How do Strategy and Governance affect Citizen Engagement in Urban Platforms?

A multiple-case study among European Urban Platforms

Master Thesis in Business Information Management

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Preface

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Acknowledgements

Executive Summary

Technology is continually developing and altering the way we live our lives. The influence of technology on urban development is no exception to this. It is expected that 70 percent of the world's population will reside in cities by 2050 and as such it is necessary for cities to be able to accommodate this rising population (BSI, 2014). One way in which this population can be accommodated is through smart city projects aimed at improving the city, or the lives of its inhabitants. Research has indicated that there are clear benefits to engaging citizens and that this engagement forms a key success factor in the development of both solutions as well as business models (EIP-SCC, 2016b). However, when the EIP-SCC (2016b) studied a number of cases they found that even smart cities that claimed they had a highly participatory inclusion of citizens were not really involving them. The rise of a new concept, the urban platform, allows for direct engagement between representatives of the city and its inhabitants.

This thesis thus works towards identifying what leads to citizen engagement in these urban platforms. There is a vast body of research on the characteristics of smart cities where the people and their engagement is seen as a fundamental component (Nam and Pardo, 2011). Despite this, in smart city projects in practice it was found that poorly executed citizen engagement actually had adverse effects (EIP-SCC, 2016b). As such, the main research objective is to understand what led to these project owners engaging, or not engaging, with their citizens. Taking predominant literature from Tiwana (2013) into account and combining it with research regarding citizen engagement and smart cities will allow for an initial framework to be established with the concepts that lead to citizen engagement from the perspective of a platform owner (Yang and Callahan, 2007; Nam and Pardo, 2011). As the research by Tiwana (2013) is not entirely applicable, it will be appended by other literature regarding the creation of trust, smart city research regarding the formulation of the strategy and creation of trust, concerns of citizens in sharing their data with platforms and how these concerns can be mitigated. This will provide for a comprehensive conceptual framework that takes into account the concerns citizens might have and how these can be mitigated in an urban platform in order to stimulate citizen engagement.

Through a questionnaire, descriptive statistics will be provided that present an overview of the development of urban data platforms across the EU. Then, a more in-depth multiple-case study will be performed that involves three platforms from the questionnaire, and two platforms that were identified by the EIP-SCC (2016a) as best practice solutions regarding the development of smart platforms. This will allow into for insights into the approaches these platforms have taken and the approaches from the best practice solutions can be looked at to see where they differ from the other platforms. Based on the questionnaire and case study the following findings resulted:

There are large differences in how far into development the urban platforms are. This has led to a number of the urban platforms not having engaged their citizens yet as until this point it has only been planning or technical development in which the citizens themselves are unlikely to play a large role, despite the platforms recognizing the value of citizen engagement. It was also found that the governance aspects of Tiwana (2013) do not entirely apply to the concept of urban platforms as they had to be expanded from their original definition in order to apply for broader urban platforms in which there are no application developers, but would apply to the underlying data platforms. However, this still provided a valuable direction for further research through a revised conceptual framework.

Where the three cases that have a high citizen engagement largely differ with the two cases that had a low citizen engagement is that they have an active dialogue going on with the citizens where the citizens are made aware of what value the platforms has for them. Additionally, through co-creation workshops and other approaches that allow for active citizen participation, these citizens are co-developing the platform according to the most desired needs of the citizens which leads to the platform having desired functionality that will make citizens want to use the platform. Based on the findings from these cases and the reflection on the propositions drafted in the theory, a revised conceptual framework is proposed with indications for further research and which relations are interesting to study further based on the case findings.

Based on the findings, managerial recommendations are provided that allow urban platform owners to steer their activities towards citizen engagement and what to focus on when aiming to engage citizens. In general, it is advised to generate trust with your citizens by engaging in an active dialogue, by including the engaged citizens in the development of your platform and by providing a transparency dashboard for not so engaged citizens to keep up with your activities.

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1 Introduction

Technology is continually developing and altering the way we live our lives. The influence of technology on urban development is no exception to this. This rise of technology has led to a new term being coined - smart cities. But what exactly is a "Smart City"? The definition of this term differs depending on who is asked. Answers include broad definitions given by the United Kingdom Department for Business, Innovation and Skills who state that a smart city is a *process* in which increased citizen engagement, hard infrastructure, social capital and digital technologies make cities more live-able, resilient and better able to respond to challenges (CentreForCities, 2014). Other answers are driven by the usage of data to improve a city and yet others are driven by a focus on citizens, where citizens have all the information they need to make informed choices about their lifestyle, work and travel options. However, nearly all of these definitions have one thing in common, which is that data, gathered through the implementation of technology or sensors throughout the city, is used to somehow improve the city or the life of its inhabitants.

Currently, 53 percent of the total world's population resides in cities, a number which is estimated to grow to 70 percent by 2050 (ISO, 2014). To be able to accommodate this rising population, efficient city planning will be crucial. Various city indicators can be used as tools to help ensure policies are put into practice that promote "liveable, tolerant, inclusive, sustainable, resilient, economically attractive and prosperous cities globally" (CentreForCities, 2014). However, many different types of indicators and information about these indicators exist, making it difficult for city management to find the right set of indicators, especially due to the fact that cities are heterogeneous and complex (BSI, 2014). ISO 37120 establishes a globally standardized set of definitions and methodologies regarding city themes such as economy, energy and governance (ISO, 2014). This set of indicators can be used by any city, municipality or local government that aims to measure its performance in a comparable manner irrespective of size and location. Through the development of specific smart city projects, cities will be enabled to reach the objectives they have set for themselves according to their performance on the set of standardized indicators.

One such smart city project is the development of an *Urban Data Platform*. A data platform in general can be seen as a platform that provides a baseline model, paired with the required data, to build applications and services that can be interoperable (Techopedia, s.d.). An *urban* data platform is a more specific form of the data platform, where *city-related data* is provided to citizens and local businesses in order to leverage a sustainable urban policy (Wendt, 2018). This opens up new possibilities for connections that were previously not feasible. Public administration could improve performance management, companies active in the transport and energy sectors could develop smart services, IT companies could act as solution providers for the smart services and research partners

could promote innovation through the increased data that is provided on the platform (Wendt, 2018). Additionally, this urban data platform can have many potential benefits, such as increased efficiency through data-driven decision making, rather than decisions based on experience or gut feeling. It can also lead to new solutions to address existing problems. Finally, due to urbanization and digitization, there is a growing demand by citizens for new, digital, products and solutions that improve their quality of life. (Wendt, 2018)

An initial survey among European cities found that the vast majority actually did not have an urban platform, mostly due to the fact that the definition, and thus the potential use and value of the platform, is poorly understood (EIP-SCC, 2017). Additionally, there is a lack of funding, insufficient internal capabilities, legacy systems that prevent the development of urban (data) platforms and a lack of a business case that encourages working across different organizational silos.

The platform ecosystem

Within urban data platforms, an ecosystem of different stakeholders, each with their own needs, can be identified. In this subsection, the most relevant stakeholders within the ecosystem for the development of a Smart City Urban Data Platform will be explained in order to establish a general overview.

In the center of the ecosystem are the *Urban Data Platform Operator* and the *Data Trustee*. The Urban Data Platform Operator is responsible for maintaining and operating the platform itself and as such is connected to all other stakeholders within the ecosystem. The Data Trustee is the stakeholder responsible for offering efficiency, scalability, trust and security. Then, within the ecosystem, there are the *Data Providers* such as citizens and businesses who provide the data to the platform. Data providers can also further be split into individual providers and *Data Brokers* who gather large quantities of data with the intent of selling the data or to fulfill some objective. On the other end there are Data Users and App Developers that make use of the data in some way to provide information or develop new applications using the data gathered in the platform. This is then passed on to citizens or businesses who then fulfill the role of data and service users. As such, this platform is a two-sided network where citizens and businesses are both potentially the providers of the data and the users of the developments through this data. This ecosystem is drawn schematically in figure 1 on the following page. (van Oosterhout, 2018)
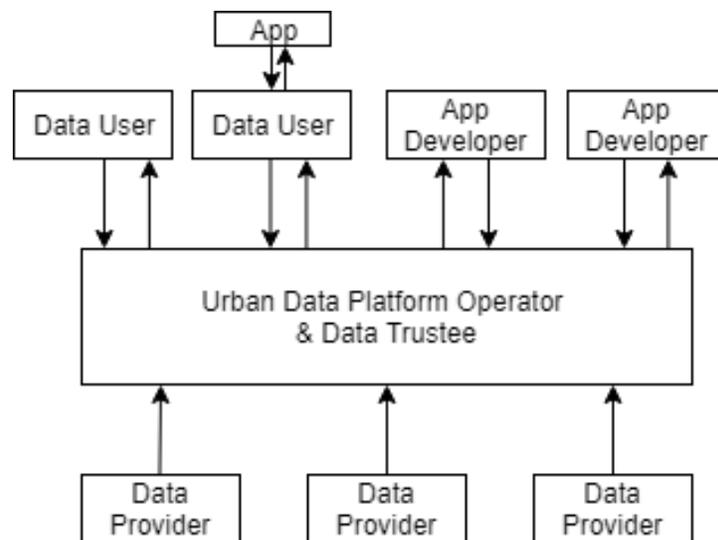
Figure 1: Urban Data Platform Ecosystem: A two-sided platform source: Van Oosterhout (2018).

The European Commission's European Innovation Partnership for Smart Cities & Communities (EIP-SCC), a major market undertaking directly supported by the European Commission, defines *city data* as "data that is held by any organisation - government, public sector, private sector or not-for-profit - which is providing a service of utility, or is occupying part of the city in a way that can be said to have a bearing on local populations and the functioning of that place" (EIP-SCC, 2017, p. 4). They further define an *urban platform* as the way of describing a logical city data architecture that brings together and integrates data flows within and across city systems in a way that exploits modern technologies (sensors, cloud services, mobile devices, analytics, social media etc) (EIP-SCC, 2017, p. 4). It is this type of urban platform that will form the unit of analysis in this thesis.

However, the data architecture that exploits these modern technologies is just the first step. This data architecture provides the building blocks that enable cities to include predictive effective operations and novel ways of engaging and serving city stakeholders, in order to "***transform, in a way that is tangible and measurable, outcomes at a local level (e.g. increase energy efficiency, reduce traffic congestions, create innovation ecosystems)***" (EIP-SCC, 2015, p. 2). As such, while the underlying data platform and its ecosystem form the core of an urban platform, the urban platform is much more than this. Serving different goals, extensions are built on top of the data platform in order to engage stakeholders in a manner that best fits the goals and the stakeholders that are to be engaged. As the end-users such as citizens are unlikely to get into contact with the data platform, in this thesis "urban platform" will also include platforms that are a result of these underlying data platforms, so long as these platforms are aimed towards improving the city. An example of this in practice is Barcelona's "Smart City 3.0" concept, which is an attempt to intimately link citizen participation with both government aims and new technologies (Urban-Hub, n.d.; EIP-SCC, 2016b). As part of this Smart City 3.0 concept, Decidim provides a platform for creating solutions through crowd-sourcing ideas and testing their viability (Urban-Hub, n.d.). Ideas that survive the test of collective intelligence can then be implemented by the city with popular support (Urban-Hub, n.d.).

The role of citizens

These urban platforms have the potential to significantly alter the lives of the inhabitants of the city the urban platform is being built for. But what should the role of the citizen be in the platform? The EIP-SCC has studied the role of citizens in smart city contexts. There is a vast amount of literature available on the benefits of participatory approaches to city design, yet there is no consensus on what exactly these benefits are (EIP-SCC, 2016b). This is a direct result of the fact that there is a lack of evidence of what works and what does not work in terms of engaging citizens (EIP-SCC, 2016b, p. 6). Many best practice cases analyzed claimed they had a highly participatory inclusion of citizens but when

studying them it turned out they were not really involving citizens. While at the same time there is clear evidence that the participation and engagement of citizens forms a key success factor in the development of both solutions as well as business models (EIP-SCC, 2016b). The EIP-SCC additionally states that citizen engagement leads to increased levels of trust (in institutions) next to increased tax revenue, increased efficiency of resources and better decision making through integrative planning processes (EIP-SCC, 2016b, p. 9). However, the EIP-SCC also found that engagement and participation activities which are poorly executed can actually generate harms or negative outcomes as unmet expectations can lead to cynicism and further disengagement (EIP-SCC, 2016b). This is what will be focused on in this thesis. Urban platforms will be studied as cases in order to gain insight into how they have engaged citizens in order to compare the cases to determine which parts worked and which parts did not. This will lead to fewer poorly executed engagement activities as the urban platforms gain a deeper understanding of which factors should be taken into account when engaging citizens.

2 Research objective and Research question

Building on the concerns raised by the EIP-SCC, in this thesis citizen engagement in urban platforms will be studied (EIP-SCC, 2016b). There is a vast body of research that has been conducted on the characteristics of smart cities and theoretical frameworks that assist in the establishment of smart cities. However, when looking specifically at citizen engagement in urban platforms research could not be found. Despite this, citizen engagement forms a key success factor in the development of solutions for your smart city, but poorly engaging your citizens can actually have adverse effects (EIP-SCC, 2016b). Cities have taken steps to engage citizens but it is not clear how these steps were determined and what the smart city project owners had in mind with these tactics of engaging citizens. As such, the main research objective in this thesis is to understand what led to these project owners engaging, or not engaging, with their citizens. However, rather than look at it from a general "smart city" perspective, this will be done by studying urban platforms as these platforms provide direct opportunities for the citizens to be engaged and they can directly contribute to the development of this platform.

Additionally, this will provide insight into urban platforms themselves as studies and findings regarding other types of platforms and smart cities in general will be applied to this new context to determine whether these findings hold up in the context of the urban platform. The theoretical foundation for this lies in the research conducted by Tiwana (2013), who has extensively studied software platforms and has developed a framework for how the strategy and

resulting technological base and governance lead to the evolution of the platform. Thus, there is a gap between findings from research regarding smart cities, research Tiwana (2013) regarding platform governance and how these relate to urban platforms. This thesis will serve to close the gap by applying these findings on a number of urban platforms. Tiwana et al. (2010) provides a research commentary on his studies with topics that need further research, where one research question concerns the governance of the platform. Corroborated by other research, such as by Nam and Pardo (2011), this governance is seen as a direct result of the strategy of a smart city or platform. Additionally, Nam and Pardo (2011) also argues that including your citizens in your smart city forms a fundamental component for its success. However, as Tiwana (2013) studied software platforms and looked at different evolutionary metrics the largest contribution of this thesis will be in finding whether the findings from Tiwana (2013) and other research regarding platforms holds true when applying it to the broader context of smart cities in which the engagement of citizens is seen as a key success factor (EIP-SCC, 2016b; Nam and Pardo, 2011). This leads to the main research question:

"How do the strategy and governance affect citizen engagement in an urban platform?"

This study will thus serve as exploratory research in order to determine which aspects of the strategy and governance are relevant and how they are linked with each other and citizen engagement (Marshall and Rossman, 1999). This will allow for suggestions to be made accordingly for the development of the platform. This will both improve the development of urban platforms as well as allow for citizens to co-create their city as policymakers see the value of citizen engagement in the development of the city. As more citizens participate in these platforms, through network effects it will also become more interesting for other parties such as application developers to join the platform and build interesting applications for the citizens on the platform, which will then lead to more citizens on the platform as they are attracted to the functionality of it (Carter and Belanger, 2005). Additionally, while there has been much research conducted regarding smart cities, some researchers found that often the focus on citizens is lost whereas the involvement of citizens is seen as a key factor in the success of smart city projects (Nam and Pardo, 2011). Studying this existing research in urban platforms will provide insight into whether this is also the case in the development of urban platforms.

This study and thus the main research question will be guided by four sub-questions, following recommendations by (Yin, 2013a) regarding research design:

1. How far into development are the urban platforms?

As no research could be found regarding these urban platforms due to the

novelty of them, the first step during the data collection is to determine how far into development the urban platforms are. The importance of this sub-question stems largely from the fact that research has been conducted that shows the benefits of citizen engagement in public participation, the development of creative solutions and use of their collective intelligence (Nam and Pardo, 2011; EIP-SCC, 2016b). Studying this in the context of urban platforms, which allows for novel ways of engaging citizens, could serve as the missing link between general smart city projects and citizens (EIP-SCC, 2015). However, this has not been academically studied yet which could be due to the novelty of the urban platforms. As such, it is necessary to discover how far into development these platforms have progressed and whether they can be employed for citizen engagement at this point in time.

2. Is the engagement of citizens included in the strategy of urban platforms?

To answer whether the concerns of the EIP-SCC (2016b) with regards to the loss of focus on citizens in the development of smart city projects hold true in the development of urban platforms, this sub-question will allow for insight into whether this is the case from the beginning of the development of the platform (during the formulation of the strategy) or whether this happens at a later phase.

3. Does the governance model of Tiwana (2013) hold true for urban platforms?

As the research of Tiwana (2013) is used as a base for the research in this thesis, answering this subquestion allows for insight into whether this governance model holds true for an urban platform or whether other research regarding governance could be more insightful.

4. Which approaches to citizen engagement are urban platforms taking?

The EIP-SCC (2016b) notes that they analyzed best practice cases that claimed they had a highly participatory inclusion of citizens but when studying them it resulted in that these cases were not really involving citizens, despite the benefits of engagement of citizens being understood by these cases. Additionally, some poorly executed engagement activities even led to disengagement and other adverse effects. As such, the last sub-question by which this thesis will be guided is which approaches to citizen engagement the urban platforms studied are taking.

Academic relevance

Most of the academic relevance stems from the application of existing and validated studies in similar platforms to this new type of urban platform that is aimed specifically at cities and their inhabitants (Marshall and Rossman, 1999). This thesis will take a similar approach towards studying the strategy and governance of a platform but in applying this to a new context it could

serve to validate previous findings regarding platform research (Tiwana, 2013). Additionally, while there have been studies regarding citizen engagement in aspects of a city such as policy making, it was found that research regarding this was done in different, often conflicting, ways that in many cases even negatively affected citizen participation (EIP-SCC, 2016b; Yang and Callahan, 2007). Next to this, this thesis will provide insights into the development of such an urban platform as well as study questions left unanswered by the EIP-SCC such as what led to different approaches to engaging citizens in smart city projects (EIP-SCC, 2016b; Chun et al., 2010). Lastly, the theory development aspect of Yin (2013a) will be taken into account to expand existing theory by examining rival explanations for the cases in order to expand the conceptual framework and guide future research.

Managerial relevance

In practice this thesis will largely be important for policymakers who will gain understanding of a novel way of engaging with citizens, through the urban platform. With this, policymakers that have sought to make use of the collective knowledge of citizens will be able to do that through the platform, while avoiding engagement activities that actually have negative effects (Nam and Pardo, 2011; EIP-SCC, 2016b). The development of urban platforms with citizen engagement in mind can lead to citizens having more of a say in policies or being able to pose issues they have encountered in the city directly through the urban platform. Smart city project owners can look at this thesis and see which aspects of the strategy and governance of a platform have an influence on the active engagement of citizens. With this, the focus will be on currently developed urban platforms, and their owners, in order to understand the steps they have taken and which steps have been successful so that these can be replicated by other urban platforms and similar smart city projects. This will allow for deeper understanding of the strategy and governance and which aspects are most important when developing the platform so that key features are not the first ones to get cut in the event of a tight budget or other unwanted circumstances.

Empirical relevance: Ruggedised and Horizon 2020

Ruggedised is a smart city project funded by the European Union's Horizon 2020 research and innovation programme (Ruggedised, n.d.a). The goals of this project are to "(1) improve the quality of life of citizens by offering them a clean, safe, attractive, inclusive and affordable living environment (2) reducing the environmental impacts of activities by achieving a significant reduction of CO2 emissions and a major increase in the investment and usage of renewable energy sources and (3) creating a stimulating environment for sustainable economic development by generating more sustainable jobs and inspiring community involvement in smart solutions" (Ruggedised, n.d.b, p.1). Horizon 2020 itself is the largest EU Research and Innovation programme in history, which is aimed

at securing Europe's global competitiveness. This thesis will be written with recommendations for Ruggedised and Horizon 2020 in mind. In the rest of this subsection the Ruggedised project structure will be explained in order to present an overview of how the projects under Horizon 2020 work.

