying a similar perception of the city as a neutral object. The demonstration project on Lolland stands on the shoulders of a strong existing community in the small village of Horslunde, which has also been utilized in other projects in Gate 21. This resembles empowerment urbanism's perception of a city as a network of people and communities, with shared needs and common goals for their surroundings.

The demonstration project in the Capital Region of Copenhagen, which tests the use of traffic data for road capacity expansion and better experience of service during construction works, is also assessed as a business case. The business case objective indicates a market-oriented form of urban development, where smartness is used as a means for branding a city as well as for eventually generating profits. Profits can, for example, be materialized as increased sales of a smart concept from a corporate view

or as increased popularity from a city authority view (Gate 21, 2020b, S. Poulsen 2020, personal communication, 11 December).

DIANA

The project originates from observations and acknowledgement that smart technology in itself is not sufficient to reach sustainable energy consumption in buildings. With this starting point, the project perceives the city with a dual focus on buildings and people. On one hand, the focus on buildings and the optimization of the operation of these imply a very technical and system-oriented view of the city. The central acknowledgement of the human behavior as key in the efficient application of smart technology adds a clear social dimension to the city. The general perception of the city is thus one of a socio-technical system.

The project also works with an open system principle. This allows for smart technology to generate shared resources in terms of data and avoids dependency on a single major tech-company. This indicates a strong awareness of the risk of corporatization in the city, and a standpoint taking the side of the public and their right to the city (Gate 21, 2020c, L. Kelstrup 2020, personal communication, 15. December).

NEMO

The NEMO application states that transport is generally in progress towards a more safe and sustainable system. The change is driven by a combination of socio-economic trends in the cities, technological innovation, novel business models, and cooperation across nations. The new system that is set out to achieve sustainable transport inevitably includes digitization and infrastructure connectivity and upgrades. With a focus on regulatory and socio-economic aspects, one of the project's main outcomes is a comprehensive collection of data on noise and air pollution from the vehicle fleet in Europe. This big data, it is stated, can be utilized to control the traffic stream and via machine learning, can objectively pinpoint outliers such as highly polluting vehicles, enabling control and regulation on the field of urban pollution from traffic (NEMO, 2020).

This suggests a view of the city as a socio-technical system that can be quantified to an extent where the system becomes fully controllable and operable through a central data platform. Data is perceived as a scientific, and therefore objective, basis on which the city can be managed. If only the activity that goes on in the city, including traffic energy flows, waste handling, economic activities, environmental conditions and so on, can be made visible and knowable, good cities can be created. Thus, the perception of the city is at the far end of the dashboard conception of a city as a technical system that is to be controlled with the main objective of efficiency.

In summary, the perception of the city differs across the projects and cannot be directly fit into the categorization of the theoretical framework distinguishing between Dashboard, Platform and Empowerment Urbanism. However, the technical aspects of a city are almost exclusively in focus in

NEMO developing smart technology with the aim of massive replication in European cities. The focus is on a seamless technological solution to pollution challenges. In fact, a stated objective is to integrate technology into the urban fabric in a way where the public is affected as little as possible. The perception of the city in NEMO is at the far end of the spectrum, with a singular focus on physical infrastructure and efficient control of traffic and subsequent pollution. The human dimensions of urban areas are to some extent included in FIMO where demonstration projects take their starting point in local geography and local demands. As FIMO consists of many demonstration projects, the perception of the city in FIMO cannot be pinpointed easily, but differs amongst the demonstration projects. On the one hand, a city perception of dashboard urbanism is prominent in for example the demonstration project in Lund, focusing on "hardware" aspects of mobility. On the other hand, the city perception gets closer to empowerment urbanism in the demonstration projects in Horslunde, where they are mainly based on the community and their existing interests and emphasis on green transitions and sustainability. Of the three projects, DIANA most explicitly takes the social dimension of the city and of smart urbanism development into account. The project deploys smart technology as a tool for sustainable energy consumption, but the project's focus is on the community's deployment and utilization of the technologies. Thus, the city and the management hereof are approached from the perspective of the public that is living and working within the smart environments.

4.2.2 Perception of the public

This section describes the perception of the public as defined by each of the three projects. As with the perception of the city the projects are assessed through the lens of the distinguishments made in the theoretical framework.

FIMO

According to the project webpage (Gate 21, 2020b), the actors in the project are municipalities and experts. This indicates a limited involvement of public stakeholders from the beginning. But as mentioned, the project consists of many demonstration projects and the perception and the role of the public differs amongst them.

The public is very scarcely mentioned in the descriptions of the demonstration projects. In the demonstration projects in Køge and Glostrup, the aim is to create an existing urban district and provide different mobility options. This leaves the public highly passive and as someone to be provided for. Similar is the demonstration project in the Capital Region of Copenhagen, where the aim is to provide better services for travelers through intelligent real time traffic information, which is thought to increase road capacity. As stated, this will lead the public to experience an increased level of service. In Lund, one of the main objectives is to foster a positive attitude amongst the public towards planned building activities. This implies a perception of the public as someone to be convinced that the development planned at city authority level is the best, and not to participate in the decisions around the direction of development. Compliance with future mobility options is also central in Lund and it is

stated that a consultant will perform an investigation of this, including a workshop, bringing together different stakeholders. Who these stakeholders might be is not stated, but it leaves room for a great deal of public involvement in defining the future development in the area of mobility in Lund. In Horslunde, a demonstration project seeks to explore the integration of different actors of mobility services. This can include both public transport companies, private actors, and community-based services, leaving substantial room for public involvement. As mentioned above, Horslunde is a strong and active existing community, so it might have been a more obvious choice to base projects off of community involvement.

It is also part of the overall project to explore the option of creating a living lab for future innovation in mobility. Again, it is not stated anywhere who should be invited to develop or participate in living lab activities. However, in a traditional understanding of a living lab (Edwards-Schachter et al., 2012), this might cultivate increased public involvement and provide an arena for the public to gain capacity to participate more directly in smart innovation processes - that is, to be empowered.

The perception of the public in FIMO thus varies substantially across the demonstration projects. However, mostly, the public is to be provided for, and where the descriptions leave room for potential public involvement or empowerment, it is rarely stated directly that this is an objective and who can be involved and how (Gate 21, 2020b, S. Poulsen 2020, personal communication, 11 December).

DIANA

The DIANA project works with the communication of data to motivate people to act, based on the information provided by it. This has included initial anthropological studies on which technical, data-based solutions for energy saving have been based.

The project has identified the target groups most motivated to work with data in the optimization of their work. For example, the project runs at two public schools. The managers or principles are not motivated to work with energy data as they have many other tasks to deal with. Thus, the project has chosen to focus on the technical operating personnel. The project aims to involve these personnel, increasing their motivation and their possibilities to act on the knowledge provided by smart data about the buildings.

For social housing, the challenge is that they have a lot of data on the energy consumption of each apartment, but people are more concerned with the risk of getting an extra bill than with the a-conto amount, or the overall energy consumption, and the consequences related to this. Thus, people in this case are not in the high end of techno-literacy or technical interest. The project then uses old-school letters to inform the residents about their consumption (retrieved from smart sensors) and how they can act to decrease it. In DIANA, there is an active involvement of the people working with the city systems. Rather than just providing data-based information on building operations, energy experts engage in dialogue with the technical personnel on how to utilize information. This is observed to be a more effective way to motivate and mobilize the use of smart data for sustainable operation of public buildings (Gate 21, 2020c, L. Kelstrup 2020, personal communication, 15).

Thus, in the definition of the overall objectives of the project and the smart solutions included, the public is passive. However, the specific groups of people working with the system operations on a daily basis are highly involved in the process concerning the utilization of the smart solutions. This positions the perception of the public as a combination of Dashboard Urbanism, in which the technical solutions are defined and deployed, and Empowerment Urbanism, in which the people that operate the smart systems are trained and given increased capacity to manage them. (Gate 21, 2020c, L. Kelstrup 2020, personal communication, 15. December).

NEMO

As mentioned, Gate 21 is responsible for the work package for communication and dissemination of NEMO. The main objective of this work package is to foster and increase "*stakeholders' awareness, stimulate acceptance and foster replication of NEMO services*" (NEMO, 2019). In the beginning of the project, Gate 21 must prepare a plan for communication and dissemination. First, the plan must include identification and thorough assessment of the key stakeholders of the project, in NEMO termed the *target audience*. Second, a set of key messages must be defined, ensuring clear storytelling about the project; further, those key messages must be received and perceived by the stakeholders. The public is defined as a central stakeholder. Third and finally, the plan must include definitions of planned activities, which format they will take, and through which channels they will be published, in relation to the main objectives of awareness, acceptance, and replication. In terms of dissemination, the work package includes a point for public dissemination, still with the main aim of awareness and acceptance. It focuses on the distribution of information about the project objectives and progress through social media, infographics, audiovisual contents, TV interviews, and press and news releases. Special dissemination efforts are made to inform a defined stakeholder group about the project. The collection of feedback from stakeholders, including the public, is emphasized and marked as essential, but only for assessing effectiveness of dissemination, and thus for awareness and acceptance.

In conclusion, the effectiveness and the subsequent impacts facilitated through dissemination are assessed through a Community Engagement Index system. The index measures actual engagement with published project content in terms of interactions between online content and stakeholders. Converted to an aggregated Project Engagement Index, this forms the basis on which the success of the dissemination is defined.