Within this project a number of Smart City solutions have been established, that can be grouped under three categories: "Smart Thermal Grid", "Smart Electricity Grid & E-Mobility" and "Energy Management and ICT" (Ruggedised, n.d.b). Solutions under the Smart Thermal Grid aim to make intelligent use of the thermal mass of buildings for thermal energy storage and exchange. Solutions under Smart Electricity Grid & E-Mobility intend to provide a smart interaction and integration of energy systems largely based on renewable energy sources and the integration of smart charging hubs. Lastly, Energy Management and ICT aims towards integration and consolidation of low carbon and interoperable ICT systems at district level. (Ruggedised, n.d.b)

These solutions are first implemented in one of the three lighthouse cities: Rotterdam, Glasgow and Umea. These lighthouse cities serve as a pilot for the Smart City solutions in order to determine the impact of the solutions on the city. After this, three follower cities (Brno, Gdansk and Parma) will monitor the impact of these solutions on the lighthouse cities so that they can learn from their experience and identify measures suitable for their local context (Ruggedised, n.d.b). Through the experience gathered from both the lighthouse cities as well as the follower cities, the Ruggedised project will develop a guide on how to replicate the smart city models through factsheets, teaching cases and business models.

Within the city of Rotterdam a number of Smart City projects have already been established or initiated to improve the city. Examples of this include a rain sensor, that provides open data to citizens of Rotterdam so that they can see where it has rained, and the usage of data gathered through photographing the city at night in order to determine where the street lighting is insufficient (Urbanbigdata, 2018). However, many of these projects are just loose projects that seemingly are not integrated or easily accessible for citizens to make use of.

As such, the empirical relevance stems from the application of theory to the development of the platform that will then be taken into account by Rotterdam and will be presented to other cities where it can be applied in practice to implement novel ways citizen engagement in their urban platforms.

Outline

First this thesis will review prior theoretical frameworks, guidelines and findings regarding smart cities, platforms and citizen engagement in the development of the city. Based on these findings a conceptual framework will be developed through propositions which will link the different concepts together.

As the aim is to see the different approaches current urban platforms have taken with regards to citizen engagement so that the theoretical findings can be validated, first a questionnaire will be sent out. This questionnaire will allow for a general overview of the development of the urban platforms and progress of cities across the EU in developing their platform. However, as a questionnaire does not allow for deep insights, based on this questionnaire and other desk research regarding urban platforms that ranked highly in citizen engagement, cases will be selected and studied more in-depth to gain a better understanding of the reasoning.

3 Theoretical background

In this chapter the theoretical aspects will be clarified in order to present an overview of relevant studies for the research question. First, various definitions and studies regarding smart cities will be critically studied in order to determine a working definition of what exactly a *smart city* entails for the rest of this thesis. In doing so, different definitions that focus on different aspects will be compared in order to determine where the focus is. Building on this definition, literature regarding citizen engagement and trust individuals can have in such smart city projects will be explored. These concepts will then be applied to currently existing leading studies regarding platforms using Tiwana (2013) as a base. This will be done by discussing the drivers for the development of platforms and platform ecosystem, after which the overarching (platform) strategy and (platform) governance will be discussed.

Based on the findings in the literature reviewed, and additional reasoning propositions will be drafted for the relationship between constructs and then build a conceptual model based on these propositions. As research regarding citizen engagement in urban platforms could not be found, constructs will be taken from research regarding other types of (similar) platforms in order to draft the propositions. Propositions often get conflated with hypotheses, but where they largely differ is that a hypothesis must be testable and measurable, while a proposition deals with pure concepts for which no laboratory test is currently available (Clay, 2018). After researching these propositions through a case study, this could then lead to hypotheses that can be tested in further research.

3.1 Smart Cities

Several definitions of smart cities were already given to show how there is not one uniform definition of what a smart city is in practice. Within academics, the definition of what a smart city entails is not uniform either. Therefore this section will first serve as a study of why academics believe the development of smart cities is an important development and how this development is taking place, together with where the benefits lie in smart city projects. This is the start of the theoretical background chapter as the urban platform is a type of smart city project and as such it is necessary to first understand what exactly a smart city is and whether a reason for the loss of focus on citizen engagement can be found in literature regarding smart cities.

Hollands (2008) argues that cities often claim to be "smart" without defining what they determine a smart city to be. The cities themselves make use of buzz words or borrow another city's assumptions and conflate it with their

own assumptions in order to define the term. Smart cities often get conflated with other terms such as *cyber cities*, *digital cities*, *wired cities or knowledge cities*. While these are all somewhat relevant to smart cities, they each have their own, varying, meanings (Hollands, 2008). When analyzing a number of existing self-designated smart cities, Hollands (2008) found that these cities were prioritizing the interests of informational business, while hiding a growing social polarization where the gap between the rich and poor keeps rising. However, the author acknowledges that this assertion requires further study and analyses of other cities, as these all differ somewhat in economy, history, politics and cultural legacy. Hollands (2008) then argues that a more progressive smart city must have a focus on human capital, rather than the information technology (IT) itself. The author argues that this is what separates a *smart city* from an *intelligent city*, which according to Komninos (2002) has four components. These are: (1) the application of a wide range of electronic and digital technologies, (2) the use of information technologies to transform life and work within a region, (3) the embedding of IT in the city and (4) bringing IT and people together so as to enhance the innovation, learning, knowledge and problem-solving that the technology offers. Secondly, Hollands (2008) argues that a progressive smart city needs to shift the use of IT from businesses and governments to the communities and ordinary people and work towards redefining what they mean by a "smart city". Within the literature reviewed in the article, one common factor appears to be the application of technology in an urban setting in order to improve a city or, more importantly, the lives of its inhabitants (Allwinkle and Cruickshank, 2011).

Nam and Pardo (2011) further builds on the study by Hollands (2008) and state that the label smart city is used inconsistently and that a one-size-fits-all definition of what a smart city is does not exist. Smart cities are required to adapt themselves to the user needs and need to provide customized interfaces. Being smarter as a city entails taking a certain *strategic* direction and governments and public agencies are embracing the notion of smartness, associating smart with achieving policy success in their jurisdictions (Nam and Pardo, 2011). The authors then provide an overview of definitions of smart cities from several studies. The complete overview can be found in Appendix A. These definitions take a different perspective and stress different factors depending on the focus and background of the authors. Some of the studies stress the implementation of technology while others view it based on an organic lens or even as a large organic system. The definitions found within literature can be largely categorized within three dimensions: technology, people and community (Nam and Pardo, 2011). Further expanding on these three dimensions, Nam and Pardo (2011) define three fundamental components of a smart city: technological factors (infrastructure of hardware and software), human factors (creativity, diversity and education) and institution (governance and policy). This can be seen in figure 2:

Technology Factors
Physical infrastructure
Smart technologies
Mobile technologies
Virtual technologies
Digital networks

Digital city
Intelligent city
Ubiquitous city
Wired city
Hybrid city
Information City

Smart City

Creative city
Learning city
Humane city
Knowledge city

Smart community
Smart growth

Institutional Factors
Governance
Policy
Regulations / directives

Human Factors
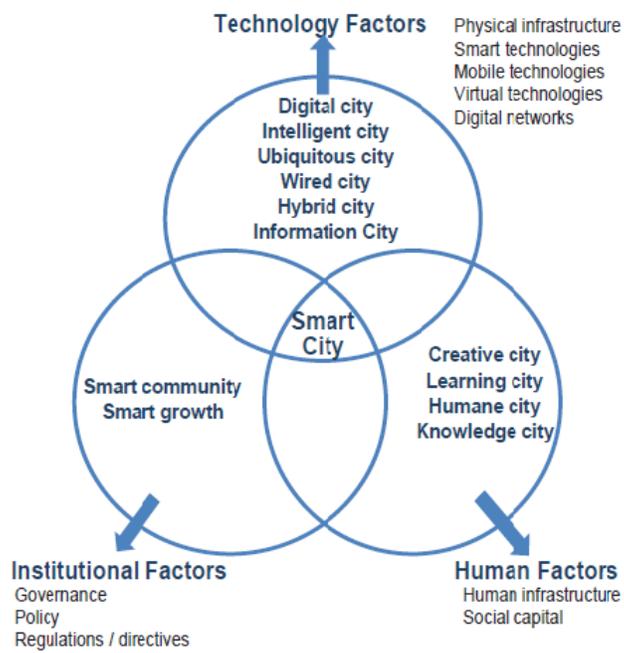Human infrastructure
Social capital

Figure 2: Three fundamental components of Smart City source: Nam and Pardo (2011).

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The technology factors constitute the base of the smart city in the form of the actual physical infrastructure and the technologies that make it possible for a city to innovate (Nam and Pardo, 2011). A smart city provides interoperable, Internet-based (government) services that enable the transformation of key government processes, both internally across departments and employees as well as externally to citizens and businesses (Nam and Pardo, 2011).

It is this external focus on citizens (and businesses) that currently often takes a backseat in research regarding smart cities and urban platforms. Despite this, in categorizing the human factors, Nam and Pardo (2011) found several studies pointing to the importance of smart people, who are open to various factors such as lifelong learning, creativity, open-mindedness and participation in public life (Giffinger and Pichler-Milanović, 2007; Giffinger and Gudrun, 2010). Solving problems through the creativity of these smart people allows for creative solutions to be made that could not be conceived in a standard manner. Other studies pointed to the importance of social inclusion of various urban residents in public services, creating knowledge networks, voluntary organizations and a knowledge base such as educational institutions and R&D capacities (Nam and Pardo, 2011). Including your urban residents, in a broader sense of the term known as citizens, can lead to greater collective intelligence and further social learning. Taking this one step further, smart city initiatives can become an integrated approach to connecting different communities and creating specific services to address city objectives (Nam and Pardo, 2011).

However, merely having a vision of wanting to include citizens in your smart city initiatives is not enough. This will need to be actively supported through the institutional factors, where the governance of the platform comes into play. Nam and Pardo (2011) believe it is necessary to establish an administrative environment, through initiatives, structure and active engagement, that is supportive of the smart city. They believe this should be paired with transparent governance, strategic and promotional activities, networking and partnerships. In IBM (2010) it was found that a 'smart government' is a government that interconnects dynamically with citizens, communities and businesses in order to spark growth, innovation and progress. This would make a government more transparent and accountable, allow them to manage resources more effectively and to give citizens access to information about decisions that affect their life. Through analyzing further studies, Nam and Pardo (2011) add that smart governance means engaging various stakeholders, especially citizens, in decision making and public services. Lindskog (2014) additionally states that the success of smart city initiatives are the result of a coalition of business, education, government and individual citizens. Active involvement from every sector of the community is essential, as united efforts create synergy.

It is clear that there is not one uniform definition of what a smart city is and there likely will never be one due to each city facing their own challenges. However, one thing nearly all studies agree on is that it requires active involvement from

the parties that will be most affected by these initiatives. Despite this, academic research points to the importance of including citizens in your vision of the smart city in order to be successful. Thus, the practical findings by EIP-SCC (2016b) do not stem from a lack of appreciation of engaging with your citizens as a smart city.

While no propositions were drafted in this subsection, it has become clear that the citizens and their engagement is of key importance in the development of smart city projects (Nam and Pardo, 2011). Despite this, many definitions of smart cities *still* focus mainly on the technical aspect of the city and in doing so forget the citizens (Nam and Pardo, 2011). Additionally, in practice there are conflicting ideas of what citizen engagement is and how it should be stimulated (EIP-SCC, 2016b).

3.2   Citizen Engagement

Before moving onto the topic of platforms, in this subsection it will first be defined what exactly citizen engagement entails. This is done in order to have a clear definition of the term, which can be specified to urban platforms for further research as there is currently no academic literature that studies citizen engagement in urban platforms due to how recent of a development such platforms are. However, citizen engagement in other topics such as politics or general policy making has been extensively studied, albeit with differences in how they define citizen engagement (OECD, 2003; Yang and Callahan, 2007; Head, 2007). As such, this subsection will be used to create a working definition of what citizen engagement entails and what barriers have been to citizen engagement in order to apply this to urban platforms.

Building on prior research regarding citizen engagement, OECD (2003) look towards online engagement of citizens. In doing so they identify three objectives for complete (e-)engagement. The first is step providing information for use by citizens, the second step is a two-way relationship in which citizens provide feedback to the government and the final objective is active participation, in which citizens actively engage in the policy-making process (OECD, 2003, p. 32). At the foundation of these long term objectives is the objective to reach and engage with a wider audience in order to enable broader participation.

Delving deeper into how the outreach translates itself into actual citizen 'involvement', Yang and Callahan (2007) held a survey among citizens to see whether efforts regarding the engagement and participation of citizens had an impact of their lives. Here, however, they make a distinction between the creation of simple participation mechanisms and actual citizen involvement. They define citizen involvement as the activities initiated by government to encourage citizen participation in administrative decision-making and managerial

processes (Yang and Callahan, 2007, p. 2). They made this distinction because while governments often do allow for participation through certain mechanisms, these mechanisms are then seldom actually used. Another important distinction they make is between citizens and other parties such as businesses or other organizations. While citizens do make up these other groups, this distinction is made because in those groups they strive for different aims, whereas as 'citizen' they push for greater involvement when their direct interests are at stake (Yang and Callahan, 2007). This distinction will also be adhered to in this thesis, but due to time constraints many citizens would have that would mitigate their direct involvement, community groups that form around particular issues or community leaders that speak at the behalf of their community will not be excluded from this definition. Returning to the study, Yang and Callahan (2007, p. 255) found that a lack of time was cited as the number one barrier to citizen involvement. The other major obstacles, as identified by over half the respondents from the study, were a *lack of trust*, *inadequate government-citizen communication* and *poorly defined participation objectives*.

Head (2007) additionally argues that themes such as participation and involvement have long been important themes, but that research regarding these themes has often been too narrow and managerial. Here, Head (2007, p. 442) states that one of the recommended new approaches is to look at the greater citizen *engagement*, which suggests an ongoing and active relationship. He argues that this is especially relevant as there has been an international trend trend toward more participatory governance. Nationally, this more participatory approach has been linked to a growing awareness of the complexity of many issues, while at a local level there is an increasing appreciation of the benefits of involving local citizens in identifying these issues and contributing to their solutions (Head, 2007). Head (2007, p. 445) also builds on top of the 'spectrum of participation' created by the International Association for Public Participation (IAPP), where there are five levels of increasing public participation: (1) inform; (2) consult; (3) involve; (4) collaborate and (5) empower. While the levels are not entirely applicable to the urban platforms studied in this thesis, they do provide an effective base on which the different levels of engagement can be taken into account to mitigate the concerns of Yang and Callahan (2007). Informing is entirely passive from the side of the citizen, consulting and involving are more active but still entirely initiated from the side of the government and collaborating and empowering are active and take into account initiatives led by citizens (Head, 2007). The levels and the way they are communicated can be seen in figure 3 on the following page:

Inform	Consult	Involve	Collaborate	Empower
Public participation goal To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	*Public participation goal* To obtain public feedback on analysis, alternatives and/or decisions.	*Public participation goal* To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	*Public participation goal* To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution.	*Public participation goal* To place final decision-making in the hands of the public.
Promise to the public We will keep you informed.	*Promise to the public* We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	*Promise to the public* We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	*Promise to the public* We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	*Promise to the public* We will implement what you decide.
Example techniques to consider Fact sheets Web sites Open houses	*Example techniques to consider* Public comment Focus groups Surveys Public meetings	*Example techniques to consider* Workshops Deliberative polling	*Example techniques to consider* Citizen advisory committees Consensus-building Participatory decision making	*Example techniques to consider* Citizens' juries Ballots Delegated decisions

Source: International Association for Public Participation (2005). Copyright IAP2, all rights reserved. Reproduced by permission.

Figure 3: Five levels of public participation source: Head (2007, p. 445).

This difference between engagement and involvement, however, appears to be mostly a semantics issue. Depending on where a researcher is located, different terms are used that effectively mean the same (Bangthetable, 2014). In an interview with a community engagement practitioner, Bangthetable (2014) found that they view engagement, participation and involvement as effectively the same terms, differing depending on where the practitioner is located. As such, the recommended approach from Head (2007) regarding studying citizen engagement will be adhered to. However, keeping the concerns from Yang and Callahan (2007) in mind, in this thesis, different levels of engagement using the public participation levels and online engagement levels as a base in order to gain insight into whether there is actually active engagement, rather than simply the existence of participation mechanisms that are then not used (Head, 2007; OECD, 2003).

3.3   Trust

In the previous subsection, through comparing different literature regarding smart cities it was found that trust is a crucial element when aiming to be a successful smart city and that a lack of trust was a major issue for citizens to get involved (Yang and Callahan, 2007). But what is trust? Trust has traditionally been a term that is difficult to define and properly measure. Although some researchers have treated trust as one uniform concept, in the past two decades most now agree that trust is multidimensional (Rousseau et al., 1998). Despite this, there is virtually no agreement on what specific dimensions constitute trust. McKnight et al. (2002) built a model based on the most widely used definitions of trust, across different research areas, and compared them with each other in order to define the most accepted definitions. In this they identified five different aspects of trust that ranged from *personal disposition to trust* to *trust in institutions*.

Building on this research and prior research regarding e-commerce, (Carter and Belanger, 2005) define *trustworthiness* as the *perception of confidence in the electronic marketer's reliability and integrity*. It is this trustworthiness that Belanger et al. (2002) found was the single most important factor for a consumer to provide private information. In a survey among American citizens it was found that they believe that e-government has the potential to improve the way the government operates, but that concerns over sharing personal information existed, fearing that data would be misused and their privacy would be diminished (Carter and Belanger, 2005).

However, while both McKnight et al. (2002) and Carter and Belanger (2005) compared many different definitions of trust in different research fields in order to develop and validate trust measures, these validated measures are all from the perspective of the truster. As such, in this thesis this distinction of different types

of trust itself will not be measured, as the unit of analysis will be the platforms themselves rather than the users of the platform. Despite this, the trust citizens have in the platform is of such importance that the overarching perceived trust, as in how platform owners believe citizens perceive their platform in terms of trustworthiness, and what the platform owners are doing to stimulate this trust, will be taken into account for the conceptual framework (Belanger et al., 2002). This leads to the first proposition:

Proposition 1: *A higher level of trust leads to a higher level of citizen engagement in an urban platform*

Bachmann and Inkpen (2011) further built on previous research regarding trust and examine a number of assumptions made about trust. They aim to examine *how* and *when* institutions matter with regard to trust building as it is arguably one of the least understood areas within trust research. They argue that institution-based trust is especially important when strategies are developed to build trust and live up to stakeholders' expectations (Bachmann and Inkpen, 2011, p. 3). As all social relationships involving trust are accompanied by an inherent risk of the trustee conducting untrustworthy behaviour, a central question in institution-based trust is concerned with what the concrete mechanisms are through which institutions can do their job. Bachmann and Inkpen (2011) describe four mechanisms: (1) legal regulation; (2) reputation; (3) certification of exchange partners and (4) community norms, structures and procedures. With this they argue that institution-based trust, through the four mechanisms, does influence the trust development process. As such, they argue that institutions should play a more prominent role in studies regarding trust.

However, they admit that there are shortcomings to their study and that future research has to be conducted, in order to understand where and when exactly institutions influenced actors to develop trust (Bachmann and Inkpen, 2011, p. 35). As such, this study is not sufficient evidence to conclusively determine which of these mechanisms influence trust. However, Bachmann and Inkpen (2011) do corroborate that it is possible to influence the amount of trust users have through mechanisms such as reputation and regulation and that this trust is necessary for other parties to engage in a relationship with the trustee. Hence, proposition 1 will remain based on these findings.

Until this point, all literature reviewed has been regarding smart cities and trust in general. In order to see whether the propositions drafted hold up when looking at urban platforms and their owners, the migration towards platforms and what their role is in these smart cities will be discussed. In doing so it will become clear in which parts literature regarding the general smart city projects is applicable and in which parts some adjustments and additions will be necessary based on existing literature regarding platforms. This literature regarding platforms will mostly be guided by the research conducted by Tiwana (2013) and will be expanded upon by other research regarding platforms and

additional reasoning to determine whether Tiwana's findings hold true. The reason the book written by Tiwana (2013) will be taken as a base is that compared to other literature regarding similar platforms it is much more comprehensive and results from years of prior research conducted. This will allow for constructs that have been validated by the authors to be taken and tested in the context of urban platforms. Additionally, all of the urban platforms have a data platform at its core, which is a nearly identical principle to the type of platform studied by Tiwana (2013).

3.4   Migration to platforms and platform ecosystems

Through smart city solutions, an ever growing amount of data is generated, with great potential value and many different purposes depending on which party acquires the data and what is done with the data (Behm et al., 2011). However, much of this potential value is left unused due to the parties that would stand to benefit from the data not having the necessary access. By developing a data platform, value can be gained by warehousing the vast amount of data and making it available for querying, analysis and other purposes such as building applications that make use of the data (Behm et al., 2011). As noted by EIP-SCC (2015), this data platform is the first step to the development of an urban platform that transforms outcomes at a local level (such as increasing energy efficiency, reducing traffic congestion and creating digital innovation ecosystems). Similar to this development, many of the traditional product-based markets have recently been migrating to platform-based markets, due to recent advances in technology making it increasingly possible to move towards software-centric platforms (Tiwana, 2013). This can mostly be attributed to five drivers: (1) deepening specialization due to growing complexity of products and services; (2) the digitization of products, processes or services, otherwise known as "packetization"; (3) software embedding, where routine processes are baked into software; (4) the Internet of Things, where everyday objects are gaining the ability to gather and transfer data using protocols and (5) ubiquity, which is the growing omnipresence of cheap and fast wireless data networks (Tiwana, 2013, p. 10).