The perception of the public in NEMO is, like the perception of the city, a highly technocratic one. As is emphasized in the defined dissemination objectives of NEMO, the main aim is to ensure, first of all, that the public and other relevant stakeholders are aware of the project's existence and its claimed potential. Its second aim is that they accept the proposed technological solutions and the societal consequences that follow. The public has remained excluded throughout the definition of project objectives as well as the approach taken towards these.

The public is included in the project in the form of online content, which provides information on project progress, outcomes, and potential, and which one can chose to interact with, for example, through social media. One of the criteria for successful dissemination is the extent of stakeholder engagement

with the published online content While it does not take into account the substance of integration with the project content, but merely the magnitude of interation or engagement, it still implies some importance of public opinion. Even though NEMO encourages the public to engage in the discussion around the new technologies, the public is nowhere given increased capacity to influence the project objective or approaches (NEMO, 2019).

In summary, all three projects deploy a relatively technocratic approach to the public. Mostly, the technological solutions do not include the public and public involvement does not occur in the development of project objectives or approaches. As with the perception of the city, there are elements of all forms of smart urbanism in terms of the public perception in the projects. Again, NEMO, is more or less exclusively Dashboard Urbanism, when it comes to perception of the public. The public has no influence on project objectives or the project process. In FIMO, the public perception varies along with the perception of the city, from highly bureaucratic demonstration projects in for example Køge, Glostrup, and Lund, to a high degree of public empowerment in Horslunde. In DIANA, the users of smart technology are in focus, however, the technology deployed and the opportunities it brings are still provided from the top. The public or the technical personnel are not involved in project objectives but are to some extent empowered in the operation of the smart systems.

Table 2 summarizes the perception of the city and of the public as well as the central methods deployed in each of the three projects. The descriptions of the organization's and the projects' perception of the city and the public positions them mainly within the Dashboard form of smart urbanism. The city is a socio-technical system that can be operated more or less efficiently. Efficiency is viewed as the key to good and sustainable cities, ensuring the best urban living environment for the public and allowing time and resources for other purposes (or for the mere purpose of reducing resource consumption). From an overall perspective, the public is someone to plan and provide for, not to plan with. Smart urbanism solutions are not, with few exceptions, such as the Horslunde use-case in FIMO, initiated by the public and do not hold any advancement for the public's capacity to set the agenda for smart development or to drive smart initiatives towards publicly shared goals.

However, as city authorities are politically driven, and formed through representative democracy, they represent the public. With all project development in Gate 21 taking its starting point in the needs expressed by city authorities, one must assume that these are the needs expressed by the public. With public knowledge, needs and wishes going through several links, the sufficiency with which city authorities can properly represent the true needs of the public and ensure that no essential points are lost on the way, can be questioned. However, the city authority's ability to be the voice of the public in these triple helix models of innovation is beyond the scope of this project.

Project objectives are highly based on the demand expressed from city authorities. So, the public involvement in defining the problems and objectives of urban development can take place here. The question is then, do the municipalities include the public in the visioning of the future urban environment and do they ensure that solutions are based on critical challenges as experienced by the public, rather than on the options provided by current technological solutions.

Table 2 Summary of perception of the city and the public and the methods applied in a few selected smart urbanism projects in Gate 21

Form of smart urbanism	Perception of the city	Perception of the public	Methods
FIMO	A neutral environment, for which generic solutions can be developed and applied.	Passive in the project objectives. However, for some of the demonstration projects, the public plays a key role in the project process and in its operation.	Triple helix innovation forum, demonstration projects, anthropological studies.
DIANA	A socio-technical system with a dual focus on buildings and human behavior.	Passive in the project objectives. However, specific groups are highly activated in the operation of the smart solutions. The main aim is to motivate specific groups to engage more in the information provided by smart solutions.	Anthropological studies, dialogue with technical personnel.
NEMO	A technical system to be managed, controlled and regulated as efficiently as possible to ensure high environmental quality. Smart digital solutions are perceived as an objective approach, ensuring scientific, just, and unbiased urban management.	Passive in the project objectives as well as the project process. They are someone to plan *for.* The main aim is to ensure awareness and acceptance through information and interaction with online content.	Online communication, social media, demonstration projects, scientific tests, and reports.

Smart urbanism is also seen as a marketing opportunity in the overall perspective of the organization as well as in several individual projects. Digital urban solutions deployed in Denmark can position the country as a front-runner and boost the global opportunities for Danish companies in promoting their solutions on a growing international market for smart urbanism (Gate 21, 2020). The objectives of smart urbanism as a crucial factor in sustainable urban development, as described above, are defined by the actors within the smart urbanism agenda, namely city authorities, private corporations, and knowledge institutions. The public thus remains passive in the definition.

Even though the main image of Gate 21's project portfolio within smart urbanism is centered around Dashboard urbanism, some of the practices in the organization have potential for increased public empowerment. The analysis now turns to the future potential for Gate 21 to cultivate public empowerment in their smart urbanism projects through existing practices as well as alternative ones.

4.3 POTENTIALS AND CHALLENGES FOR PUBLIC EMPOWERMENT IN GATE 21

The intervention with project managers of smart urbanism projects in Gate 21 revolved around the potentials for increased empowerment in project processes. The discussion took its start in the existing practices of the organization and the potential for these to cultivate further public empowerment. Towards the end, it turned towards alternative methods for a strengthened public empowerment aspect in Gate 21 in the future. The main points from the intervention are summarized in the following sections.

4.3.1 Demonstration as a starting point for qualified conversations

Demonstrations are often a part of smart urbanism projects in Gate 21. But, as one project manager observes, often demonstration projects are carried out and then nothing more happens. For example, an app for cyclists to navigate urban areas full of construction work is currently being tested with the public. Gate 21 also wants to flaunt their focus on scaling and replication. The demonstration projects that have been successful must not die but be disseminated for others to harvest the benefits. Currently, Gate 21 works on scaling projects concerned with the optimization of land use and road capacities.

Demonstration projects can be good for testing technology under real circumstances and for uncovering the needs or desires of the public. As a solution is tested in real life, the public can react on the outcomes of a potential implementation of a solution in an experimental environment, that is, before solutions are scaled or replicated. Thus, demonstration projects can give the public the opportunity to direct the development towards the tested solutions, or away from it, through their reactions towards a specific solution in a specific context. This might also make it easier for the public

to engage in qualified conversations about future development: which smart solutions to carry on with and which to discard.

Demonstration projects can also serve as a strong communication means. The overwhelming and sometimes intangible consequences of smart urbanism solutions can be frightening. Fear of surveillance and data security is something that project managers in Gate 21 are often met with from the public. Hence, the starting point for smart urbanism initiatives should be to inform and educate the public in terms of the possibilities that a certain technology can bring. Subsequently, it is easier to involve the public in the application of technology: whether it is needed or wanted, what to use it for, how to use it, and which restrictions to set up. But first, the black box of some smart technology must be demystified. Demonstration projects can be valuable in this case.

4.3.2 Living labs – commercial demonstration or public empowerment?

Living Labs are a major part of the methodological approach in Gate 21. It started out with DOLL (Danish Outdoor Living Lab), which is a big site in a suburban industrial area outside Copenhagen where innovative outdoor lighting and smart urbanism solutions can be tested and demonstrated at full scale. It gives municipalities and urban developers the opportunity to search the market and gain oversight of potential solutions for smart lighting or other areas before they invest.

After DOLL became a success, several other areas in the organization have adopted the living lab strategy. This includes the Silent City Living Lab, in which a number of municipalities, who share major concerns and issues around traffic noise, have come together to test and demonstrate potential solutions in real life and to share knowledge and experiences.

However, these forms of living labs seem to serve more as commercial demonstration sites than living labs, inviting everyone to participate and be a part of experimenting future solutions. It is acknowledged in the organization that it is essential for the living labs to invite the public to participate. It is, for some project managers, perceived as essential to bring the public to a more central position concerning the living labs. For example, when testing autonomous vehicles, the experiment relies on 500 dedicated test persons from the public. It is not the public who defines the idea, the technology, or the setup in the first place, but they are a crucial part of the project setup; and in line with the individual demonstration projects, the public is invited into the project machinery, where they can voice their opinions and learn about and be prepared for a qualified discussion on the further development.

Taking the living lab principle further towards an understanding of a living lab, which is open to everyone who wants to participate and experiment with future solutions to urban challenges, could be interesting for Gate 21. One project manager expresses interest in creating a living lab, taking form more as an open playground, for everyone to play around and to set direction and define which types of, for example, mobility solutions should be a part of the future city. It could also be relevant for subjects such as micro mobility.

However, the public empowerment approach has quite clear limits, and is not an option for all fields. One project manager brought up the example of MaaS (Mobility as a service). This topic is not perceived as suited for too much public participation and must be controlled mostly in a top-down approach. But already, when MaaS is defined as something that must be implemented, the public empowerment is already very weak and limited to only public acceptance.

Project managers participating in the interventions are highly aware of the potential corporatization of smart urbanism development. One stresses the experience of international Smart City conferences, where major tech companies compete for market shares and promote their projects under the cover of urban ideals of livability and sustainability. Urban authorities then try to navigate within this market-driven field where they are completely reliant on the tech manufacturers, their products, and their development.

So, a living lab approach cultivating more public empowerment is relevant for Gate 21. However, concrete public involvement remains a municipal task and thus one link away from Gate 21.

4.3.3 Work distribution between Gate 21 and the municipalities

Bringing together different municipalities in knowledge and experience sharing networks is a core objective for Gate 21. As many public servants in the municipalities are often alone in their field, they want to spar and work together with other municipal experts in their field. Further, Gate 21 works with competence development within the municipalities.