These drivers each have their consequences and further substantiation for why it is causing a migration to platform-based markets, but in the context of smart cities, the Internet of Things can be seen as the most relevant driver for the development of an urban data platform. Everyday objects embedded with inexpensive sensors are now able to communicate directly using the same protocol that connects the Internet. This allows computing and communication capabilities to inexpensively be embedded into objects that can be found everywhere in a city (Tiwana, 2013). This driver towards platforms is similar to the earlier mentioned technological factors of a smart city by Nam and Pardo (2011) and forms the base for the development of the platform. This driver leads to both a
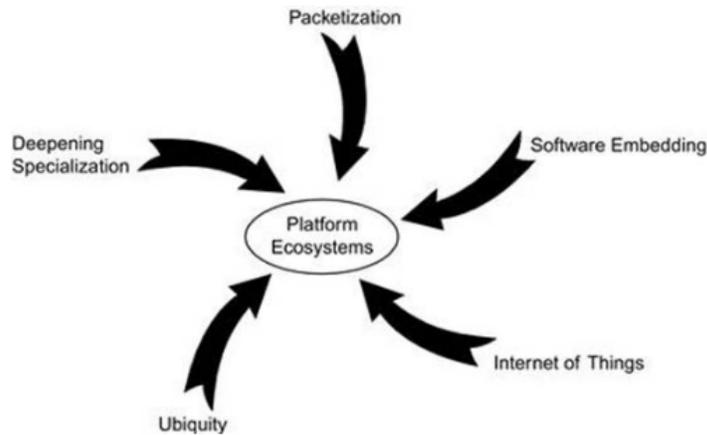
Figure 4: Drivers towards platform-centric business models source: Tiwana (2013, p. 10).

generation of data *streams* from these networked objects as well as an increased context awareness. Rather than a static stock of data, networked objects can communicate data real-time leading to entirely new business models and pricing strategies. However, it is almost impossible for one firm or party to do all of the processing and developing of applications, which necessitates a growing *platform ecosystem*, which can be defined as the collection of the platform itself and the apps specific to it (Tiwana, 2013). The ecosystem can be divided into *upstream* and *downstream* parts of a value chain. The upstream part refers to what goes into producing the platform itself such as suppliers, software licensors, and network connectivity providers (Tiwana, 2013). The *downstream* part of the value chain includes the platform complement producers, such as the earlier mentioned app developers, end-users and other intermediaries. The end-users of the platform, which would be citizens or businesses in the context of an urban data platform, derive value not only from participation in the platform, but also from the applications developed through the data in the platform (Tiwana, 2013).

In his study on platform ecosystems, Tiwana (2013) focuses on *software-based platforms*, which is a very similar type of platform to urban data platforms (which form the base for urban platforms and apps to be developed). A software platform is defined as a software-based product or service that serves as a foundation on which outside parties can build complementary products or services (also called *apps*) (Tiwana, 2013). These apps act as complementary goods for the platform as participating in the platform itself becomes more desirable if there are more complementary apps available. In this type of platform model, innovation is essentially outsourced to outside partners. These partners bear

the cost and risk of innovation and then share the proceeds with the platform owner. Boudreau (2010) found that when opening a platform to independent developers, rather than developing in-house, there was an increase of up to 500 percent in new innovations, depending on the degree of access and how the policy was implemented. However, not all platforms are able to become open platforms, which can mostly be attributed to the underlying *architecture* and *interfaces*. Tiwana (2013) defines the architecture of a platform as "a conceptual blueprint that describes how the ecosystem is partitioned into a relatively stable platform and a complementary set of apps that are encouraged to vary, and the design rules binding on both." The interfaces are defined as specifications that describe how the platform and apps interact and exchange information (Tiwana, 2013, p. 7).

Where architectural choices used to be only technical, it now forms the DNA that allows the platform to evolve from how it started (Tiwana, 2013). Early architectural choices are near impossible to reverse later on, but they influence who can participate in the platform and what their incentives are to participate. As such, the architecture forms the base for the strategy in platform markets.

Due to the topic of this thesis, the platform architecture will not form a core concept in the conceptual framework as it strays into different research territory and covers too many topics to delve into, especially when combined with the platform governance (Tiwana, 2013). In a research commentary regarding platform ecosystems, Tiwana et al. (2010) denoted researching the architecture as one research question and the internal fit between architecture and governance as another separate research question. As such, adding the architecture to the framework is not feasible. However, it will be taken into account that the strategy of a platform, and its resulting governance might not be realized, if the necessary architecture is not in place.

3.5   Strategy (formulation)

Following the earlier categorization of the three factors, Nam and Pardo (2011) provide strategic principles, taken through analyzing prior studies regarding smart cities, intended to make cities smart in order to realize their visions. The strategy extends beyond technology, but the technology is still at the base of the smart city, as otherwise it can not be "smart". IT is a facilitator for creating a new type of innovative environment, which requires the comprehensive and balanced development of creative skills, innovation-oriented institutions, broadband networks and virtual collaborative spaces (Komninos, 2009). In terms of human factors, Nam and Pardo (2011) believe that the strategic direction should be one of *learning*, where there should be stronger approaches to awareness, eduction and leadership off services that are accessible to all citizens. Education and training actions should develop IT skills, nurture knowledge workers and

facilitate the environment of social learning (Cairney and Speak, 2000). And lastly, the strategic direction for institutional factors is one of *governance*. Nam and Pardo (2011) defines governance as encapsulating collaboration, cooperation, partnerships, citizen engagement and participation. Successful smart cities collaborate with different parties through sharing their *visions*, *goals*, priorities and even strategic plans of the smart city projects with their citizens and other stakeholders (Nam and Pardo, 2011).

This finding is consistent with other studies, such as by Anthopoulos and Fitsilis (2009), who argue that it is necessary to see the user layer as a stakeholders layer rather than merely as users. In doing so, and defining solutions together with these stakeholders, the city will be able to obtain the *trust* of the citizens and communities in the city (Anthopoulos and Fitsilis, 2009). Nam and Pardo (2011, p. 288) studied this article and other case studies regarding smart cities such as Maryland, California and Boise, and found that the leadership of key leaders, along with a strong support of the vision is fundamental to the success of a smart city. This leadership is pivotal both within the government as well as for the relationship of the government with its citizens.

Before looking deeper into platform strategies, it is first necessary to establish what exactly a strategy entails. Strategy, like smart cities, does not have one uniform definition that is universally accepted by academics. Andrews (1971, p. 18) defined strategy as "the pattern of decisions that determines and reveals objectives, goals and purposes, and produces the principle policies and plans for achieving those goals". Strategy is about the future direction of a firm, or in the case of this thesis an urban platform. It points to what the platform wants to accomplish and how it aims to get there (Smolka, 2015). In her textbook regarding business strategy, Smolka (2015) compiled different definitions of strategy (in management) by well-known authors of strategic management textbooks (see Appendix B). Here, she found that these definitions do not all align with each other and that there are different schools of thought in strategy research. However, one thing these well known authors mostly agreed on was that strategy concerns the goals (or purposes) of a firm and the objectives (and by which these objectives are tracked) they have set in order to meet these goals. This aligns with the earlier mentioned strategic direction recommendations of Nam and Pardo (2011) who found that successful smart cities have a clear vision and goals that they can then *communicate* with their stakeholders. As such, it is proposed that the base of the strategy of a smart city consists of clear goals and objectives that have been set. This strategy must then be communicated to the stakeholders in order to become a trustworthy smart city in the eyes of these stakeholders (Nam and Pardo, 2011).

Proposition 2: *Communicating the strategy is positively associated with (perceived) trust.*

It is important to note that while strategy and specifically *platform strategy*

does go further than the goals, objectives and (which will be explained in subsection 3.6.2) a valuable service to attract users. More specifically, Parker and Van Alstyne (2014) define a platform strategy as mobilizing a networked business platform to expand into and operate in a given market. In conducting a survey regarding current platform strategies they identified strategies such as subsidies, seeding users, micro-market launch, piggybacking, governance and how to deal with competition (Parker and Van Alstyne, 2014). However, aside from the governance which was identified earlier by Tiwana (2013) these platform strategies are too specific to research considering how recent of a development urban platforms are, paired with the fact that urban platforms do not strive for profit and are bound geographically to the city the platform is developed for. As such, these more specific platform strategies are either largely irrelevant in this context or are not able to be studied yet due to the early phase of development of urban platforms. Thus, when talking about strategy in this thesis, it is more fitting to look at the formulation of the strategy and the early steps by which the platform owner intends to attract citizens in order to reach the goals set.

Network effects within platforms

As was briefly discussed earlier, platforms have multiple sides that are brought together through the platform. In the case of an urban data platform this could be data providers on one side, and app developers or end-users on the other side. These data providers are likely to also become end-users of an app on the platform, and thus enjoy the direct benefits of providing their data to the platform (Tiwana, 2013). Looking at broader urban platforms this could also be in the form of citizens on one side and city officials on the other side, where the opinion of citizens is weighed more heavily if there are more citizens participating in the urban platform.

The platform provides value by allowing participants on one side to find those on the other side through the platform (Tiwana, 2013). Within such a platform, *network effects* occur. This refers to the degree to which every additional user, or developer, of the platform makes it more valuable for the existing users (Eisenmann et al., 2006). Every additional user will have more users they can interact with, thereby increasing the value of the platform. These network effects can be either *same-side* or *cross-side* network effects. The former occurs when drawing users to one side helps attract even more users to that side, while cross-side network effects occur when adding a participant to one side creates value for the other side. Either of these *positive* network effects could have an influence on the amount of citizens that are involved in the network. Same-side network effects could be relevant for an urban platform in, for example, proposing a certain idea for your neighborhood, which would gain more credence if it is supported by more citizens. Cross-side network effects are especially relevant for parties such as developers will be attracted to the platform if they see there is a substantial amount of users on the platform. As such, successfully reaching

out to citizens and getting them to join the platform will lead to more citizen engagement through network effects. As more citizens join the platform, it will be viewed as more trustworthy. This leads to proposition 3:

Proposition 3: *Network effects will lead to a positive relationship between citizen engagement and trust*

Both same-side as well as cross-side networks can occur within the platform, depending on which applications are developed. (Eisenmann et al., 2006) recommend the subsidization of quality- and price-sensitive users and to secure "marquee" users' exclusive participation in the platform. However, Tiwana (2013) claims that such pricing strategies are often costly and prone to failure in practice. The safest approach is to **offer a valuable product or service** that is attractive enough to gather enough participants on one side so that the other side will grow accordingly Tiwana (2013). This way, users will have voluntarily joined the platform and they are expected to have a higher involvement in the platform due to the fact that they joined voluntarily and through its functionality the platform offers something the users actually *want*. This will be seen as a **part of the strategy** as it concerns the way in which the platform owner intends to reach their goals and objectives.

Kobsa and Teltzrow (2004) tested the effect of perceived benefits by conducting an experiment in which one group was provided a general privacy statement and the other was given a personalized benefits list of what filling in the data actually meant for them and the benefits that could result from providing their data. The group that was given this contextualized list of benefits shared a significantly larger amount of their personal data. This reaffirms the previous findings that a valuable service that could provide benefits to these citizens would lead them to *want* to join the platform and in turn get engaged in the platform in order to reap the benefits from that valuable service.

Scholten and Scholten (2012) looked at challenges innovation platforms face when directing external innovation efforts in platform ecosystems. Similar to what was mentioned earlier regarding network effects, they found that the platform ecosystems co-create the platform's value proposition and support its market adoption as the more complementors that join the ecosystem, the more valuable the platform becomes to consumers due to a greater variety of choice. In this, they found that while there has been much research regarding the external innovation aspect, a concrete understanding to guide platform owners was lacking. In studying this they argue that once the platform-based innovation strategic direction has been formulated, such as which innovations are desired and which capabilities to develop-inhouse or externally, this must be translated into dedicated objectives, tactics, initiatives and measures (metrics) (Scholten and Scholten, 2012, p. 178). This article reaffirms both the use of indicators as part of the strategy as well as that which innovations are desired, or in this case which services are desired by citizens, are a part of the strategy.

3.6 (Platform) Governance

The goal of the governance of a platform is to shape and influence the ecosystem of the platform, rather than direct or control the parties involved (Williamson and De Meyer, 2012). Rather than being employees of the platform owner, data providers and app developers are free agents and as such, the platform owner has no direct authority over them (Tiwana, 2013). According to Tiwana (2013), platform governance encompasses three dimensions: (1) decision rights partitioning; (2) control mechanisms and (3) pricing policies. These dimensions, and strategic decisions made regarding these dimensions, form the basis of how the platform interacts with the parties involved in the ecosystem.

3.6.1 Decision rights partitioning

The first of the three dimensions is the partitioning of decision rights. This partitioning can be split onto two broad categories, strategic decisions and implementation decisions. Strategic decisions refer to what a party should accomplish, while implementation decisions are about how it should be accomplished. This partitioning can then be further split into app decisions and platform decisions. These rights can either reside with the platform owner (representing a centralized platform) or with the app developers (representing a decentralized platform). Regarding platform strategic decisions, Tiwana (2013) recommends the platform owner to make the decisions, with input from the app developers. As for app strategic decisions, it is recommended to leave these decisions to the app developers. As the focus in this thesis is on the citizens rather than the app developers, this aspect of the platform governance will not be taken into further account. (Tiwana, 2013)

3.6.2 Control mechanisms

The second dimension of platform governance is about the control mechanisms in place to align the apps with the goals of the platform. Tiwana (2013) identifies three formal control mechanisms: *gatekeeping, process control, control via metrics*, and one informal control mechanism: *relational control*. These control mechanisms, their definitions and their prerequisites can be found in the table below:

Table 1: The four control mechanisms source: Tiwana (2013, p. 119).

Control Mechanism	Definition	Prerequisites
Gatekeeping	The degree to which the platform owner uses predefined criteria for what apps are allowed into the platform's ecosystem	Platform owner must be competent to judge, must be fair and speedy and app developers must be willing to accept such gatekeeping.
Process	The degree to which a platform owner rewards or penalizes app developers based on the degree to which they follow prescribed development methods and procedures that it believes will lead to desirable outcomes	Platform owner must have the knowledge to mandate methods to app developers, platform owner should be able to monitor app developer's behaviors or verify compliance.
Metrics	The degree to which the platform owner rewards or penalizes app developers based on the degree to which the outcomes of their work achieve performance targets predefined by the platform owner	Metrics must be set by the platform owner, predefined and objectively measurable.
Relational	The degree to which the platform owner relies on norms and values that it shares with app developers to shape their behaviors	Existence of shared norms and values and platform owner, low app developer churn.

For an urban platform that aims to stimulate trust in order to engage citizens, gatekeeping and relational control are the two most relevant control mechanisms. Process control, rewarding or penalizing application developers based on performance metrics, is less relevant at this point in time, as due to their novelty the urban platforms do not yet have prescribed development methods and procedures they believe will lead to desirable outcomes.

However, metrics *do* form an important part of the urban platform, but due to prior literature reviewed that included clear objectives as part of the strategy, the metrics will be included in the conceptual model in the *strategy* of the platform rather than the governance. This is more consistent with findings by Scholten and Scholten (2012) and Giffinger and Gudrun (2010). In their study regarding the ranking of smart cities, Giffinger and Gudrun (2010) argue that the ranking of cities can be an important guide for cities to judge their strengths and weaknesses and to define their goals and strategies for future development. However, they found that these rankings largely neglected the use of indicators and the purpose and effectiveness for strategic planning aimed at the improvement of a city's ranking. Based on these findings they researched a number of current rankings used and found that the use of specific indicators can form the base for a comprehensive assessment of strengths and weaknesses of the city (Giffinger and Gudrun, 2010). The most consistent finding with prior research regarding strategies is that they defined *objectives* as being not only specified by their aim and their target audiences but also by their scope, desired factors and *indicators* (Giffinger and Gudrun, 2010, p. 9). As such, rather than look at metrics as a separate dimension, the metrics aspect will be looked at in the strategy when formulating the objectives and by which metrics these objectives are measured.

Having more citizens on the platform makes it more attractive for parties such as app developers or other data users to join the platform. Then developing more applications that could be useful for end-users such as citizens makes the data platform and extensions of the data platform even more attractive to join. Through gatekeeping, the platform owner sets the criteria for both what is allowed in, as well as who is allowed into the platform ecosystem (Boudreau, 2010). However, as urban platforms do not necessarily have application developers, in this thesis gatekeeping will be expanded from the definition to include all parties entering the ecosystem. This will have a positive influence on the amount of trust a user has in the platform (Tiwana, 2013).

Relational control relies on the platform owner to provide an overarching collective goal for the platform ecosystem, which functions as a sort of shared identity that defines the character of the platform ecosystem (Tiwana, 2013). Similar to gatekeeping, in this thesis the definition will be expanded to include norms and values shared with all parties in the ecosystem as urban platforms do not necessarily have application developers. This shared identity then functions as a common ground to evolve the ecosystem and create unity within it.

One important prerequisite is that there must be an existence of shared norms and values. Looking at urban data, this shared context exists in the form of the city a participant inhabits and that developing apps or, on the side of the citizens, being involved in the platform has the potential to make this city more attractive. This shared system of values is likely to improve trust if the values align with the values of the citizens. This relationship between shared norms and values and their influence on trust has been examined in studies regarding national culture and is not expected to be different in this specific context of urban platforms (Doney et al., 1998). These two control mechanisms lead to the following two propositions:

Proposition 4: *A higher level of gatekeeping leads to a higher level of (perceived) trust in the urban platform*

Proposition 5: *A higher level of relational control leads to a higher level of (perceived) trust in the urban platform*

3.6.3   Pricing Policies

The third aspect of governance as identified by Tiwana (2013) is the creation of platform pricing policies. Tiwana (2013) mentions that pricing policies that are too geared towards subsidizing one part often are too costly or difficult to get exactly right. The goal of pricing policies is to create suitable incentives that make users want to join the platform (Tiwana, 2013). As such, rather than look at different pricing policies, in this thesis the use of incentives will replace pricing policies as part of the governance of the platform. This is not to say that the pricing policies themselves are irrelevant to the governance of the platform, but due to the inherent complexity involved in pricing policies and that the concept of urban platforms where citizens get engaged directly is relatively novel, researching the pricing policies themselves are outside of the scope of this thesis.

3.6.4   Privacy and Incentives

Looking at data disclosure through the smart grid, Zhao et al. (2014) found that through the fine-grained data collected through smart meters it is possible to enable trending, forecasting and fault detection, leading to a more efficient and robust grid system. However, this information reveals sensitive information such as human behavior. The techniques used to gather the data from these smart meters also allowed malicious third parties (such as burglars) to gain access to these human behaviors. This led to public outcry, which in turn has led to the deployment of smart meters encountering obstacles (Zhao et al., 2014).

Which parties have access to the data affects a user's willingness to share their data or provide the means for their data to be collected in the first place (Zhao et al., 2014). Similar to the study by Zhao et al. (2014), Hann et al. (2002) find that improper access to the data and unidentified secondary uses of the data negatively affect individuals' willingness to share their data. This concern over privacy has been identified to be one of the most critical impediments to the widespread adoption of e-commerce in the early 2000s (Hann et al., 2002). As an urban data platform forms the core of a further urban platform, this could also be a limiting factor for the adoption of urban platforms in general.

Lee et al. (2017) built on these findings and found that as platform owners use and sell data to run their platform, there are serious concerns about data misuse, privacy issues and revenue sharing between different stakeholders. They argue that proper data governance is necessary and as such set up a study where they looked at 57 papers that dealt with platforms, platform governance or platform ecosystems. In analyzing these papers they identified seven different data governance factors that are relevant for platform ecosystems. The entire list with factors can be found in appendix C. They then applied these factors to four existing platform and found that there were serious issues regarding the data governance in these platforms (Lee et al., 2017). In some cases, who the owner of the data was unclear and in other cases who used the data, when they used the data and how they used the data was unclear. As these findings are the most significant, they will be taken into account in this thesis. One of the papers studied by Lee et al. (2017) is the study by Tiwana (2013) in which they found that the "Data Ownership & Access definition" factor is partially covered through the discussion of incentives. Building on this, the "Data ownership and access definition" factor will be looked at when discussing data governance as this is a relevant extension of the literature by Tiwana (2013). By clearly specifying these data access and ownership rights, the earlier mentioned concerns of citizens regarding the misuse of their data can be mitigated (Carter and Belanger, 2005). This leads to proposition 6:

Proposition 6: *The level of (perceived) trust will be higher with clear data access and ownership definition than without*

The authors of the privacy study also found that individuals' concern for privacy is not absolute as they are willing to trade off privacy concerns for economic benefits (Hann et al., 2002). This is reaffirmed by a study conducted by Hui et al. (2007), who found that monetary incentives had a positive influence on the disclosure of information. In line with this, Lee et al. (2017) found that platform users always expect either immediate rewards or future benefits when using the platform. As such, it is proposed that the citizen engagement will be higher if they are incentivized to engage. This does not have to be entirely monetary but can also be through providing a clear benefit model for what their benefits would be from engaging. This leads to proposition 7:

Proposition 7: *Citizen engagement will be higher with incentives than without incentives*

While Tiwana (2013) categorizes these incentives are a part of the governance (under pricing policies), these incentives will be categorized slightly different as, while they are a part of the governance, the other aspects of the governance are related to the trust whereas the use of incentives is a direct way to get citizens interested in the platform rather than improving the trust they have in the platform.

3.7 Conceptual Framework

In this section, the conceptual framework resulting from the propositions established in the theoretical background chapter will be drafted. The underlying theory and propositions have already been drafted in the previous chapter, but they will be repeated briefly in order to provide a clear overview of how the relations are shaped.

The strategy consists of setting clear *goals*, *objectives* (and the *indicators* or metrics by which these objectives are measured) and developing a *valuable service* in order to attract citizens to the platform so that they want to engage with the platform. Following **proposition 2**, communicating this strategy to the citizens is expected to improve the level of (perceived) trust citizens have in the platform.

The strategy leads to the *governance* of the platform, as proposed by Tiwana (2013) and (Nam and Pardo, 2011). Of the control mechanisms developed by Tiwana (2013), *gatekeeping* and *relational control* are also expected to improve the level of trust through **propositions 4 and 5**. Additionally, going beyond just the platform governance, clear *data ownership and access definition* is expected to improve the level of *trust* through **proposition 6**.

Citizens that trust the platform are expected to be more likely to engage with the platform through **proposition 1**, and more citizens being engaged is expected to improve the trust citizens have in the platform through network effects (**proposition 3**). Another aspect of the governance, the use of incentives, is also expected to improve *citizen engagement* as citizens are more likely to engage if they are actively incentivized to do so (**proposition 7**). The connection of strategy to citizen engagement results from goals and objectives set in terms of engaging citizens. If engaging citizens is a goal, the platform owner will likely actively seek to engage citizens whereas oppositely if goals are only geared towards businesses, citizens are likely to be less engaged. The resulting conceptual framework can be found on the following page.

As case studies do not seek to establish a causal relationship, and this being

largely exploratory research in a new context, with this framework I do not attempt to define a clear causal relationship between the concepts (Yin, 2013a). However, the propositions drafted in the theoretical background do provide an indication of the expected (positive) relationship between the concepts. This will form the base for the cross-case analysis and thereafter the development of theory.
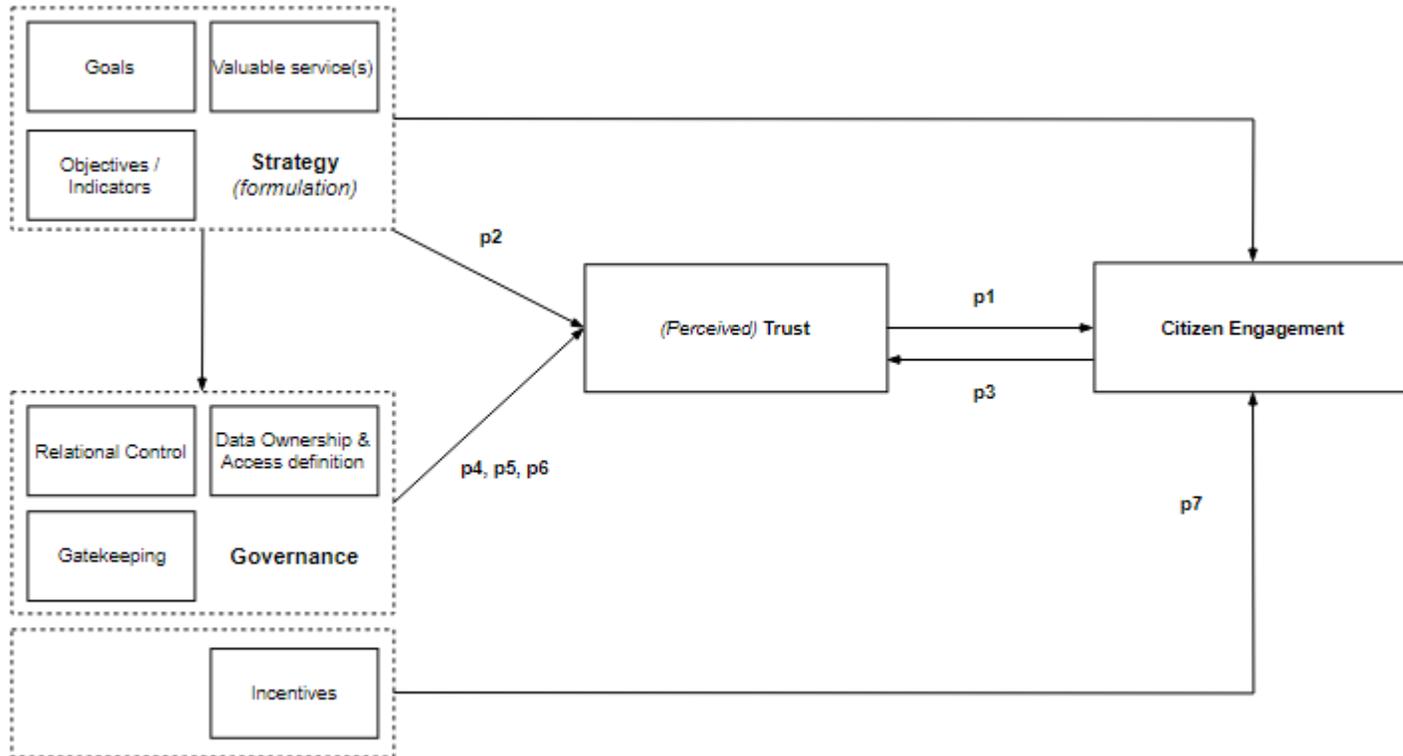
Figure 5: The conceptual framework.

4 Data and Methods

4.1 Research design

In urban platforms available, strategic decisions have all been taken in order to arrive where they currently are and have (or have not) stimulated citizens to participate in these platforms. This makes these platforms themselves interesting cases to look at as the unit of analysis. Following this, a (holistic) multiple case study is the most suitable research strategy in order to provide a roadmap for cities developing their own urban platforms that are looking to engage with their citizens (Yin, 2009). However, the most prevalent concern that arises when conducting a case study is that in many cases the case study investigator has been sloppy, has not followed systematic procedures and has allowed evidence or biased views to influence the direction of the findings and conclusions (Yin, 2009). Another frequent complaint is that they often take too long and result in massive, unreadable documents (Yin, 2009). In order to mitigate these issues, paired with the fact that case studies can offer important evidence to complement other research methods, rather than do an entirely dedicated case study, first a questionnaire will be sent out to all the projects that partake in the Horizon 2020 project.

As such, the research design consists of exploratory research (where the aim is to generate hypotheses based on the drafted propositions and look for potential relations between the variables) through initially getting an overview of the development of urban (data) platforms across the EU by setting out a questionnaire (Clay, 2018). This exploratory research is a new angle taking a theoretical foundation from Tiwana (2013) and applying it to the context of urban platforms to determine which aspects of the governance are relevant for urban platforms. This will guide future research into a direction for in-depth studies on the separate topics of the conceptual framework such as strategy, governance, trust and citizen engagement itself (*Exploratory Research*, 2018). Taking into account the five components of research design, the questions were drafted in chapter two, the propositions in chapter three and the unit of analysis is the urban platform (Yin, 2013a). The insights from the cases will then be linked by using the analytic techniques recommended by Yin (2013a): pattern matching and a cross-case analysis. However, as these patterns and the cross-case analysis could provide a simplified view of reality that might not be correct, each proposition will then individually be reviewed using findings from the cases to determine whether the proposition can be confirmed or whether further research is needed. In the discussion, these propositions where the cases provide indications that there might be more behind the proposition than was initially thought will be linked back to the theory studied in this thesis.

The questionnaire will provide insight into the research question and the aspects

of the conceptual framework to determine where in what stage of development the urban data platforms are, whether they have a clear strategy they follow, whether they have proper governance in place and how the inclusion of citizens is viewed. The case study research design is then especially useful to determine whether specific aspects of a model apply to phenomena in the real world and is a useful design when not much is known about a phenomenon (Yin, 2013a). This is the case in urban platforms as while research regarding their underlying data platform has been extensively studied, not much is known about the urban platforms that get built on top of these data platforms. While data is still collected and used in the underlying data hub, making the theory regarding software platforms relevant for the urban platform. With the combination of a questionnaire and the multiple-case study, this is a mixed method research, making the results more robust. Yin (2013a, p. 174) notes that this combination is a possible way in which a case study can be combined with another method where the findings are complementary to each other. The gaps in the case study can be filled with the data collected from the questionnaire (Mills et al., 2009). After studying the cases and the drafted propositions they will then be reflected on, based on rival explanations of findings in the cases (Yin, 2013a). In this case, findings from currently widespread platforms will be applied to a new type of platform, this being the urban platform to see whether these findings hold true or other theory should be incorporated into the topic of citizen engagement in urban platforms. Rival explanations have already been discussed in the theoretical background chapter but as there has been little academic research regarding urban platforms due to their novelty, it is unlikely all theory will be covered (Yin, 2013a). The case study protocol by which the data collection of the case study was guided can be found in Appendix E. Yin (2013a) provides tests of the research design and ways to improve the design. These tests, and the design of the case study report itself, will be expanded upon when discussing the case study later on in this chapter. First, descriptive statistics of the questionnaire will be presented. During the explanation of the research methods it will also be explained how data is collected and analyzed.

4.2   Questionnaire

Within Horizon 2020, there are a number of projects such as Ruggedised. Each of these projects have their own goals which are then to be followed by the cities that partake in these projects. Among these cities, the cities that are building an urban (data) platform in some form or are exploring the possibilities of building such a platform will be included in the questionnaire. From these respondents a descriptive overview will be presented regarding aspects of the development of their platform, their strategy, governance and inclusion of citizens. The advantages of gathering the data through this questionnaire are that data is produced on a relatively large amount of real-world observations in a short amount of time. However, asking the right questions in order to

get a high construct validity, which is the degree to which a test measures what it claims to be measuring, will not be possible for all of the propositions drafted in the theoretical background chapter (Kelley et al., 2003). This is due to the fact that while these concepts, such as trust, have been validated often over the course of the years, this has only been from the perspective of the user. As such, as of yet there is no real validated measure of these concepts meaning that measuring these from a questionnaire will not be entirely valid. Additionally, asking further questions to understand reasoning behind decisions is not possible in a questionnaire. Aside from this, the questionnaire covers many differing topics leading to multiple representatives having to fill in different aspects of the questionnaire, which could lead to significant differences even within the same response. It is also likely that topics studied in this thesis are influenced by other topics covered earlier on in the questionnaire. Because of this, questionnaire will be only used to provide an overview of the development of the urban platforms and their engagement of citizens after which the multiple-case study will be performed. It is important Nevertheless, these descriptive statistics do form an interesting base to see whether urban data platforms across the EU are similar to what would be expected from theory and whether the theory will need to be revised based on the descriptive statistics presented.

In total, 34 representatives from the platforms answered the questionnaire. However, as the questionnaire covered many topics not all of the representatives were able to answer questions regarding the involvement of citizens in their platform. Excluding these respondents results in a remaining 23 respondents. This exclusion was done in order to provide a more complete overview and to improve the reliability of the questionnaire, despite the questionnaire only being used for descriptive statistics (Litwin and Fink, 1995).

Stage of development

Out of these 23 respondents, 14 (60.9%) claim their platform is operational and have their first wave of participants onboard. However, respondents often chose this in combination with another stage of development as different aspects of the platform are at differing stages of development. Looking at respondents that only stated their platform was operational (and thus had finished the other stages of development) this number shrinks to 7 (30.4%) operational platforms.

Other participants includes research institutes or universities. The majority of respondents only views citizens as a consumer of the data and apps on the platform (91.3%) or as providers of the data (78.3%). In terms of exploring and planning the platform, only 5 (21.7%) respondents stated citizens were included and 1 (4.3%) respondent stated citizens were included in the technical development of the platform. The largest roles in the urban data platform are for the local government and businesses, according to the respondents. The complete results can be found in the table below:

Table 2: Which participants are included in different aspects of the platform.

Participant	Exploring and planning	Technical development	Providing data	Consuming data and apps	Developing apps
Local government	21 (91.3%)	15 (65.2%)	23 (100%)	22 (95.7%)	19 (82.6%)
Central government	6 (26.1%)	1 (4.3%)	0 (0%)	12 (52.2%)	5 (21.7%)
Businesses	15 (65.2%)	13 (56.5%)	19 (82.6%)	20 (87%)	21 (91.3%)
Citizens	5 (21.7%)	1(4.3%)	18 (78.3%)	21 (91.3%)	10 (43.5%)
Other participants	9 (39.1%)	9 (39.1%)	16 (69.6%)	14 (60.9%)	12 (52.2%)

The majority of the questions regarding the strategy, governance and inclusion of citizens were asked on a 5-point Likert scale (Norman, 2010). In this scale, 1 and 2 will be presented as "low", 3 will be presented as "medium" and 4 and 5 will be presented as "high". This categorization is the only way in which the data is altered and is done to provide a more comprehensive overview as the sample is relatively small compared to what is expected of questionnaires. Questions where such a Likert scale was not applicable due to not having the necessary underlying theory to formulate such a statement were open questions and will be discussed separately.

Strategy

When asked about the use of KPIs, 9 (37.5%) respondents stated they made use of KPIs. None of the specific answers to which KPIs were used included citizens. When asking about the use of a specific measurement framework to assess the performance and impact of the urban data platform, 4 (16.7%) of the respondents stated they made use of a measurement framework with the other 20 (83.3%) either not using a measurement framework or currently exploring which framework best suits their needs.

Respondents were also asked whether they follow a clear strategic guideline and whether they develop valuable services specifically to attract individuals to share their data on the platform. The results can be found in the table below:

Governance

Questions regarding the platform governance were converted into statements by taking the definitions of Tiwana (2013, p. 119). Respondents were then asked to what degree they made use of these governance mechanisms. In addition to this, respondents were asked whether they made use of incentives and had clear data governance in place. The results can be found below:

Table 3: Questions regarding strategy.

Statement	Low	Medium	High
"There is a clear strategic guideline to follow when making decisions regarding the platform"	6	4	13
"There are valuable products or services developed specifically to attract individuals to share their data on the platform"	9	10	4

Out of 23 respondents, 9 (39.1%) respondents stated they made use of incentives either for data providers or data users but these incentives are entirely monetary, as in fees paid to acquire data.

Table 4: Questions regarding governance.

Statement	Low	Medium	High
"Please rate the degree in which gatekeeping is used as a control mechanism in the UDP"	2	6	9
"Please rate the degree in which relational control is used as a control mechanism in the UDP"	5	4	8
"Please rate the degree in which process control is used as a control mechanism in the UDP"	6	3	8
"The right of access to the data is clearly communicated to users within the platform"	2	4	17

The use of process control is higher than expected where these platforms state that they do not use a measurement framework or KPIs, but this can mainly be attributed to the fact that the question regarding process control was asked in a section of the questionnaire pertaining to the GDPR and as such respondents rated this statement highly if they were concerned with following the prescribed GDPR regulations. This same GDPR leads to data access and ownership rights being clearly specified (in 17 out of 23 responses).

Trust

Respondents were asked how important they deem trust. 21 respondents answered statements regarding how important they deem trust and how participants in the ecosystem perceive their performance on these aspects of trust, but when asked in a follow-up question whether they have measured trust or any proxy of it only 1 (4.3%) respondent stated they had (by surveying the 'open data reliability perception' of their users).

Citizens

Lastly, platform representatives were asked to rate 4 statements regarding citizen involvement. These questions are based on research currently being conducted by Dr. Saskia Bayerl, looking at citizen involvement from the perspective of the citizens.

Table 5: Questions regarding citizens and their involvement.

Statement	Low	Medium	High
"Have citizens been consulted in the design of your urban data platform?"	13	10	0
"Do citizens have a say in the amount and/or type of data collected for them by your UDP"	9	6	6
"How openly are citizens informed about (potential) privacy implications for their personal data"	3	6	12
"How intrusive do you consider your UDP with regards to citizens' privacy"	14	3	4

None of the respondents rating the consultation of citizens in the design of their platform high is contrasting to expectations from the beginning of the questionnaire where respondents were asked to rate the degree to which different statements fit the purpose of their urban data platform. Out of the six statements, two of these statements (in bold) specifically included citizens. The results can be found in table 6.

Table 6: Statements regarding urban data platform goals

Statement	Low	Medium	High
"To make city operations more efficient and effective"	0	1	22
"To engage and empower citizens and make the city more inclusive"	1	5	17
"To stimulate entrepreneurship and innovation"	1	2	20
"To meet the cities' sustainability objectives"	0	4	19
"To co-create city services and outcomes with businesses and citizens"	0	5	18
"To increase security and public safety"	6	4	13

Out of 23 respondents, 17 rated the engagement and empowerment of citizens and making the city more inclusive high, while 18 out of 23 respondents rated the co-creation of city services and outcomes with businesses and citizens high.

Despite many purposes being to engage and empower citizens, these same citizens did not play a large role in the design of the platform.

Follow-up

At the start of the questionnaire, respondents were asked whether they would be available for a follow-up call in order to gain a deeper understanding of aspects of the questionnaire as well as delve deeper into the conflicting aspects of the questionnaire. As such, some respondents that rated the engagement and empowerment highly yet did not consult citizens in the design of their platform were contacted to understand their reasoning. When following up it became clear that even the platforms that stated they were operational were in most of the cases not operational to the point where there was actually functionality developed that citizens could make use of. It is either still being developed or options are being explored. As such, rather than alter the theory for the case study based on the questionnaire, the cases themselves will not all be taken from the questionnaire. Instead, cases from the questionnaire will be compared to cases that *do* actively engage citizens in order to see where the differences lie between these cases and the cases in the questionnaire where the citizens were not consulted in the design of the platform or did not play a large part in the design of the platform. These will be two cases that are seen as best practices by the EIP-SCC (2016a).

4.3 Case study

In this subsection, a (holistic) multiple-case study will be performed in order to gain more in-depth knowledge into the strategic decisions taken by the platform owners and what motivated them to take these decisions. Further, Yin (2013a) argues that case studies are most appropriate for "how" questions, as is the case in this thesis (Yin, 2013a). A multiple case-study was chosen over examining a single case as this research design is stronger and drawing conclusions based on a single case will undoubtedly provide biased conclusions (Yin, 2013a). A multiple-case study will also be somewhat biased but much less so (Yin, 2013a). The case study is a suitable research method as the object of study or its environment is not manipulated, providing in-depth insight into a real-life context (Dul and Hak, 2007). One disadvantage that stems from case studies is the relatively low validity (when compared an experiment), but this can be mitigated by checking for plausible explanations and triangulating available information (Yin, 2013b). As such, combining the case studies with the information gathered from the questionnaires and triangulating interviews with online sources will allow for insight into how the strategy was actually developed and whether citizens were actively engaged in these platforms.

This thesis will follow the case study protocol derived from Yin (2013a) in order to keep the author targeted on the subject of the case study. This case study protocol can be found in Appendix E. Additionally, this case study protocol helps mitigate common issues researchers have had with case studies and ensures a higher validity. The multiple-case study approach will be used, as there will be one unit of analysis (the urban platform) studied across multiple cases. This is deemed to be the most valid approach as it is exploratory research and a prior study by the EIP-SCC (2016b) found that cities have mostly taken their own approaches to involving citizens in their smart city projects and these different approaches have not always been successful. In studying multiple cases and carefully selecting them, the aim is to identify aspects of the strategy, governance and creation of trust that were *successful* for the platform owner in terms of engaging their citizens.

Yin (2013a) notes the use of proposition in a case study as an especially important part of the research design as they guide the author of a study towards where to look for relevant evidence. It is these propositions that will form the base of the case study as they guide the author into researching from a case only that which is necessary to answer the research question (Yin, 2013a). The cases themselves are the same as the unit of analysis, which will be the urban platforms, in order to gain understanding in the strategic and governance steps they have taken to engage with citizens.