The municipalities represent the public. Thus, they are the ones to attend to and manage the wishes of the public. Assuming that the municipalities perform well on this task, and with Gate 21 taking their starting point in the demands of the municipalities, the risk of being out of sync with the public should not be relevant.

The direct involvement of the public is the responsibility of the municipalities and not Gate 21. There is no clear public empowerment aspect in the tasks of Gate 21 and there never has been. The municipalities are the connecting link. That being said, a stronger aspect of public empowerment is thought to be relevant for Gate 21. However, the path goes through the municipalities and other partners of Gate 21.

In the field of smart urbanism, it is also stressed that the complexity of many projects can make it difficult to fully involve the public. However, the involvement of organized public groups, public representatives, or grassroot organizations could be relevant. This could be a way for Gate 21 to engage more with the public and cultivate public empowerment in smart urbanism development.

The potential of starting a project with a highly governed approach and over time merging it into publicly managed projects was also brought up. This has for example been the case with some of the fab labs that have emerged through the municipalities within the last decade. Having started as

municipal initiatives, which were facilitated and financially supported by the municipality, they were gradually handed over to the public to the point that they are now more or less publicly managed. This could potentially be an approach for both municipalities and for Gate 21 to apply more.

4.3.4 Alternative practices for strengthened public empowerment

In bringing up alternative methods for more public empowerment in Gate 21's projects, project managers were hesitant. A few points were made, even though they did not move much beyond what has already been done, or is being done, in the organization already.

Hackathons, such as the ones presented in the Open4Citizens project mentioned earlier, were touched upon. However, project managers participating in the intervention did not see a relevance for the hackathon approach as it, in their view, is restricted to include young tech-people and therefore cannot have a public aspect. The challenge is that if the topics of a hackathon are not very narrowly defined, they are not useful. And in order to bring together a broad crowd, including the public or public representatives, one must ask very broad questions.

The SPRINT method was also brought up as an alternative method for more public involvement. The SPRINT approach is a part of the design thinking methodology. It is a structured format of co-creation, where the development process is frequently opened up for consultation with a broader crowd. The approach is, to some extent, similar to that of a public hackathon.

Once before Gate 21 has facilitated a large public meeting. The public meeting revolved around the issue of traffic noise and invited in both experts from the private sector, researchers on the topic, politicians, public servants, and the public. Public meetings of this magnitude on a specific topic, which by all accounts concerns the public, based on the large attendance, can have major effects. It can create media attention and put a topic on the political agenda and be a forum for the public to voice their opinions, as individuals or as a part of public organizations. Debates that do not only include experts, but also public stakeholders and citizens living in the noise or in the smart city, can be a strong means for political attention and for achieving the public capacity to affect the agenda. This is especially the case with the amount of support and turnout that this event received. The facilitation of such events is one of Gate 21's core competences and holds the potential to strengthen public empowerment. However, it is not a big part of the portfolio at Gate 21; and despite the big success of the public meeting about traffic noise, nothing similar has been repeated. The facilitation of such a large event requires a lot of resources, and it has therefore not been prioritized in the organization. However, the format is still on the agenda for the future activities of the organization.

4.3.5 The challenge of public involvement

Some of the challenges pointed out in the theoretical framework around smart urbanism were also confirmed in the intervention. First, smart urbanism projects are often complex and technically advanced. High technical complexity makes it difficult to properly involve the public as a broad crowd.

Often, the problem with traditional public involvement is that it is the same narrow crowd that turns up for public meetings, especially on broad questions on urban development. The issues must be framed to be relevant to the public of concern, and then the empowerment approach can be chosen . When involving the public in development projects, it is essential to be specific in terms of field and scope of the project and it is mistaken to believe that public empowerment can be a successful approach in all fields of smart urbanism. That being said, there is room for improvement, and it is equally important to be aware and alert, making sure development does not take a direction, which the public does not support.

Also, the political and financial scope of action is not infinite. If this was the case, context specific, publicly driven development, based on a full public empowerment strategy, could be the relevant approach. However, this is not the case. Projects must prioritize and find a balance between public involvement and meeting project objectives.

Finally, digitalization and smart urbanism is often about efficiency, saving resources, and optimizing operation. These fields are thought not to be suitable for a public empowerment approach. This resembles exactly the paradox of the conceptualization of smart urbanism that claims it can do both.

In conclusion, there are several of the existing practices of Gate 21, currently operating at a level of very limited public involvement, that hold the potential to drive an enhancement of public empowerment in smart urbanism projects. It seems that there is a positive attitude towards strengthening public empowerment in smart urbanism projects as well as a highly developed awareness of the necessity of a strong social dimension if projects are to become successful, scalable and replicable. However, restrictive convictions, and not at all irrelevant ones, mainly around public empowerment, are outside the scope of the projects of Gate 21. The examples presented, and to some extent also the potentials discussed, are still limited to public involvement to an extent where it is concerned with the finetuning of already defined project objectives for optimized value creation and easy acceptance. Thus, the "*capacity of actors to mobilize resources and institutions to achieve a goal*" (Avelino, 2017, p. 507) or the capability endowment to establish a direction for and drive development towards a certain goal (Hölscher et al. 2018), remains limited.

5 DISCUSSION

The analysis above showed that Gate 21 holds both potential, and to some extent willingness to work towards, increased public empowerment in smart urbanism projects. A few points generated in the case studies and the intervention calls for further discussion and reflection. This section returns to questions about public empowerment as an idealistic approach to urban development, to understandings of democracy and the effects on public empowerment, and to the cause of sustainability.

5.1 IDEALISM AND PUBLIC EMPOWERMENT THROUGH SMART URBANISM

Sometimes smart urbanism is criticized for being an utopian idea without foundation in reality (Kitchin, 2014). It follows that many smart urbanism projects lack a social dimension and that technology-centered projects cannot be successful as long as the public is passive. This critique calls for increased public participation in smart urbanism projects and ultimately empowerment. But in a society that consists of many people, public participation and empowerment can be difficult in practice; and it even may not always be desirable. This dilemma is well explained by Hardin (1968) in his 'The Tragedy of the Commons'.

A commons is a resource collectively owned and shared by a community. Common goods are, within economic theory defined as goods that are non-excludable, but rivalrous (Murphy & Parkey, 2016). In other words, common goods are freely available to all (shared), but the consumption of it by one individual might reduce the value of the good for others. A city can be framed as a commons through its public nature, freely available to all, and its vulnerability for rivalry (Foster & Iaione, 2016) in terms of congestion and potential for environmental degradation by pollution. The more people that use the city the greater the extent of the classic urban issues, such as traffic or waste generation, becomes.

The commons as a basis for a form of managing strategy has received extensive amounts of critique. The tragedy of the commons tells the story of the inevitable failure of collective action around a common pool resource based on economic behavioral theory. Hardin (1968) illustrated this mechanism by depicting two herdsmen sharing a common field, in which they both have free, unlimited access. In self-interest, the herdsmen continue to add cattle to the field, since it will provide individual profit, until the field suffers substantially from overgrazing and the profit for all will go to zero. The rationale behind their action is that they will gain the full (short term) benefit of the extra cattle, but only suffer a partial cost, since the field is a shared common. The same tragedy is at play in environmental issues. Environmental goods are often of the common good category, and as long as the rational man finds

that his share of the short-term costs is less than the benefits, he will continue to pollute (Hardin, 1968). A similar critical viewpoint of the commons is the concept of the prisoner's dilemma, which similarly assumes that human self-interest will lead to free riding in a commons-based management of resources (Tucker, 2011).

With the prospect of the tragic destruction and degradation of the commons the critics mainly call for privatization or centralization. Adding to the simple definition of the commons to be a resource collectively owned by and freely available to a community, the control of the resource by the community through regulations on access and exploitation, securing the maintenance of quality and sustainable use of the resource (Morelli et al, 2017), is an important aspect. Thus, the commons framework implies a "for the people, by the people" approach and thus a great deal of public empowerment in urban governance.

On the Opposing side of Hardin is Ostrom, arguing that it is possible to manage common resources through principles resembling public empowerment. Ostroms (1990) analysis on governing the commons presents a methodology for managing the commons, while avoiding the tragedy. Ostrom thus provides a set of principles which enables collective management of common pool resources, which provides individual value while ensuring sustainable usage. Central to her arguments are institutional and organizational arrangements in which the commoners can communicate and reach solutions through which they can escape the tragedy. A group of 'appropriators' (individuals who depends on or extract benefits from a specific shared resource) "are jointly affected by almost everything they do" (Ostrom, 1990, p. 38), hence, they are interdependent. If they act independently within such a joint system, their net gain will most likely be lower, than that if they somehow coordinate their actions around the common resource, and in the worst case, independent action might entirely destroy the shared resource and net gains will go to zero, as in Hardin's metaphor of the herds (Hardin, 1968). Organization of some form of collective action around a common resource, however, will lead to higher joint returns. And in contrast to the prisoners, in the prisoner's dilemma, the appropriators of a common resource are not cut off from communication. A set of design principles, which is derived through the analysis of cases where common resources are successfully comanaged by a self-organized community. The deign principles includes 'Clearly defined boundaries', 'Congruence between appropriation and provision rules and local conditions', 'Collective-choice arrangements', 'Monitoring', 'Graduated sanctions', 'Conflict-resolution mechanisms' and 'Minimal recognition of rights to organize' (Ostrom 1990, p. 90).