Yin (2013a) also notes that the development of theory is essential in the design phase of the study, no matter if the purpose of the ensuing case study is to

develop or to test theory. The goal of this theory is not to be seen with the same formality that grand theory is in social science, nor is it to become a master theoretician (Yin, 2013a). Rather, the goal of developing theory (and an ensuing conceptual framework) is to have a blueprint that guides the author to what it is they want to study, how they will collect the data and how they will then analyze it. This theory can then be revised based on insights gathered from the case studies and provide direction for future research (Yin, 2013a). One important aspect to note of case studies is that researchers often think of *statistical* generalization. However, as the cases are not "sampling units" this is not possible. Rather, the cases should be seen in the sense of multiple experiments where the results *do* allow for *analytical* generalization, in which findings from previously developed theory are used as a template with which the empirical results from the case study can be compared. If two or more cases are shown to support the same theory, replication may be claimed. This means that the cases must be carefully selected so that they are expected to either produce similar results or contrasting but anticipatable results (Yin, 2013a).

After the cases are studied, an individual report will be conducted per case. After this, a cross-case analysis will be conducted to show the degree of replication logic. The within-case analysis will allow the researcher to become familiar with the separate cases in order to observe unique patterns, whereas the cross-case analysis serves to counteract human subjectivity (as case studies inherently present a biased view due to the small amount of cases that can feasibly be studied) and to find novelties (Eisenhardt, 1989). In order to ensure no novelties are lost due to not fitting entirely within the conceptual framework, each within-case analysis will be accompanied by a 'further recommendations' section in which novel insights gained from the interview will be presented that can be reflected on and provide indications for further research.

Additionally, as noted by Mills et al. (2009), the data from the questionnaire can serve to fill in the gaps from the case study. This is especially relevant as one of the subquestions is concerned with the stage of development the urban platforms are in and generalizing this from a limited number of cases is much less valid than a questionnaire conducted among urban data platforms across the EU (Yin, 2013a).

4.3.1   Case selection

The cases are selected based on their ability to provide insights into the subquestions and aspects of the conceptual framework. A case would be relevant if they have actually developed the technical aspect of their platform to the point that it would be possible for citizens to contribute to the (further development of) the platform. Citizens being a large part of the goals will not be necessary as an urban platform that does not have a focus on citizens can also provide

interesting insights despite not being what is expected from the literature. This is for the simple reason that if the platform owner never had a focus on citizens and has taken no effort to engage with citizens and as such has had no involvement from citizens, this is something to take into account as a recommendation for urban platforms that *do* want active citizen engagement to avoid. The cases that perform low on these aspects are also important to take in consideration as this will improve the analytical generalization of this thesis (Yin, 2013a).

The most important criteria is that the platform owner (as a representative of the platform) must be able and willing to share information regarding the three main concepts in this thesis: strategy, governance and citizen engagement. Additionally, as aspects of the strategy such as the goals and objectives are often mentioned in relevant documentation of the project this must also be readily available. This will then be triangulated with the interviews to determine whether these goals are actually employed. Another criteria is that a representative of the platform must be willing to participate in an interview.

The final criteria is that each case studied must have a unique value proposition. As the urban platforms serve different goals (a platform that intends to improve energy efficiency will develop tools that allow for insights into energy, while a platform that is meant for participatory democracy will develop tools that allow their citizens to develop proposals online). This will allow for more valuable comparisons into different ways of engaging citizens in order to determine which were effective and which should be avoided. However, the potential for replication is kept in mind. As such, the selected cases can all provide insight into the theoretical base and the cases have been selected with that base in mind. These selected cases are either similar enough to allow for predictable outcomes or provide contrasting outcomes that can be reasoned for (such as a platform that does not include citizens in their goals having low citizen engagement).

4.3.2   Collecting case study evidence

Yin (2013a) has identified six sources of gathering case study evidence, each with their own strengths and weaknesses. Of these six, interviews and documentation are the most relevant and the strengths of these sources are the most fitting for this thesis. The strengths of interviews is that they are directly focused on the topic and that they are insightful, providing perceived causal inferences. The weaknesses are that there is a potential response bias, inaccuracies due to poor recall and the phenomenon of reflexivity where the interviewee tells the interviewer what they want to hear (Yin, 2013a). These weaknesses will be mitigated by making use of a clear interview protocol and by recording and transcribing the interviews. Additionally, by combining the interviews with documentation, statements can easily be verified. The strengths of documentation are that gathering documents is unobtrusive, the documents themselves

are exact and contain a broad coverage. The main weaknesses are that retrievability could be low and that access to certain documentation may deliberately blocked. However, in this thesis these weaknesses are mitigated by ensuring that the necessary documentation is available before selecting the case. This triangulation of methods additionally improves the validity of the study (Yin, 2013a).

4.3.3 Interview protocol

To mitigate one of the weaknesses of interviews, an interview protocol was adhered to. In the beginning of the interview the interviewee was reminded of the purpose of the interview, the duration and the key concepts of the interview. After this, to get the interviewee to open up, some introductory questions were asked. Then, questions regarding the concepts in the model were asked. However, after the first pilot interviews I noticed that asking them in the same standardized manner proved to not be as effective as expected. As such, through desk research prior to the interview aspects of that specific platform were inquired about before asking more general concepts relating to the conceptual framework. The 'standard' interview protocol can be found in appendix D. After finishing the interview it was transcribed based on the recording and sent to the interviewee for further review and confirmation of its contents.

Due to the fact that the majority of the interviewees were from another part of the European Union, the preferred means of communication was through Voice over Internet Protocol VoIP (VOIP). In doing so, both the interviewer and interviewee can conduct the interview from a neutral, comfortable location while not losing important visual cues (Redlich-Amirav and Higginbottom, 2014). However, where VoIP interviews were not possible, interviews were conducted via telephone. This allows for more flexibility during the interview but also requires a more intensive directing of the interview as visual cues are missing (Redlich-Amirav and Higginbottom, 2014).

4.3.4 Selected cases

Based on the criteria drafted in 4.2.1, the following five cases were selected and analyzed. Rotterdam and Utrecht were mainly selected because of their direct involvement in the Ruggedised project and willingness to participate extensively, in addition to the empirical relevance of this thesis being for the Ruggedised project. Muenchen.de was a suitable respondent from the questionnaire that was willing to participate in the interview and had a sufficiently developed urban platform that allowed for insights into citizen engagement. Decidim and Our MK were two cases that did not participate in the questionnaire but

were selected as they were identified by the EIP-SCC as best practice solutions regarding the development of urban platforms and inclusion of citizens in these platforms (EIP-SCC, 2016a). In the cases where one representative was insufficient, an additional interviewee was interviewed in order to gain a deeper understanding into topics the first interviewee could not entirely answer, in addition to verification of the answers given by the first interviewee:

Table 7: Selected cases.

Case	Function	Interviewee
Digitale Stad (Rotterdam)	Productmanager	Roland van der Heijden
	Account Director	Roland van Ravenstein
Open Data Platform (Utrecht)	Strateeg Innovatie CIO	Thomas Kruse
	Strategie & Innovatie	Arjen Hof
Muenchen.de (Munich)	IT-Strategie	Uwe Montag
Decidim (Barcelona)	Coordinator Democratic Innovation	Pablo Aragon
OurMK (Milton Keynes)	Manager Community Engagement	Dr. Daniel Gooch

4.4 Measurement

In order to mitigate one of the challenges of case study research, the recommendations provided by Eisenhardt (1989) will be adhered to. First a within-case analysis will be performed with descriptions of the cases and analysis of the variables. Then, a cross-case analysis will be conducted in order to find patterns between the cases. Tactics regarding cross-case analysis are driven by the reality that people are notoriously poor processors of information (Eisenmann et al., 2006). The danger here is that researchers reach premature or even false conclusions as a result of these information-processing biases. One tactic to mitigate this is through the selection of categories, looking for within-group similarities coupled with intergroup differences (Eisenmann et al., 2006). In line with this categorization, the variables will be ranked either low or high depending on the criteria set in the following paragraphs. When more than half the variables are in the expected cells, a proposition will be supported. Thus, if less than half of the cases are not in the expected cells the proposition will be refuted.

The categorization is based on the literature reviewed in the theoretical background chapter but as some of the variables concern continuous variables, the

priority in categorizing will be to allow for a comprehensive comparison between the cases. This is done primarily because while a matrix or checklist per variable would be ideal to compare very specific aspects of the variables, the urban platforms studied are in many cases not able to provide such specific insights as they are aspects that have simply not been thought of. As such, this relatively simple low-high categorization will serve as an indication of where potentially interesting new research lies, which can then be studied more in-depth in future research when the development of the urban platforms has progressed to a degree that makes such research possible.

4.4.1 Strategy

The strategy consists of goals, objectives (and their indicators) and a valuable service to attract citizens to the platform. Goals and objectives themselves can not be classified as low or high, but when looking at the goals and objectives in terms of the degree to which citizens are included, this classification does become possible. As such, a platform that does not include citizens in their primary goals or objectives will be classified as "low", whereas a platform where (the engagement of) citizens are a primary goal will be classified as "high". Connecting this to certain requirements does not provide added value due to the differences in scope of the platforms, where different platforms could have the exact same goals but have more development teams available making the prioritization of the goals much less relevant, as teams can work on the goals concurrently. As such, whether citizens form a primary goal will be gathered mostly from indications from the interviews. The development of valuable services will similarly be ranked as "low" if the platform is not concerned with developing valuable services (valuable in the eyes of the citizen), while it will be ranked "high" if the development of these services is encouraged.

4.4.2 Governance

Of the governance, relational control will be ranked "low" if there is little to no existence of shared norms and values within the platform, and "high" if there is. Similarly, gatekeeping will be ranked "low" if there are little to no predefined criteria for what is allowed into the platform ecosystem and "high" if there are clear predefined criteria. While these variables are both continuous as they concern the degree to which they are present in the definition presented by Tiwana (2013), this categorization will be used in order to provide an indication into whether gatekeeping and relational control are applicable in the broader urban platform context rather than the underlying data platform. If they are, this categorization will serve as an indication of which aspects of the governance to further study and determine the specific aspects of *how* these specific parts of

the governance have an influence on the creation of trust. Data ownership & access definition will be ranked "low" if the access to the data and ownership of the data is not clearly defined and it will be ranked "high" if it is. This is not an ideal classification, but due to the differences between platforms and the way in which they handle data, this categorization will allow for the most comprehensive comparison between platforms. Incentives will be ranked "low" if there are no clear incentives for citizens to be engaged and "high" if incentives are geared towards citizen engagement. As stated, this does not have to be monetary but can also be in the form of citizens gaining clear perceived benefits from participating in the platform (such as, for example, receiving funding for a citizen-driven project, which would lead to the citizens participating in the platform).

It is important to note that the platform governance aspects have been taken from the research of Tiwana (2013), but as these findings concern a different type of platform where only applications are developed on top of the data platform (rather than a direct interaction with end-users), the definitions of the governance aspects are expanded from table 1. Rather than look purely at apps and app developers, gatekeeping and relational control concerns all parties entering the platform ecosystem. This is due to the differences between an urban platform and the type of software platform studied by Tiwana (2013) in which the platform has to deal with competition and functions purely as a platform that allows for the development of software rather than the addition of, for example, proposals or projects from the citizens.

4.4.3 Trust

Trust will be slightly different from the previous variables, as many of the validated measures are from the perspective of the truster rather than the trustee. Carter and Belanger (2005) does define trustworthiness as the perception of confidence (in the electronic marketer's reliability and integrity). Based on this, trust will be categorized as "low" if the platform (owner) perceives their trustworthiness to be low, or is not concerned with encouraging the trust citizens have in the platform. Whereas trust will be categorized as "high" is actively encouraging the creation of trust in some way (such as the inclusion of a privacy statement). As this is not an ideal indicator, whether the platform owner is concerned with trust in their platform and how they measure, or do not measure, trust will also be taken into account.

4.4.4 Citizen Engagement

Citizen engagement will be classified differently from the other variables. Rather than classify it as low or high, the classification will be based on the levels of public participation identified by Head (2007) and the three goals of online engagement by OECD (2003). Citizen engagement will be ranked as "low" if the engagement is purely passive on the side of the citizen, which is the case if the citizens are only provided with information. The second category will be "medium", where the platform owner still initiates all developments of and on the platform but takes into account feedback from the citizens in case they have concerns or recommendations. The final category will be "high", which will be the case when citizens are actually making use of the platform and actively proposing suggestions and ideas based on their use of the platform, rather than the initiatives coming purely from the side of the platform owner. It can be possible that in one use case citizens have been actively participating, while in others citizens have not played a role. In cases where this occurs, the categorization will result based on how large that use case is compared to the scope of the entire platform. Additionally, while it would be possible to separate these categories further, based on expectations from the EIP-SCC (2016b), it is expected that many platforms will not have concerned themselves that much with citizen engagement to the point where they are able to provide such deep insights in order to further divide the categories. As such, these three levels will be used when analyzing citizen engagement in the platforms and allow for a comprehensive comparison.

4.5 Validity and Reliability

In this subsection the four critical conditions of the research design will briefly be discussed in order to ensure the quality of the study. These critical conditions are the construct validity, internal validity, external validity and reliability (Yin, 2013a, p. 41). The validity in general has been mentioned multiple times throughout this thesis but here these four critical conditions will be reiterated in order to present a clear summarizing overview.

4.5.1 Construct validity

Construct validity concerns identifying the correct operational measures for the concepts being studied (Yin, 2013a). This construct validity has largely been assured through using existing literature from topics that have been extensively studied, analyzed and scrutinized in order to form working definitions through-out this thesis. In addition, as the literature studied was often built on top of

earlier literature studied in order to expand their theory into different topics, this also shows the reliability of these theories and their applicability to the context of urban platforms (Tiwana, 2013; Lee et al., 2017). However, it should be noted that the definitions of gatekeeping and relational control are expanded from their original definitions by Tiwana (2013) as these included only app developers which do not necessarily exist in urban platforms. In order to ensure that all interviewees perceive the questions in the same manner, concepts that could potentially have conflicting definitions will be explained during the interview. But rather than have this be a weakness of the study, it will be used as a potential strength by asking the interviewees how *they* view trust and what they have been doing to stimulate trust. Triangulating the interviews with online documentation and secondary interviews when aspects are unclear will allow for further construct validity.

4.5.2 Internal validity

Internal validity is mostly relevant when studying explanatory case studies where the researches attempt some kind of causal relationship (Yin, 2013a). This is not the case in an exploratory study such as this, but there is the issue of making proper inferences. Thus, the internal validity is assured through pattern matching, in which the propositions have been drafted according to existing studies in extensively studied topics as well as studies that lack this information (Yin, 2013a). These propositions are then matched with the patterns from the cross-case analysis in addition to exploring rival explanations by purposely selecting cases that differ from each other (within the set criteria for selecting cases) in order to determine where differences stem from. Based on these rival explanations, findings from the cases will be scrutinized to determine whether the conceptual framework holds true.

4.5.3 External validity

External validity concerns whether a study's findings are generalizable beyound the immediate case study (Yin, 2013a, p.43). As mentioned earlier, statistical generalization is not feasible but analytic generalization is. This will be assured through following the replication logic paired with the earlier mentioned categorization where if more than half of the cells of the variables are in the expected cells, the proposition will be accepted (Yin, 2013a). If more than half of the cases support the same theory, replication may be claimed (Yin, 2013a). Additionally, findings from one case will be applied to the other cases in order to allow for deeper comparison.

4.5.4 Reliability

The objective of reliability is to ensure that if a later investigator follows the same procedure and conducts the same case study all over again, this investigator should reach the same findings and conclusions (Yin, 2013a). To this end, the interview protocol is included in Appendix D, which will be applied to all of the cases. Additionally, as the interviews were triangulated with desk research, the desk research will also be referenced to throughout the case study so that these findings can also be reliably replicated.

5 Within-case analysis and Cross-case analysis

5.1 Digitale Stad (Rotterdam)

Introduction

Rotterdam is developing the 'Digitale Stad', which is seen as more than just an urban data platform (van der Heijden, 2018). It is a structure of a multi year knowledge environment with knowledge institutions, businesses and citizens. Additionally, the aim is to develop an open-source information and communication platform based on a 3D model of the city (van der Heijden, 2018). It is a part of the Horizon 2020 project 'Espresso' where the goal is to identify a collection of open standards that work well together, having been proven to help smart cities and to identify gaps and weaknesses in the framework of available standards, where Rotterdam serves as a pilot city (van der Heijden, 2018).

Strategy

The Digitale Stad does have a clear planning strategy, but due to the way this strategy has been planned out, citizens have not been included yet. They work in Proofs of Concept, where after each proof of concept they receive a go or no go on whether they should continue the project. Until this point, the technical and informational proofs of concept have finished and they are initiating their interaction proof of concept where they will explore how to communicate the value of the project to stakeholders (van der Heijden, 2018). Additionally, different departments within the municipality have been running their own smart city projects where a key part of the platform is to be a generic way of connecting these loose projects.

The Digitale Stad is a part of the Ruggedised project, where one of the three

main goals is to "improve the quality of life of citizens by offering them a clean, safe, attractive, inclusive and affordable living environment" (Ruggedised, n.d.b, p. 1). Next to this, van der Heijden (2018) states that in the long term the goal is to include citizens and they have set up a few pilot projects such as *"gamen op Zuid, waar een filosoof samen met TU delft bezig is om een game te ontwikkelen waarmee de jongeren uit de buurt bekend worden met hun omgeving. Wat wij vanuit de digitale stad doen is de faciliteit bieden om dalijk op die generieke omgeving dat spel aan te kunnen bieden"*. However, as this is seen as more of a long term goal and that due to the proofs of concept so far they have only been concerned with the technical development of the platform rather than working towards these goals, generally goals (in terms of citizen engagement) are relatively *low*. There is the development of a valuable service to attract citizens to the platform through the different pilots so this is *high*.

While van der Heijden (2018) worked on the Citykeys project, which was concerned with the development and validation of a performance evaluation system, Digitale Stad currently does not make use of metrics or indicators. They are, however, exploring multiple sets of indicators in order to determine which indicators could be useful but at this point in time there are no indicators used in the development of the platform. As such, this is *low*.

Governance

van der Heijden (2018) rates both gatekeeping as well as relational control in the platform as neutral as they are still exploring options to design this, due to not being sure what the 'correct' way to do this is. In a presentation shown by van Ravenstein (2018) of KPN, who handle the underlying Data Hub of the Digitale Stad, it is stated that they do not decide the governance. Rather, they safeguard it. KPN sees this [the designing of the governance] as being done by the businesses with specific knowhow. The reason for this is that in cities politics, emotions and money are involved which makes designing this governance more complicated. As such, the gatekeeping can be seen as *low*. Additionally, as each department involved in the smart city projects is currently building their own applications without consulting each other, the degree of relational control is also *low*.

Data access and ownership definition, however, is *high* as KPN views the safe and efficient re-use of data sources with the control remaining with the owner as a key part of the Data Hub (van Ravenstein, 2018). Additionally, van der Heijden (2018) states that the base principle is that the data provider remains in control of their data and in the long run becomes a co-owner of the Digitale Stad through owning a part of the data of it.

There are no incentives being developed for the platform. van der Heijden (2018) believes that in the long run if the platform is developed properly, there could be incentives in the form of business models but the municipality only intends

to facilitate this rather than create incentives themselves. As such, this is *low*

(Perceived) Trust

van der Heijden (2018) states that citizens have more trust in companies than the government but that citizens will have the most trust in a platform where all parties involved are co-owners of the platform. However, this is something that needs to be explored in the long run and is currently not part of the platform. For now, people entrusting their data to Facebook, yet being skeptical when it comes to the government is what leads van der Heijden (2018) to believe that the perceived trust is *low*. Additionally, one uncertainty KPN is concerned with is figuring out what trust is.

Citizen Engagement

Currently, nothing has been done when looking at citizen engagement (van der Heijden, 2018). In the long term van der Heijden (2018) believes that citizens should take an active role in the platform but for now for the Digitale Stad it remains a question of when it would be best to include them. There are projects where citizens do play an active role but as different departments within the municipality run these projects according to their own needs, in the general platform environment there is currently no citizen engagement. Recently, however, the customer value trajectory has started in which it will be explored how to engage with different stakeholders and what their value would be when joining the platform ecosystem. Currently, they view the professional world as more of a priority in order to start the adoption. These businesses could serve as a bridge to individual citizens in the long term (van der Heijden, 2018). As such, citizen engagement is currently *low* but could rise soon through the customer value trajectory.

Case Overview

Table 8: Case Overview Digitale Stad.

Variable	Level	Indicator
Strategy		
Goals	Low	*"In het begin zal de focus meer op bedrijvigheid liggen"*
Objectives and indicators	Low	*"Nog niet, maar dat gaan we wel doen natuurlijk"*
Valuable service	High	*"Er zijn verschillende pilots"*
Governance		
Gatekeeping	Low	*"... op het platform willen toelaten, dat bepalen we dan met elkaar."*
Relational control	Low	*"Eigenlijk is iedere afdeling nu zijn eigen toepassingen aan het ontwikkelen maar ... al die verschillende tools een soort onbeheersbaar zooitje"*
Data access and Ownership definition	High	*"... kan bepalen wie op welk moment toegang heeft onder welke voorwaarden"*
Incentives	Low	*"Dat gaan we op voorhand niet bepalen"*
(Perceived Trust)	Low	*"Het blijft natuurlijk nog steeds dat mensen meer vertrouwen hebben in bedrijven dan de overheid"*
Citizen Engagement	Low	*"Het is nog niet op het punt om direct met de bewoner in contact te komen omdat dat via de services gaat"*

Further insights

van der Heijden (2018) believes the development is very much an iterative process where through co-creation with the parties involved, the desired solutions are reached and adapted based on findings during the development. However, due to the way the strategy planning and proofs of concept have been set up there currently has been no place for citizens to get engaged as so far purely the technical aspects have been focused on as these decided whether the project gets continued or not.

5.2 Open Data Platform (Utrecht)

Introduction

Utrecht Open Data platform is the data platform of the municipality of Utrecht, being developed by Civity (Kruse, 2018). This platform is being developed as

part of the IRIS project where the value of the platform is being explored to determine whether it would be worthwhile for follower cities in the project to also develop such a platform through reproducability. At the base of the platform is the public data gathered by the municipality and through the API developers can develop their own analyses or applications (*Utrecht Data Platform*, 2018).

Strategy

Within the IRIS project, the concept of a city innovation platform and the policies surrounding this platform have been thoroughly elaborated together with a number of stakeholders (Kruse, 2018). These policies largely surround the GDPR, which the platform has to be fully compliant with. In the bid for the development of the urban platform, as well as top-down from the IRIS project some goals and indicators have been established. From IRIS there are aspects such as empowering citizens and stakeholders to share their experience through initiatives and citizen engagement (IRIS, 2017, p. 12). Additionally, one important aspect of the IRIS project is to build awareness and trust in IRIS actions and solutions to accelerate replication of smart city solutions among professional audiences and citizens alike (IRIS, 2017, p. 9). However, when speaking to Hof (2018) who is developing the platform, the goals of the project are seen as more of a way to safeguard the quality of the platform and help the platform be more open and standardized. Next to this, currently the focus is on the exchange of data between parties along the lines of a confidential data locker (Kruse, 2018). As such, while the overarching project goals would be rated high, in the development of the platform itself they are currently *low*. Additionally, there are no clear objectives and indicators used as this is currently one of the deliverables of the project (Kruse, 2018). There are a few indicator sets on a European level but whether these fit remains to be seen (Kruse, 2018). So objectives and indicators will also be seen as *low*.

In terms of valuable products or services, this is currently not really being stimulated. The priority is on the development of a data market where multiple sources of city data are included so that it becomes interesting for app developers to develop something on a larger scale (Hof, 2018). So currently there are barely apps being developed. This is something that is supposed to happen in due time but that is related more to the quality of the data on the platform rather than the platform itself (Hof, 2018). As such, this is currently also *low* but is expected to be high once the underlying data quality can be guaranteed.

Governance

Kruse (2018) rates the level of relational control as low, and the level of gatekeeping as high. In terms of relational control, Hof (2018) states they are organising meet-ups with developers to ask them how they can best help them in addition to trying to build partnerships with other organizations that are concerned

with the development of data and get them involved. However, at this point there is only a very small group of developers working on applications for the platforms as the scale is not large enough to be interesting for large developers (Hof, 2018). In addition to this, the API is open for anyone to use the data to develop applications and as it is all public data, the platform owners do not have direct communication channels with parties that use their API other than the select group of people closely involved (Hof, 2018). As such, the level of relational control is *low*.

While the level of gatekeeping is rated as high in the questionnaire, nearly all of the platform is immediately usable, the (public) datasets are immediately available and the API comes with a guide on how to use it (*Utrecht Data Platform*, 2018). As such, there are no real predefined criteria for what or who is allowed into the platform ecosystem. This leads to the level of gatekeeping being ranked as *low.*

The data access and ownership definition is very clearly specified as a key functionality of the platform is to become a data locker in order to facilitate the exchange of (confidential) data between different parties (Kruse, 2018). In addition, a 'functionaris gegevensbescherming' judges the platform and every data set published on the platform to ensure the quality is upheld and there are no data that can be traced back to a single person (Kruse, 2018). As such, this is *high.*

The incentives are also still being explored (Hof, 2018). There are different motivations for why a party would want to share their data in the platform but as of now there are few successful examples of applications being developed and thus there are no real incentives in place. As such, incentives are also *low.*

(Perceived) Trust

Trust has not been measured by the data platform, but in line with the data locker principle, where the safe storage and exchange of data is guaranteed, it can be argued that the (perceived) trust is *high*. Upon visiting the platform the first thing a visitor sees is a disclaimer where visitors can provide their recommendations, ideas or ask questions regarding the platform (*Utrecht Data Platform*, 2018). Additionally, it is clearly communicated that all data available is open data that can be accessed in order to create a greater economic value (*Utrecht Data Platform*, 2018). Next to this, the platform is compliant with the 'Wet gegevens persoonsbescherming', which means that no personal or sensitive data is available. In order to uphold this, they even employ a 'functionaris gegevensbescherming' in order to uphold their compliance (Kruse, 2018).

Citizen Engagement

Similar to the Digitale Stad, there are some projects where citizens are being

engaged. However, the platform itself has been entirely developed without the participation of citizens (Kruse, 2018). On the site, citizens do have the option to contact the platform and voice their concerns but there is no evidence of this being used in the development of the platform. So far it has been entirely informing the citizens through what is available on the platform (*Utrecht Data Platform*, 2018). As such, the citizen engagement is *low.*

Case Overview

Table 9: Case Overview Open Data Platform.

Variable	Level	Indicator
Strategy		
Goals	Low	Kruse: *"Het hoofddoel is een datamarkt."*
Objectives and indicators	Low	Hof: *"Nog niet zo expliciet."*
Valuable service	Low	Hof: *"Er worden nog niet of nauwelijks apps op ontwikkeld."*
Governance		
Gatekeeping	Low	Hof: *"Iedereen kan toegang tot die (publieke) data krijgen"*
Relational control	Low	Hof: *"Als het open data is kan iedereen die gewoon vrij gebruiken"*
Data access and Ownership definition	High	Kruse: *"Dat zijn uitgangspunten rondom de AVG, daar moet het volledig compliant mee zijn"*
Incentives	Low	Hof: *"Er zijn verschillende motieven maar ook dat is echt nog gewoon uitzoekwerk"*
(Perceived Trust)	High	Kruse: *"Zodat die partijen vertrouwelijk data kunnen uitwisselen ... wij ons aan bepaalde wet- en regelgeving houden"*
Citizen Engagement	Low	Kruse: *"Dat is zonder inwoners bedacht, dus dat zijn voornamelijk bedrijven."*

Further insights

Kruse (2018) believes that the citizens should have a role somewhere in the process of sharing data but how this will be realized is still not certain. In using data, most regular citizens will not make use of it. It could be possible, but this would likely be through a business that develops an application on the platform (Kruse, 2018). Citizens could also have a voice in what is allowed to be done with the platform, but Kruse (2018) believes it is more likely a higher level authority such as a European instance will regulate the market. Additionally, both Kruse (2018) and Hof (2018) believe the connectivity with other platforms is crucial for the development of applications as on a city level the scale is too

far. This would also create network effects where services developed in one city can be reused in another city (Kruse, 2018; Hof, 2018).

5.3 Muenchen.de (Munich)

Introduction

Munich is part of the Smarter Together project where they focus of five areas of integrated smart solutions: citizen & stakeholder engagement, data management platform & smart services, electric renewable energy source, holistic refurbishment projects and e-mobility projects (SmarterTogether, 2018). Under this project, the city of Munich has developed the Muenchen.de platform where they disseminate all types of information regarding the city (SmarterTogether, 2018). At the core of this platform is the 'smart data platform' where an open, secure and city-wide smart data platform is developed which allows for the improvement of urban planning and the quality of life in urban spaces (SmarterTogether, 2018).

Strategy

The platform is being developed almost entirely to serve the 'key number 20', which is to cut CO2 emissions by more than 20%, to raise the use of renewable energy to above 20% and to increase energy efficiency by more than 20% in the experimental Neuaubing-Westkreuz/Freiham district (Montag, 2018; Smarter-Together, 2018). As part of this, a SmartCity app has been developed that uses data gathered which has indirect social benefits for local residents, public authorities and other local actors but this is not a primary goal (SmarterTogether, 2018). As such, goals will be seen as *low.*

The KPIs, as they are today, are designed specifically to track performance on the 'key number 20' goals such as CO2 emissions and energy savings (Montag, 2018). Some indicators have been prescribed by the Smarter Together project but currently there are no concrete goals or indicators including citizens that are being used to track performance and the focus remains on the energy aspects (Montag, 2018). Once the applications and use cases are thoroughly developed, the plan is to go around to different departments in the city and show them what is possible and that the platform is also something they could make use of (Montag, 2018). Then, citizen targets are more likely to be included but at this point they do not form a priority. As such, the objectives and indicators will also be seen as *low.*

The development of valuable services can be seen as *high*, despite being more of a secondary benefit as a result of striving to accomplish their goals. The SmartCity app provides a central access point to all of the smart innovations of the

city, resulting in residents having digital access to their 'personal neighborhood' when they need it (SmarterTogether, 2018). With this app, users gain direct access to data such as the environment, weather and traffic conditions as well as public transport and energy usage in their house (SmarterTogether, 2018).

Governance

In terms of the governance, Montag (2018) rates both the degree in which gate-keeping is used as a control mechanism as well as the use of relational control as *high*. In the interview this is pretty much affirmed. In terms of gatekeeping, not everybody is allowed to access the data or the API (Montag, 2018). In the future the plan is to open up some of the data and then invite parties or the community to build up their own data but at this point it is still very much a controlled environment (Montag, 2018).

As for the relational control, platform representatives work closely together with parties interested in developing an application on the platform or making use of the data on the platform (Montag, 2018). For every use case in the platform all the stakeholders are described from end to end, with what they require from the platform, what their problem is, what the goal is and which data they require (Montag, 2018). Based on this they provide a benefit model to the data provider or app developer. If you want to retrieve data this is a more simple process as you can simply register for the API and gain access to all of the (unclassified) data, but bringing in data is always an active dialogue (Montag, 2018). This dialogue is very important according to Montag (2018) as parties (including citizens) will always ask *why*. As such for every use case there is a thought out benefit model that explains why sharing this data has a benefit for the data provider (Montag, 2018). One example given was for the end-users or citizens where data is gathered through smart home solutions and citizens asked why they should participate (Montag, 2018). The benefits were thought out beforehand and included the comparison of their own usage behavior with the average through a gamification approach and the improvement of their energy use (SmarterTogether, 2018). As this is a clear example of incentivizing to engage with the platform (or in this case the app) the use of incentives will also be seen as *high*.

Similarly, the data access and ownership definition is *high*. For all data that enters the platform, the data provider discusses the rights together with platform representatives (Montag, 2018). It is discussed what value the data has, which possibilities to go into privacy issues exist and often times only then do the data providers see the value of their data (Montag, 2018). So then they discuss further which aspects are not to be shared and through a matrix they agree to certain conditions under which the data is shared (such as who is allowed to access the data, for how long, is it allowed to be combined with other data). Additionally, in specific use cases the scenario could arise where the data must be paid for as you cannot get all data for free (Montag, 2018).

(Perceived) Trust

Montag (2018) states that trust in the platform is very crucial. The sensors currently installed are all about weather conditions and pollution so nothing really invasive (Montag, 2018). However, different sensors could provide insight into, for example, how many cars are driving on the road and other data that becomes more specific than that. As such, in the beginning trust must be built so they will accept the implementation of new sensors and then they enter a dialogue to see what citizen will or will not accept (Montag, 2018). Here, the city has a role of a trusted data handler rather than a Facebook that collects and sells large amounts of data so through these initial implementations trust is being built with the citizens (Montag, 2018). As such, the trust will be seen as *high*.

Citizen Engagement

There are two main approaches to citizen engagement in the project. The first is that the Urban City Lab holds open consultations for local residents and stakeholders, with staff members of Smarter Together Munich on site in order to inform citizens about the projects (SmarterTogether, 2018). However, only few citizens attend these open consultations (Montag, 2018). What has been more effective are the co-creation and design workshops where specific use cases get discussed between a number of really engaged citizens and expert planners (Montag, 2018). One development that has resulted from these workshops is the creation of a transparency dashboard [relating to the trust] where citizens were being told what was being done with their data but they had no way of verifying it (Montag, 2018). As such, a transparency dashboard was developed in order to show citizens which sensors are being installed, what is being done with the data and for what purpose the data is being collected (Montag, 2018). In this, over 2,500 participants have been mobilized (SmarterTogether, 2018). As such, as these citizens are actively proposing ideas for what they want to see from the platform, citizen engagement will be categorized as *high*.

Case Overview

Further insights

Montag (2018) states that the platform itself is useless and it only becomes interesting when the applications are involved. Collecting data is a great feature but it does not provide any value if you do not have any end users that can make use of it, so Montag (2018) discusses is as an end-to-end solution where the platform is just one element that helps. Additionally, communication plays a very large role in getting the residents of the city to understand what exactly is going on and having a clear benefit model for these citizens in place will allow them to understand what is being done (Montag, 2018). Through communicating this in the co-creation workshops this has resulted in a transparency dashboard where citizens can see exactly what is going on. Additionally, Montag (2018) notes that

Table 10: Case Overview Muenchen.de.

Variable	Level	Indicator
Strategy		
Goals	Low	*"The project is done just for that purpose (energy efficiency)"*
Objectives and indicators	Low	*"Some have to do with the 20% reductions, others have to do with some other efficiency things"*
Valuable service	High	*"The benefit ... is that they get an app to see their behavior, temperature, condition and average among all users"*
Governance		
Gatekeeping	High	*"No, it's absolutely not free in the sense that everybody could access it"*
Relational control	High	*"We are directly discussing with people based on a certain use case ... and here's the benefit model"*
Data access and Ownership definition	High	*"It's very important to discuss that there is a classification and to make sure what role the data plays"*
Incentives	High	*"There will be use-cases where you have to buy data, or incentify some people, you cannot get all data for free"*
(Perceived Trust)	High	*"Trust is very crucial ... we want to build trust with the citizens"*
Citizen Engagement	High	*"We have co-creation workshops hosted by the Technical University of Munich ... a small team of citizens that are really engaged"*

the platform as it is now, will only remain for the time of the project or as long as there is a budget to keep the platform running. The platform would be a real success if other departments would say we need the platform and the citizens that use it would notice they are missing some functionalities that the platform provided (Montag, 2018).

5.4 Decidim (Barcelona)

Introduction

Decidim is a free open-source participatory democracy platform for cities and organizations that makes it possible for democratic organization by making proposals, joining public meetings, make decisions through different forms of voting and monitor the implementation of decisions (*Decidim*, 2018). Next to this, it is possible to configure participatory processes and participatory budgeting

as it is possible to discuss and set up priorities with citizens or members of the organization, estimate the price of projects, open these projects to voting and monitor results (*Decidim*, 2018). Additionally, Decidim is aimed at three different parties. The first is citizens that can join community meetings, contribute to feature specifications, discuss over the platform and meet other people (*Decidim*, 2018). Developers and researchers can contribute to the open-source code, join research teams, write documentation and join the technology committee (*Decidim*, 2018). And finally institutions can 'deliver the best experience' by improving democratic quality, making their institution smarter, opening their governance and letting their members or citizens self-organize.

Strategy

Citizen form a core part of the goals of Decidim as it is about participatory democracy in which citizens can vote and come up with new proposals. Barcelona is a city that is increasingly becoming digital and this platform is one way in which the people have a say in the public sector, where the data and citizen infrastructure has to be public and not privately managed (where the exploiting of the public sector becomes a source of money for corporations) (*Decidim*, 2018). The concept of participatory democracy itself is to retake the power of the people from the representatives as the sovereignty belongs to the people (*Decidim*, 2018). As such, the goals will be seen as *high.*

Decidim makes use of indicators and KPIs to guide the platform (Aragon, 2018). In addition to this, the platform presents data visualization about the amount of participants, proposals, action plans, physical participants, meetings, proposals accepted, active users and online interactions (*Decidim*, 2018; Aragon, 2018). These statistics are currently being expanded in collaboration workshops and seminars with experts to discuss which metrics and indicators should be used and how they should be presented (Aragon, 2018). With this, objectives and their indicators is *high* too.

In terms of valuable services, the entire platform is developed as a service that could be valuable for the citizens (Aragon, 2018). With this, behind the platform itself there is also a community that votes on functionalities and features they want on the platform, which then gets taken into a monthly assembly and monthly research seminar to see whether and how this desired functionality can be implemented into the platform (Aragon, 2018). Valuable services can be seen as *high* as well.

Governance

Both the relational control as well as the gatekeeping can be seen as *high*. Any party that wants to join the Decidim project has to follow the social contract (Aragon, 2018). This social contract guarantees that transparency and citizen collaboration in participatory processes is upheld. Additionally, the platform

must be transparent, traceable and integrity must be upheld (*Decidim*, 2018). By ensuring this social contract is upheld, the level of gatekeeping is high as parties are not allowed to join the platform's ecosystem if they do not adhere to the social contract, while the contract creates norms and values to shape the behaviors of parties in the ecosystem. Next to this, citizens are required to register to verify their identity to vote on proposals that could affect Barcelona (Aragon, 2018). Additionally, the meta-community where decisions vote on the development of the platform itself serves as a way of relational control.

The data access and ownership definition is are clearly defined in the sense that Decidim specifies no data shall be transferred to third parties and personal data will not be used beyond what is necessary for user registration and verification (*Decidim*, 2018). With this, data access and ownership definition is **high.**

In terms of incentives, while there are no monetary incentives, citizens are actively being stimulated to engage with the platform. This mainly stems from the fact that the platform makes it possible for citizens to reach their own goals by coming up with an initiative on the platform, gain support for an idea and to bring their initiative to power (*Decidim*, 2018). As such, incentives will be categorized as **high**.

(Perceived) Trust

The (perceived) trust will be categorized as **high.** The social contract was created as the developers of the platform believe merely having a technological code and contract are not sufficient to preserve the democratic systems (Aragon, 2018). In addition, as the platform itself is being develop along recommendations given by the community behind the platform, this improves trust (Aragon, 2018). Next to this, metrics are actively explored and presented to citizens.

Citizen Engagement

Citizen engagement is **high**. Active engagement from the side of the citizen is almost required as the platform allows for the creation of proposals, support of ideas and bringing initiatives to power, but these all require the citizen to propose the idea. Additionally, the meta-community effectively decides which direction the platform is going to be developed towards, which requires active proposals.

Case Overview

Table 11: Case Overview Decidim.

Variable	Level	Indicator
Strategy		
Goals	High	*"... have a direct implication in policy making and community building rather than just having many citizens participate in the platform. For me, that is one of the main goals of this effort"*
Objectives and indicators	High	*"... general statistics like participants, proposals and so on ... new metrics will be incorporated and also some visualizations so you can understand how these metrics are involving over time"*
Valuable service	High	*"The community helps to test new functionalities ... they were polled and the most wanted ones were integrated in the following development plan"*
Governance		
Gatekeeping	High	*"Decidim has the social contract that specifies not only how the code has to be done but also how these processes have to follow some specific principles in terms of integrity, usability and so on."*
Relational control	High	
Data access and Ownership definition	High	*"No personal data will be shared with third parties ... personal data will not be used beyond beyond the purposes of what is strictly necessary for user registration "*
Incentives	High	*"Participants get access to collect support and bring their initiative to power"*
(Perceived Trust)	High	*"The social contract includes transparency, traceability and integrity"*
Citizen Engagement	High	*"The community, and also the team in charge of Decidim, identifies new upcoming challenges so experts are identified every month to solve the work or start a debate"*

Further insights

Both on the website as well as in the interview Aragon (2018) the emphasis is largely on either the social contract or the meta-Decidim community. The social contract provides an answer to nearly every aspect of the governance covered in the thesis, while the meta-Decidim community covers the other aspects. Through initially polling the community for what they would like to see on the platform and then inviting experts to discuss the topic and evaluate

indicators, the aspects of the strategy are covered. This combination has led to relatively widespread adoption as over 30.000 participants have made use of the platform, which is much larger than any other platform studied in this thesis (Aragon, 2018). This large adoption compared to the other urban platforms could be explained by Decidim being an experimental platform on which the 'Smart City 3.0' concept, and subsequently the urban platform concept, is based. As such, it might have been too soon to compare this case to the earlier three as they are following the Horizon 2020 time-line and are substantially behind in development when compared to Decidim. However, this can also serve as taking Decidim as an example and providing recommendations based largely on Decidim as the platform has progressed further, leading to valuable insights for platforms wanting to engage their citizens.