In extensive research on the city as a commons, Foster & Iaione (2019) sets up five key principles for working with urban commons, which jumps off Ostrom's principles on successfully governing the commons, but are adapted to a city context. The principles include collective governance, an enabling state, social and economic pooling, experimentalism and tech justice. This means deploying a multi-stakeholder engagement principle, where different actors are actively participating throughout the management process. It is observed that the urban commons management strategies highly benefit

from cooperation between a broad field of commons-minded actors. This includes community members, knowledge institutions and civil society organizations as well as city authorities or the state in a collective governance format, where authorities plays the role of the enabler (Foster & Iaione, 2019). Thus, core to the professional planning practice becomes enabling of cooperation across a diverse field of stakeholders. This form of collaborative management of urban development resembles the quadruple helix approach and open innovation, where the public is invited to the table, deployed as a strategy for driving and adopting innovative solutions (European Commision, 2019). However, where the open innovation approach has a clear focus on the corporate part of the helix, with strong emphasis on economic impact, and growth, the commons approach focuses on democracy and identification of shared interests and values. Elements of the quadruple helix model remain relevant as it invites civil society into the circle in which management, planning and development of common resources are discussed.

In relation to public empowerment in smart urbanism this discussion is highly relevant. In the interviews with project managers in Gate 21, the argument often fell on how difficult it can be to involve and empower the public in smart urbanism projects. The projects are often technically complex, making meaningful public participation close to impossible. If this is the case, public empowerment might not even be desirable. In terms of achieving sustainability, technocratic smart urbanism initiatives might be desirable, avoiding the tragedy of the commons, which has left urban areas in poor environmental condition so far, and which might also be a main contributor to the climate crisis the world finds itself in.

This discussion makes one question whether public empowerment in smart urbanism projects is an idealistic thought, that cannot be applied in practice. And for cities to move towards sustainability, the requirements for public participation might slow the process further down, to a pace where the climate crises can no longer be suppressed. On the other hand, if public empowerment is a prerequisite for sustainable transitions in the cities, as some literature suggests, it is the fastest, and the only way to go forward. Further, for smart technology to cultivate public empowerment, it requires open data politics. Open data must be treated as a common for everyone to potentially harvest the benefits of it. But who is likely to engage with such data or technology? One concern is that the data accessibility will be mostly to the advantage of the already powerful groups of the public, the creative class (Florida, 2004).

5.2 DEMOCRACY AND PUBLIC EMPOWERMENT THROUGH SMART URBANISM

An alternative perspective, from which to look at public empowerment in smart urbanism is from that of democracy. Boni et. Al (2019) outlines four ways of cultivating public empowerment (deepening democracy) through participatory smart urbanism initiatives, what they term Digital Grassroot Innovations (DGIs). First, public empowerment can be cultivated by strengthening civil society. Here,

the role of the public is to be guardians of urban development. Strengthening the civil society is to enhance their capacity to mobilize and control government, to monitor and to ensure they meet demands. This requires a focus on transparency and responsiveness in governance and a strong and knowledgeable public. This relates well to a representative democracy. Putting Public accountability at the center of democracy, Smith & Stirling (2017) defines democracy as "*access by the least powerful to the capacities for challenging power*" (Smith & Stirling, 2017). In a smart urbanism perspective, strengthening civil society means open access principles concerning smart data. Second, public empowerment can be cultivated through co-governance. This relates to a more direct participatory understanding of democracy. Here the public holds capacity to directly engage with city authorities concerning decisions around public policy. Third, and in a radical perspective of democracy, public empowerment can be cultivated through self-organization and positions all decision-making with the public and away from city authorities. An example of radical self-organization is community currencies such as timebanks. It focuses on trust among people within a community and community currencies has been observed to enhance social cohesion and foster empowered and active citizens (Kwon et al., 2019). Last, public empowerment can be cultivated through deliberation. This perspective of democracy focuses on dialogue and discussion amongst the public and through deliberation common concerns are solved. In smart urbanism terms, this could for example be enhanced digital communication services, ensuring equal information and flattening power distribution.

This is not to provide I different framework for public empowerment in smart urbanism. It is to add a dimension concerning democratic understanding in continuation of discussions around feasibility, efficiency and desirability of public empowerment in smart urbanism. If democracy is the way we distribute power in practice, the understanding of democracy must affect how we understand empowerment and with whom the interest of the public lies. In a representative democracy, like the one we have in Denmark, on a local scale, the municipal politicians are the ones who attends to and represent the concerns of the public. On the same note, it cannot be the responsibility of Gate 21 to ensure public empowerment in smart urbanism projects, especially not since the municipalities are usually involved themselves. This seems to be the general standpoint of Gate 21 in practice. And this might be a fair standpoint as they have never stated directly that public empowerment is an objective of theirs. However, they do claim that their smart urbanism projects create good cities for people, and they tap into the general discourse of smart urbanism which claims to hold the dualism of technology-based development and public empowerment. And the question is then, if an organization can buy into the smart urbanism paradigm, making it a focus area and a core part of the business model and at the same time deny responsibility for public empowerment.