Additionally, where this case largely differs from the previous three cases is that the previous cases focused on involving businesses first and citizens second, while the Decidim project focuses almost entirely on citizens but has seen businesses adopt their platform as well (Aragon, 2018). One such example is a company in France that has built a business on installing the Decidim platform in different organizations and councils in France.

Decidim, and the Our MK platform below, are both platforms that are not being developed by municipalities (as opposed to the previous three cases where the municipality has a lead role). While the development of the platform was mandated by their city councils, all development is in the hands of the cooperating entities within these platforms. This might play a role in the goals and KPIs set as the municipalities have been mandated to reach certain goals and indicators and do not have the necessary freedom to change these KPIs, while businesses or universities

5.5   Our MK (Milton Keynes)

Introduction

The Our MK platform was a part of the MK:Smart platform, which is the smart city project platform of the city of Milton Keynes (Gooch, 2018). This platform involves 18 core partners and 7 work packages that were meant to connect to a central data hub and these work packages were centered around particular domain issues such as water, energy, transport, education and community engagement (Gooch, 2018). Within this MK:Smart platform, the Our MK platform centered around ensuring a bottom-up, community-driven input to the design of the project activities, complementing the top-down specification developed by the project team (*Decidim*, 2018). The Our MK project already finished by the time of writing this thesis, but the project has some very valuable insights and as such will still be studied, albeit in the past tense.

Strategy

The Our MK platform was entirely developed with the engagement of citizens in mind. When putting the consortium together, there was a recognition that a lot of smart city programs fail through a lack of citizen engagement, particularly in the energy domain where technology is introduced without buy-in from end-users (Gooch, 2018). In line with this, the purpose or Our MK is to demonstrate that citizens have information that technologists and city planner do not always know about, in addition to having different needs, desires, perspectives, timescales and knowledge regarding problems they have and how to solve those problems (Gooch, 2018). Often times the scope of ambition and timescales are mismatched as these large scale projects look at 5-10 years down the line, whereas a citizen has an issue right now that often times can be solved with a simple solution (Gooch, 2018). As such, goals will be categorized as *high.*

In terms of indicators and objectives, this is also *high.* There were KPIs built into the bid that were centered around the number of projects funded, the number of project ideas sourced and the number of citizen innovation projects that attracted external funding (Gooch, 2018). These KPIs are all citizen-oriented. However, as the people worked on the project they changed the last KPI to guide it more towards the sustainability of the project in terms of whether the projects funded will continue having an impact even when the funding stops (Gooch, 2018). Next to these KPIs, other statistics were looked at such as the number of people spoken to, number of people seen as workshops and number of website visits (Gooch, 2018). These were not as important as the main project KPIs but they did provide insight into the reach into the city the platform project had.

Valuable services will also be categorized as *high* as citizens had the ability to propose their own projects on the platform and receive (crowd-)funding and support from the platform (*MK:Smart Citizens*, 2018).

Governance

The gatekeeping can be seen as *high.* The high level of gatekeeping stems mostly from the fact that the Our MK platform did not allow for businesses to apply for funding as initially start-ups and social enterprises also applied for funding (Gooch, 2018). Next to this, only residents from Milton Keynes were allowed to participate. The projects applying for funding must also fit within three project aims: achieve impact for Milton Keynes, involve some form of technology and show the potential to attract further funding to develop the idea (Gooch, 2018). The level of relational control is also *high*. This stems mostly from the fact that all showcase applications were developed by the MK Data Hub team (Gooch, 2018). Part of that specific work package was also develop training material but this was a collaborative development setup where the MK Data Hub team would support the in-house developers (Gooch, 2018). Next to this, the project

aims must be adhered to and in the platform projects that did not adhere entirely to the project aims were sent to different guidance (Gooch, 2018).

Data access and ownership definition is *high* as the owners of the data have fine grained control over what is allowed to be done with their data (Gooch, 2018). There are a variety of licensing options in addition to having data on the data hub but anonymized so no one can see it is your data (Gooch, 2018).

In terms of incentives, this will also be categorized as *high*. This is due to the fact that citizens have to create their own proposals for their projects in order to be eligible for funding from the platform and as such are incentivized to actively engage (Gooch, 2018).

(Perceived) Trust

The (perceived) trust was *high.* This can be attributed mostly to the fact that there were two ways in which citizens were made aware of the project, the Our MK website and a Community Action Milton Keynes (CAMK) team. The Our MK platform collects feedback and ideas and facilitates volunteering for projects that were successfully funded in order to get the projects off the ground (Gooch, 2018). The CAMK team went out into the city and engaged in an active dialogue with the citizens where they could explain the benefits of the platform and as such improve trust (Gooch, 2018). This was one issue the Our MK platform team had with setting up the website as this is very much a case of presenting some information and getting a citizen to just read it, where through a conversation it is much more possible to establish the needs of the citizen and what benefits could result from engaging with the platform (Gooch, 2018). As such, the website was revised many times in order to define a narrative that worked online (Gooch, 2018).

Citizen Engagement

Citizen engagement was *high* to the point the platform is seen as a best practice regarding citizen involvement by the EIP-SCC (EIP-SCC, 2016a). There were generally two separate approaches to citizen engagement, with overlap between the of them. The CAMK team was the more active approach where feedback would be gathered through talking with citizens and seeing what problems they are encountering. The Our MK platform itself was more of a medium-level (as categorized in this thesis) citizen engagement as they did take into account to alter the platform but it was mostly passive (Gooch, 2018). However, as the projects that wanted to receive funding had to propose this to the platform by themselves rather than this initiating from the platform, combined with the CAMK team's outreach efforts, the citizen engagement will be categorized as high. Additionally, Gooch (2018) observed that citizen engagement is different for different people. For professionals that do not have a lot of free time a top-down approach works better where they can look at some decisions and vote

(Gooch, 2018). The citizens that were typically engaged were either extremely active in their community or had a relatively high amount of free time available (Gooch, 2018).

Case Overview

Table 12: Case Overview Our MK.

Variable	Level	Indicator
Strategy		
Goals	High	*"... as an engagement team we thought it was an important part of the citizen program"*
Objectives and indicators	High	*"Our interpretation of what that KPI was talking about was the sustainability of the project, in terms of "we funded this project, is it going to continue having an impact of the city?""*
Valuable service	High	*"... it had a momentum behind it so that these smaller concerns, which citizens would typically struggle to get raised, were actually being raised at quite high levels within the council"*
Governance		
Gatekeeping	High	*"We decided not to fund for-profit companies simply because the project also had a work package which was meant to be integrating with businesses so that was just deemed outside of our scope"*
Relational control	High	*"That said, some of the social enterprises we worked with fit that kind of grassroots approach. Because they're community-based they funnel their money back into themselves or the community so we didn't want to rule those out"*
Data access and Ownership definition	High	*"No, the data owner has quite fine grained control over what can be done with their data"*
Incentives	High	*"in a way that made explaining the benefits easier because you are having a dialogue with people"*
(Perceived Trust)	High	*"I think those people that we successfully engaged could really see the value of the Our MK initiative"*
Citizen Engagement	High	*"with their work with citizen groups, community action would talk about the platform ... I'd agree there was that kind of passive and active approaches but sometimes people came to us from funny directions"*

Further insights

The Our MK platform had quite clearly defined KPIs and goals within their work package, but in certain cases where citizens proposed a project this actually worked negatively. One of the main challenges was that there were at least two project proposals that were going to have huge social benefits for the communities they were based in (Gooch, 2018). However, these projects did not fit entirely within the project aims and funding Smart City projects so they could not receive funding because of a lack of technical innovation (Gooch, 2018). This issue did get mitigated by the involvement of the Community Action team, as aside from supporting the Our MK platform this team has other funding programs which led to most of these projects receiving funding in another program (Gooch, 2018).

Another challenge they encountered was that in some cases the citizens leading the initiatives were not particularly technically literate. This was counteracted by the presence of technically skilled volunteers to support them, such as volunteer app developers, and ensure the project would be eligible for funding (Gooch, 2018). During the project it was also encountered that rather than look for technological innovation, 'innovative data' was actually sought (Gooch, 2018). Data that could not be extracted in other ways.

And lastly, the largest challenge encountered was the financial constraint. There was no particularly large marketing or advertising budget so they had to look for creative ways to get the platform out there (Gooch, 2018). Additionally, the project had buy-in from a high level in terms of the city council. However, as the UK is going through a process of austerity where there is less money available, the city council had to return to their statutory duties instead of supporting these innovations (Gooch, 2018). Due to the broader financial situation the city council could not be as open to innovation as it would have liked to have been.

5.6 Cross-case analysis

In this subsection, the cross-case analysis is discussed. The case overviews created during the within-case analyses will be summarized and the propositions will be accepted or rejected based on how many of the cells are in their expected cells. If over half of the cells are in the expected cells, the proposition will be accepted. If less than half of the cells are in the expected cells, the proposition will be refuted. So if the proposition states that a higher level of gatekeeping leads to a higher level of trust, the proposition will be accepted if in over half of the cases both the level of gatekeeping as well as the level of trust is *high*. Similarly, in the table if there is a low level of gatekeeping and a low level of (perceived) trust, the cells are also in their expected locations and as such the proposition will be accepted. However, as the cases provided additional insights

and challenges they overcame, the propositions will be reflected on to determine whether they hold true and the conceptual framework will be revised. Additionally, not all of the propositions can be answered through this categorization so while in the table below a proposition can be accepted, through reflecting on the propositions it will be examined whether the proposition itself is still valid.

Table 13: Cross-case overview.

Concept	Digitale Stad	Open Data Platform	Muenchen.de	Decidim	Our MK
Strategy					
Goals	Low	Low	Low	High	High
Objectives and indicators	Low	Low	Low	High	High
Valuable service	High	Low	High	High	High
Governance					
Gatekeeping	Low	Low	High	High	High
Relational control	Low	Low	High	High	High
Data access and Ownership definition	High	High	High	High	High
Incentives	Low	Low	High	High	High
(Perceived Trust)	Low	High	High	High	High
Citizen Engagement	Low	Low	High	High	High
Propositions					
Proposition 1	Yes	No	Yes	Yes	Yes
Proposition 2	-	-	-	-	-
Proposition 3	Yes	No	Yes	Yes	Yes
Proposition 4	Yes	No	Yes	Yes	Yes
Proposition 5	Yes	No	Yes	Yes	Yes
Proposition 6	No	Yes	Yes	Yes	Yes
Proposition 7	Yes	No	Yes	Yes	Yes

Based on the table, it could be argued that, with the exception of proposition 2, every proposition will be accepted as 4 out of 5 cases confirm each proposition. While this could be true, it is unlikely that this presents all of the concepts related to citizen engagement and it is more likely that some aspects have not entirely been taken into account. As such, using rival explanations and further developing theory through the additional findings gathered from the cases, each proposition will be qualitatively reviewed to determine whether it has to be changed or whether the current explanations based on the theory from the theoretical background chapter are sufficient to confirm the proposition (Yin, 2013a).

5.6.1 Reflection on Propositions and Additional Findings

Proposition 1: *A higher level of trust leads to a higher level of citizen engagement in an urban platform*

With the exception of one case, the proposition was supported based on the categorization conducted in the within-case analysis. However, this can largely be attributed to the perception of trust of the interviewee. Only one interviewee indicated that they think, that in the eyes of citizens, another party being the platform owner might generate more trust (van der Heijden, 2018). Additionally, resulting from the questionnaire it is doubtful that asking questions regarding trust even results in useful insights as the platform representatives in the questionnaire answered questions regarding trust and how they are viewed by participants in their ecosystems, but then in a follow-up question it turned out only 1 respondent (out of 23) had actually measured trust or a proxy of it.

This aligns with expectations from literature that while trust forms a core part in research regarding engagement in smart city projects, it is a broad concept that has traditionally been difficult to define and measure (Rousseau et al., 1998). As such, it is necessary to ask the citizens themselves how much they trust different aspects of the platform and make the platform owners aware that these aspects are valued by citizens. In doing this, the validated measures of trust discussed in the theoretical background chapter can also be applied as these have been extensively validated from the perspective of the trustee (Yang and Callahan, 2007; Bachmann and Inkpen, 2011; Carter and Belanger, 2005; McKnight et al., 2002)

Proposition 2: *Communicating the strategy is positively associated with (perceived) trust.*

Reflecting on the second proposition, the way the proposition is formulated does not allow for categorization in the cross-case analysis, while the propositions would have been accepted if the three aspects of the strategy were accounted for as separate propositions. The goals and objectives were seen as a part of the strategy as this was a commonality in many definitions regarding strategy (Smolka, 2015). Additionally, the offering of a valuable service that attracts users to the platform was also taken into account as part of the strategy as it concerns the way in which the platform owner intends to reach these goals and objectives. These aspects of the strategy were then categorized based on the degree to which they involved citizens. However, as was found in the Muenchen.de platform, a valuable service was developed to attract citizens despite not having the objectives and goals geared towards citizens. This was due to the fact that this application needed to have benefits that would lead the citizens to use it, so that the application could gather data that can then be used to track performance on the goals and objectives that were set. The communication itself, rather than just

the communication of the strategy, appears to be a much more important factor as noted by the cases. Muenchen.de is creating trust by building a transparency dashboard where citizens can see what data is being collected and for what purpose it is being collected. Next to this, they are creating trust by installing sensors that are not invasive before moving on to other projects that allow for more data collection. This is done in active dialogue where the citizens are asked what they would accept and what they would not accept in addition to what the benefits would be of participating in such projects (Montag, 2018). In Our MK the same was observed where in a face-to-face dialogue it was much easier to convince citizens to trust the platform as it was possible to explain the benefits in a dialogue, whereas on the website this was much more difficult to do as it was just a provision of information (Gooch, 2018).

In the case of urban platforms run by municipalities it also appears these goals and objectives largely get dictated by a project owner higher up and the municipalities that are in control of developing the platform can not really effectively make use of these goals as the timescale is too large to develop the platform along these goals and objectives. While in the case of Our MK, the team working on the development of the platform saw that a KPI did not measure what it was intended to measure and they changed the indicator in order to align it more with what the project was intended to achieve (Gooch, 2018). Additionally, van der Heijden (2018) believes the development should be an iterative process where through co-creation with the parties involved the desired solutions are reached and adapted based on findings during development. Next to this, in the Decidim case the citizens themselves had a say in the goals and direction of the platform and experts were invited to seminars in order to discuss these goals and define proper indicators for them (Aragon, 2018).

As such, while this proposition will not get refuted it does require further research into communication as a separate variable and the relation of citizen engagement to the strategy itself must also be looked at in order to determine the effects of citizens having a say in the strategy and direction of the platform.

Proposition 3: Network effects will lead to a positive relationship between citizen engagement and trust

While network effects could lead to a positive relationship between citizen engagement and trust, the way the proposition is written, leads to the proposition being accepted if proposition 1 is accepted as well during the cross-case analysis. Theory points to the importance of network effects but, aside from Decidim, the urban platforms studied do not have sufficient adoption to the point where network effects are really relevant. Aragon (2018) is still looking into these numbers and will be analyzing this, but currently this information is not available.

Studying network effects will require the further development of urban plat-

forms and the purposeful selection of urban platforms that have seen large user adoption in combination with having these numbers available so an analysis can be performed.

Propositions 4 and 5 : *Higher levels of gatekeeping and relational control lead to a higher level of (perceived) trust in the urban platform*

For the reflection on the propositions 4 and 5, they will be combined as they stem from the same aspect of platform governance by Tiwana (2013) and follow largely the same reflection. These two propositions can be confirmed but it should be noted that they were categorized in terms of all parties that are part of the platform ecosystem rather than just the app developers (Tiwana, 2013). As such, this made the categorization to be more likely to be high as the cases often included requirements for certain parties, such as Our MK not allowing businesses to propose projects for funding on their platform (Gooch, 2018).

Proposition 6: *The level of (perceived) trust will be higher with clear data access and ownership definition than without*

This proposition can also be confirmed and one main driver towards having this data access and ownership clearly specified is the GDPR that has gone into effect on May 25th and requires the appointment of data protection officers by all public authorities that have an expert knowledge of data protection law and practices (Burgess, 2018). Additionally, the GDPR gives individuals a lot more power to access the information that is held about them (Burgess, 2018).

Proposition 7: *Citizen engagement will be higher with incentives than without incentives*

This proposition can also be confirmed. The three platforms that provided clear incentives for citizens all three had active citizen engagement. Muenchen.de stimulated the engagement of citizens through a gamification approach where they could compare and improve their use, Decidim makes it possible for citizens to reach their own goals by coming up with ideas and their suggestions get implemented in the platform through the meta Decidim community and Our MK funds projects that fit the platform aims (Gooch, 2018; Aragon, 2018; Montag, 2018).

5.7   Revised Conceptual Framework

Based on the cross-case analysis and the reflection on the propositions the revised conceptual framework is presented in figure 6. The relations between concepts that have a dotted line are relations that still require further research and could not be conclusively answered through the case study.
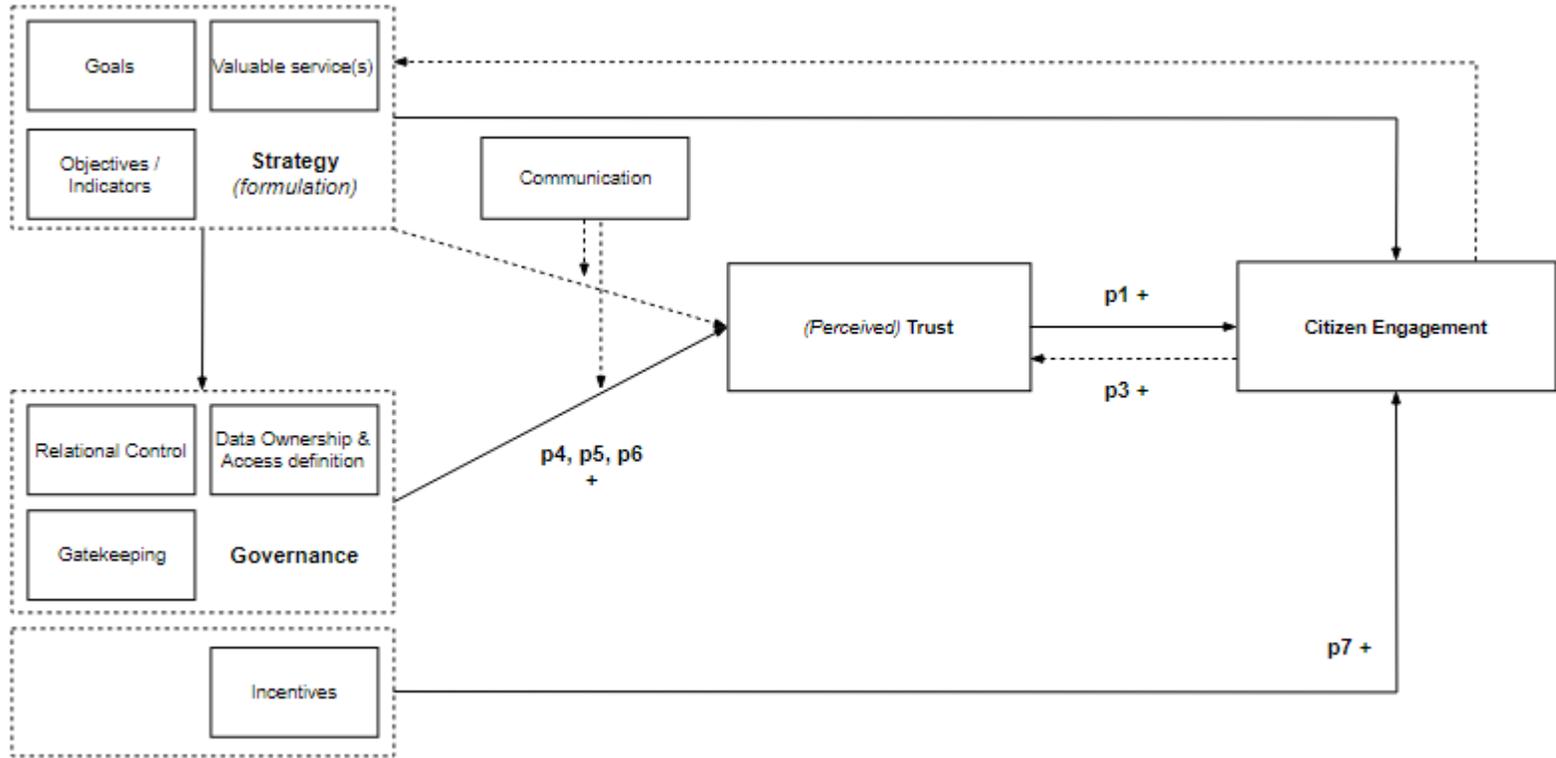
Figure 6: Revised conceptual framework.