5.3 SUSTAINABILITY AND PUBLIC EMPOWERMENT THROUGH SMART URBANISM

What they do claim to cultivate is sustainable development. The main focus is on relieving the climate crisis and ensuring environmental quality. This is relevant in the discussion of smart urbanism and public empowerment in Gate 21. It poses the question: what is the cause for deploying smart technology? It can be many things. It can be for environmental protection, for promoting circular or sharing economies, it can be in caring for a community, and it can be for the smart technology itself. And the cause might differ, depending on perspective. For the giant tech company, it might be about profit, for the municipality it might be about efficiency and sustainable development and for the individual it might be about life quality, physically and mentally, for ourselves and for future generations.

Whether a smart city is a good city can be questioned. But sustainability is compulsory. We need to find ways to make urban life less harmful for the environment and for the global climate. Stirling (2020) calls for a "*shifts from 'technocratic control' to 'caring struggle'*" if we are to solve the climate and environmental challenges. It is argued that, even though technological development is prioritized with the best intentions of controlling the climate and environment, technological solutions should not be central. They are "*top-down power-concentrating vision aiming to stabilize planetary conditions through global regulatory control based on technical elite science and blinkered quantitative modelling*". This refers back to the idea of the climate, the environment, cities and people as something that can be controlled. In the technocratic quest for sustainability, the public is perceived more as a target group for nudging or behavioral changes, that as actors of intrinsic rights. And, Stirling continues, environmental improvements and relieving climate change, happens to a greater extent through political values, than through technical expertise. Science and engineering has an important role to play, but is secondary to cultural and political values generated elsewhere (Stirling, 2020).

Returning to questions of democracy and sustainability, there might still be a tension between the two. As Hardin's tragedy of the commons, and renowned scientist Lovelock argues that democracy or public empowerment as a strategic management approach, is an obstacle to achieve sustainability, making democracy the problem rather than the solution. However, strong opposers such as Stirling (2020) or Willis (2019) continuously draw in the opposite direction. Stirling suggesting multicriteria mapping approaches and a focus on cultural and political values rather than technical solutions to solving the climate crisis. Willis points to approaches such as Citizen assemblies and deliberative workshops and argues that undemocratic (technocratic) approaches are unrealistic approaches. Thus, to deepen democracy or to empower the public, in any way suitable is a prerequisite for making sustainable progress.

6 CONCLUSION

Smart urbanism is at its core about deploying digital technologies in the urban fabric, management and operation, with the aim of increasing efficiency. Smart urbanism has received much critique for being a technocratic form of urban governance, targeting only symptoms of the deeper lying wicked problems of urban development. Further, a strong social dimension and the involvement of the public throughout urban, planning, development, and operation, is said to be critical for change to occur as cities strive for crucial sustainable development. As a response to some of this critique, many corporate and governmental entities have included a focus on the more social dimension of urban development in their narratives around smart urbanism, now holding a dual promise of efficiency and public empowerment by means of digital technology.

In several Smart Urbanism projects, the promise of public empowerment remains unfulfilled. To a large extent, this is also the case in the organization Gate 21. With a focus area dedicated to Smart Urbanism, as well as several smart projects dispersed around the organization, Gate 21 holds the potential for public empowerment to gain ground in the increasingly smart environment in cities. In this thesis, three projects in Gate 21 has been analyzed in terms of their perception of the city and of the public. This positions Gate 21 within a framework of Smart Urbanism including elements of Dashboard, Platform, and Empowerment Urbanism. While the projects hold elements, which could cultivate public empowerment, they lack overall strategic elements intentionally working to promote public empowerment. Gate 21 still holds potential to strengthen public empowerment and gain stronger basis for durable changes well-anchored with the public and increase the chances of sustainable transitions to happen and persist. Current practices include living labs, demonstration projects and development workshops, which in theory could be suitable arenas for stronger public empowerment. The organization sees potential in strengthening the public dimension in these practices, however, they remain hesitant, due to especially two reasons: Strong public involvement in technically complex projects is challenging, and outcomes of for example demonstration projects or workshop do not necessarily benefit from extensive public involvement. Further, Gate 21 works as a partner organization with the demands from the municipalities as a driving factor for project development. There is a strong culture of triple helix innovation, including municipalities, private corporations and knowledge institutions. The responsibility for public involvement and empowerment is thought to reside with the municipalities, as they represent the public in our representative democracy.

Finally, public empowerment in Smart Urbanism projects is discussed in relation to idealism, understandings and deepening of democracy, and to sustainability. There can be challenges of finding a balance where public empowerment is at the core of smart urban development, while sufficiently reaching for sustainable cities.

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