6 Discussion and Conclusion

In this chapter, first the main findings regarding the research question and the sub-questions will be reviewed. The propositions themselves were already reflected on through the cross-case analysis but in the discussion subsection the theory from the theoretical background chapter will be linked to the findings. In addition, literature will be assessed in order to provide a new theoretical base for the revised conceptual framework where the case study findings pointed towards new research as the empirical findings were insufficient for conclusive statements. After this, managerial recommendations will be given and lastly the limitations and future research will be discussed.

6.1 Main findings

The main research question was to research how strategy and governance affect citizen engagement in urban platforms. This was guided by four sub-questions for which the main findings will be presented in this subsection.

1. How far into development are the urban platforms?

There are large differences in how far into development the urban platforms are. Out of 34 respondents in the questionnaire, 23 respondents answered questions regarding the involvement of citizens. Out of these 23 respondents, 14 respondents claimed that the platform was operational. However, this was often in combination with another stage of development. Excluding these respondents and thus only taking into account respondents that had an entirely operational platform, 7 operational platforms remained.

When following-up on these respondents, it turned out that the respondents that noted they were operational were barely operational or had just left the planning phase. Out of the cases studied, the two cases that were taken from the best practice recommendations regarding smart platforms were the only platforms that had developed the platform to a point where measurement of adoption could be relevant. Muenchen.de had just left the planning phase, while Digitale Stad is still in a pilot phase. Open Data Platform Utrecht does have a functional website but this is aimed towards businesses. This could serve to explain why there has been no research regarding citizen engagement in urban platforms despite literature pointing towards the benefits of including your residents in the urban planning which can be facilitated by the urban platform.

2. Is the engagement of citizens included in the strategy of urban platforms?

Looking at the questionnaire, 18 out of 23 respondents agreed highly to the

co-creation of city services and outcomes with businesses and citizens being one of their urban data platform goals. 17 out of 23 respondents agreed highly to the engagement and empowerment of citizens and making the city more inclusive being one of the platform goals. However, no respondents agreed highly to citizens having been consulted in the design of their urban platform, in addition to no respondents indicating they use KPIs that include citizens or their engagement.

Looking at the cases studied, two platforms that scored low on goals and indicators (in terms of goals and objectives being aimed at citizen engagement) also scored low on citizen engagement. Muenchen.de, however, scored low on these goals and objectives being aimed at citizens, but as they saw the value in including your citizens and communicating with them in order to be able to reach the actual goals and objectives of the platform, citizen engagement was still a part of the strategy. It just was not a part of the initial formulation of the strategy. Decidim and Our MK clearly had the engagement of citizens as a part of their strategy but these platforms are developed nearly entirely for citizens. As such, the formulation of the strategy does not necessarily have to include citizens as noted in the Muenchen.de case, but thinking of including citizens early on during the formulation of strategy does lead to the development of the platform being guided towards the engagement of citizens. Additionally, where for Digitale Stad and Open Data Platform Utrecht the priority lies in businesses, in Decidim and Our MK the priority lies on citizens and both platforms attracted businesses to the platform (Aragon, 2018; Gooch, 2018).

3. Does the governance model of Tiwana (2013) hold true for urban platforms?

While the propositions regarding the governance of the platform were confirmed, they were expanded from their original definitions in order to have a categorization that aligns more with the urban platforms studied in this thesis. This was done as the urban platforms differ from data platforms in the sense that not only applications get developed on top of the platform, but, taking Decidim as an example, citizens can open their proposals, estimate the price of projects and monitor results (*Decidim*, 2018).

As such, while the governance model does not entirely align, it still provided a valuable direction for the governance of the platform. However, this governance model is better served to study the underlying urban data platform which does form the core of the urban platform but is only the first step of it (EIP-SCC, 2015). Further research should be conducted from the perspective of the citizens to determine which aspects of the platform governance of Tiwana (2013) are relevant.

4. Which approaches to citizen engagement are urban platforms taking?

Digitale Stad and Open Data Platform Utrecht are currently not engaging citi-

zens other than Open Data Platform Utrecht providing an options for all users of the website to provide feedback. This is not to say that they do not see the value in engaging with citizens, but the timescale of Digitale Stad has meant citizens have had no place in the development of the platform, while the Open Data Platform is currently aimed entirely at the exchange of data and there is no real value for citizens until more applications are developed that could provide direct benefits for citizens.

In Muenchen.de there are two main ways of engaging with the citizens. The first is through a specialized team called the Urban City Lab holding open consultations for local residents and stakeholders (Montag, 2018). However, these open consultations are not so successful (Montag, 2018). They are open in the sense that citizens can visit them and some do, but more successful for Muenchen.de have been the co-creation and design workshops with a number of really engaged citizens. This direct dialogue between the expert planners and local residents helps ensure that user-centric solutions are developed in accordance to what citizens. This way of engaging with the citizens has been more successful and has led to the development of the transparency dashboard and the smartcity app (SmarterTogether, 2018).

Decidim has the meta-Decidim community behind the platform that co-creates the platform and is polled based on what they would like to see from the platform (*Decidim*, 2018). Similar to Muenchen.de, these are then taken as topics for the following workshops where the topics get discussed together with experts in those fields to determine whether this would be a relevant addition to the platform and what suitable indicators are (Aragon, 2018).

Our MK takes two approaches to engagement, where one is more passive through having the platform that citizens need to provide their own proposals on, and one is more active where a community action team ventures into the city and discusses with residents what issues they are encountering in the city and how these can be solved (Gooch, 2018). There is a distinct difference between the two as the online platform is simply providing the information while in a face-to-face conversation the benefits of the platform can really be explored and personalized for that specific conversation (Gooch, 2018). This again points to the importance of communication. Additionally, Gooch (2018) notes that different citizens require different approaches.

How do strategy and governance affect citizen engagement in urban platforms?

With the revised conceptual framework based on the case study it is proposed that strategy and governance affect citizen engagement in two ways. The communication of the strategy and the governance is likely to lead to the generation of trust in citizens which means that they are more likely to engage with the platform (Gooch, 2018; Montag, 2018; Lee et al., 2017). The benefits of the platform can be explained and through communicating the governance to the citizens

their trust can be generated through parties that could misuse the data not being allowed into the platform ecosystem and the existence of shared norms and values increasing trust (Doney et al., 1998; Lee et al., 2017). Building on theory from platform ecosystems, the trust between platform owners and users (in this case citizens) is seen as a prerequisite for success (Lee et al., 2017, p. 3).

Additionally, as the strategy concerns the direction of the platform it is likely that citizen engagement finds its roots in the formulation of the strategy of the platform. If the engagement of citizens is identified early on in the platform as a key success factor, the platform will likely be developed with the engagement of citizens in mind rather than as an afterthought. This means that in designing the governance of the platform, the incentives will be aimed at citizens and the benefits they receive from the platform and the control mechanisms of the platform governance can be used to generate trust in citizens whereas an open innovation approach is recommended by Tiwana (2013) when focusing on application developers. As such, where the priority lies in the strategy likely determines whether platform owners will seek citizen engagement or whether they will take a more passive approach. Taking a more active approach early on can result in citizens co-creating the strategy as goals, indicators and which services are desired can be explored together with these engaged citizens rather than being communicated to them top-down from the platform.

6.2   Discussion

In this subsection, the theory from the theoretical background will be reflected upon based on the findings from the questionnaire and the case study. Then, new literature will be assessed in line with the revised conceptual framework to determine whether the empirical findings have support in academic literature. The strategy and governance will be looked at together as they are largely interrelated and changes in the strategy have implications for the governance of the platform, where they both have a relationship with trust through the type of communication as proposed in the revised conceptual framework.

6.2.1   Strategy and Governance

Looking at the literature studied regarding smart cities and strategy, it was found that engaging smart people (who are open to various factors such as lifelong learning, creativity open-mindedness and participation in public life) could lead to greater collective intelligence and an integrated approach to connecting different communities and creating specific services to address city objectives (Nam and Pardo, 2011; Giffinger and Pichler-Milanović, 2007). However, merely including citizens in your vision of a smart city is not enough

and this will need to be supported through the institutional factors, where the governance comes into play (Nam and Pardo, 2011). Nam and Pardo (2011) found that successful smart cities collaborated with different parties through sharing their goals, visions, priorities and even strategic plans of the smart city projects with citizens and other stakeholders (Nam and Pardo, 2011). Taking the commonality between definitions of strategy, the goals and objectives were looked as part of the strategy and how these affect citizen engagement (and how their communication affects trust) (Smolka, 2015; Nam and Pardo, 2011). Based on the cross-case analysis it can be stated that the way in which the goals and objectives are formulated (and whether or not they include citizens) is likely to lead to a higher level of citizen engagement.

However, as was found in the Decidim case, engaged citizens can also have a reverse influence on the strategy, where they propose desired functionalities of the platform and then through a workshop with experts indicators are developed to guide this functionality (Aragon, 2018). Literature regarding empowerment strategies can serve as a base for this relationship as a study regarding consumers' product demand found that customers that were empowered to select which products should be marketed had a stronger feeling of psychological ownership of the products selected (Fuchs et al., 2010).

Nam and Pardo (2011) pointed towards the communication of the strategy as being important to become a trustworthy smart city in the eyes of the stakeholders involved. However, the cases point towards the communication itself, rather than the goals and objectives that form the base of the strategy, being important to generate trust. Montag (2018) noted an active dialogue with both citizens as well as data providers in order to get these stakeholders to understand the benefits of the platform. Additionally, the building of trust is done by beginning with less invasive data collection and through a dialogue with the citizens it is explored what they would and would not accept. Gooch (2018) noted that it was much easier to convince citizens of the benefits of the platform through a face-to-face dialogue and that it took multiple attempts to write a narrative that worked online. The Community Privacy Management (CPM) theory could serve to affirm these findings and the relation with trust (Metzger, 2007). This theory states "individuals develop rules to aid decisions about whether to reveal or conceal private information and thus how to best protect personal privacy" (Metzger, 2007, p. 336). In studying the CPM theory in e-commerce, Metzger (2007) found that the consumers were willing to let go of some of their privacy rules if there are incentives to do so (as was theorized in this thesis). Additionally, results suggest that online marketers will likely have greater success when eliciting less threatening information in order to build up a relationship and ensure trust has been proven before moving on to requesting more sensitive information (Metzger, 2007, p. 357). This appears to be exactly the way in which Muenchen.de is generating trust. However, this will require further research into the topic of communication and whether this holds up in urban platforms.

Taking the recommendations and the three factors (technology, governance and humans) Nam and Pardo (2011) believes constitute a smart city, the research of Tiwana (2013) was taken as a base for the conceptual framework, as this provided an extensively tested framework for aligning the strategy, architecture and governance of a platform. However, as Tiwana (2013) studied platforms in which competition played a large role, the findings from Nam and Pardo (2011) and other literature that emphasizes the importance of citizen engagement in smart city projects was combined in order to apply aspects of the governance Tiwana (2013) to urban platforms. In this thesis, the definitions of Tiwana (2013) were expanded to include all parties in the ecosystem rather than just the application developers as urban platforms are often an extension of the underlying data platform and as such form an entirely different platform. This was the case in Our MK, where the Our MK platform was meant to be developed on top of the MK Data Hub that would then handle the data and generate insights. In this case, there are no app developers as the platform is not intended for the development of applications but rather for the engagement of citizens and funding their proposals. However, in the platform there are clear restrictions for what parties are allowed to apply for funding and sticking to the original definition by Tiwana (2013) would not have allowed for this to be categorized as gatekeeping, despite it being functionally the same.

It was found that a higher level of gatekeeping likely leads to a higher level of perceived trust as when the platform owner can guarantee who is allowed into the platform ecosystem, this generates trust through not allowing parties that could misuse personal data into the ecosystem, which negates one of the concerns of different stakeholders in platforms (Lee et al., 2017). However, this finding is not in line with findings by Tiwana (2013) in which a more open platform leads to higher evolutionary performance. In this, there is a discrepancy between what would be best for app developers and the generation of trust of the citizens. Part of the strategy is the development of a valuable product or service, but if the platform performance is lower because of fewer applications being developed there will need to be research as to what the trade-off between the level of gatekeeping and the development of valuable or attractive services on the platform is.

Similar to gatekeeping, relational control likely leads to higher levels of perceived trust (Doney et al., 1998). However, as Gooch (2018), Montag (2018) and Aragon (2018) noted it is important to have a dialogue with your stakeholders. This dialogue can convince the citizens (or other stakeholders) that there is indeed a shared system of norms and values.

In terms of data ownership and access definition, while this has been a concern in the past, the GDPR has resulted in organizations being required to specify who is accessing their data and where the ownership of the data lies as they could face substantial fines for not complying (Burgess, 2018).

As such, where the largest theoretical contributions lie regarding the strategy and governance is that theories by Tiwana (2013) and Nam and Pardo (2011) are validated and expanded to form a conceptual framework for further studying urban platforms. The findings of Nam and Pardo (2011) regarding the fundamental components of a smart city are applied to form the base of the urban platform. In this it is found that starting with people from the human capital side, rather than blindly following technology, is a recommended approach even in urban platforms (Nam and Pardo, 2011). Despite this, in practice the technological developments often still take a priority despite citizens being able to contribute ideas in order to ensure that the technology being developed is something that is wanted by the citizens, rather than forcing a platform onto the citizens that they have no need for. Research in this specific context is thus an addition to the findings by Nam and Pardo (2011) and Tiwana (2013) as the urban platforms are a novel concept to which this literature had not been applied yet.

Additionally, validating the aspects of the governance of the framework by Tiwana (2013) is a recommendation for research opportunities as identified in his research commentary (Tiwana et al., 2010). In the research commentary, Tiwana et al. (2010, p. 679) states there exist research opportunities around how platform governance influences the evolutionary dynamics of ecosystems and modules in platform settings, where modules are defined as add-on software subsystems that connect to the platform to add functionality to the platform. In this thesis it was found that the functionality of the platform likely plays a large role in getting citizens to use the platform as there is a trade-off between perceived benefits and their concerns regarding privacy (Lee et al., 2017). Additionally, this thesis serves as an indication that the framework by Tiwana (2013) can be expanded beyond software platforms. Next to this, taking into account the active dialogue with citizens and their feeling of psychological ownership through being empowered could serve as an area of expansion for the model by allowing the end-users to partake in the design of the governance of the platform and stimulating the psychological ownership which could lead to higher evolutionary dynamics (Tiwana et al., 2010; Tiwana, 2013; Fuchs et al., 2010).

6.2.2 Trust

From the theory studied in the theoretical background chapter it became evident that trust forms a central concept in engaging in a relationship with another party and to provide private information (Belanger et al., 2002; Carter and Belanger, 2005). In a study regarding the adoption of e-government it was found that despite the clear benefits e-government initiatives have, the success and acceptance of them largely depends on citizens' trust in the agency running the initiative (Carter and Belanger, 2005). In this thesis it was also found that citizens'

engagement with the platform is likely contingent on the trust they have in the platform through the (communication of) the strategy and governance (Nam and Pardo, 2011).

However, in the questionnaire only 1 out of 23 respondents had measured trust. As such, rather than study trust as perceived trust and what the platform owners are doing to stimulate this trust it is recommended to measure trust from the perspective of the citizens. This would allow the validated measures of McKnight et al. (2002) and Carter and Belanger (2005) to be studied in the context of urban platforms and whether the citizens trust these platforms and their owners.

6.2.3 Citizen Engagement

Citizen engagement forms the main topic of this thesis but as was found during the questionnaire, many of the urban platforms that are part of the Horizon 2020 project have not progressed to a point where citizen engagement becomes relevant due to their large timescales and the projects only just starting to research the value of their platform and the benefits it could bring to citizens. As such, while in the theoretical background chapter Head (2007) builds on the five levels of public participation and example techniques to engage the public in each of these levels, the success of these different techniques could not be verified in this thesis as it is too soon into the development of these platforms to test this. As these urban platforms are largely following the same timescales and answers to the questionnaire indicated that they were deploying new, expanded, versions of their platform together with more extensive citizen engagement within the coming months it is recommended that the theory by Head (2007) gets revisited once the development of urban platforms has progressed to the point where it is possible to look into the success of the different engagement approaches.

Additionally, while through the cases an indication was given of which approaches were successful, this is still only one side of the story. Surveying citizens to determine how they perceive different approaches to their engagement could serve as a valuable alignment between what the platform owners are trying to achieve and what would work best from the perspective of the citizen.

6.3   Managerial implications

In this subsection, the managerial implications will be discussed based on the empirical evidence (findings) from the cases in addition to recommendations

stemming from theory. First, general recommendations will be given that could apply for the engagement of all stakeholders in the platform. Then, based on the empirical evidence recommendations will be given for the engagement of citizens specifically.

Firstly, it is recommended to clearly define the boundaries and scope of the platform so that the strategy can be defined accordingly. An urban platform that strives to be purely a data platform that facilitates the development of applications will likely benefit more from a focus on app developers, while an urban platform that strives to facilitate participatory governance will likely benefit more from a focus on citizens themselves in order to get them engaged.

In line with this, involve your most important stakeholders in defining the strategy. Discover what it is these stakeholders value in your platform and ensure that your governance is designed in a way that maximizes their value. Where strictly governing who is allowed into the platform ecosystem is likely to lead to higher trust from the citizens, it is theorized that this strict governance could lead to lower innovations in a data platform (Tiwana, 2013). Thus, the governance should accommodate the needs of these stakeholders and through involving your most important stakeholders they will be more likely to accept this governance compared to when it is forced upon them and they had no say in it.

Looking at citizens specifically, it is recommended to have incentives and the creation of a valuable service to attract your citizens. These incentives do not have to be monetary but they could also be a benefit model for the citizen which explains what the benefits are they would receive from engaging with the platform in order to stimulate this engagement. Additionally, to get citizens really engaged it is recommended to hold a direct dialogue with them in which you can tailor these benefits to their needs and through holding co-creation workshops these needs can get explored with your most engaged citizens so that you can allocate your resources most effectively.

Lastly, it is recommended to create trust in your citizens and have different approaches for your citizens. This can be through the direct dialogue above for the really engaged citizens, but it can also be through the creation of a transparency dashboard as is being developed in Munich, where citizens can visit the website and be presented with an overview of what the project is trying to accomplish and for what purpose the data is being developed. This is likely to be effective for most citizens as they do not have time to visit all of these co-creation workshops in order to be aware of what is going on. Additionally, create trust through implementing sensors and data collection that is less invasive in order to build trust and through the dialogue explore what your citizens would or would not accept before attempting to implement something that could be seen as invasive by your citizens.

6.4   Limitations and Further research

In this final subsection the limitations and recommendations for further research will be discussed.

Firstly, the definition of urban platform was expanded from merely data platforms and was made to include the platforms that get developed on top of these data platforms so long as they are aimed towards improving the city, as it is through these platforms that citizens get engaged and it is much less likely the citizens will be in contact with the data platform itself. However, as this definition was taken from practice rather than from established theory it has resulted in an unclear boundary of these platforms. The underlying data platform on which the urban platforms are built processes the data which can then be used to track performance for the urban platform and create, for example, transparency dashboards to engage citizens. However, it is unclear where this urban platform ends and whether concerns regarding the data platform itself also apply for the urban platform. As such, while for this thesis this was in line with the purpose of the exploratory research in order to gain valuable insights from different types of platforms within the broad concept of urban platforms, for future research it is recommended to focus on one specific type of platform and apply theory regarding specific aspects of the framework to it. Taking the cases as example, for studying platforms similar to Open Data Platform Utrecht it would be recommended to take the theory from Tiwana (2013) and study this entire theory in-depth to determine which aspects of the governance hold true in an urban context. Looking at platforms such as Decidim it would be recommended to look towards specific theories regarding participatory democracy and participatory budgeting.

One main limitation regarding the literature by Tiwana (2013) is that the architecture and the governance of a platform should be taken into account together. However, as the underlying architecture is likely not something citizens can contribute to, in addition to Tiwana et al. (2010) noting these topics as separate research questions due to the large scope only the governance aspects were taken into account for this thesis. Further research is required to determine how the architecture and governance evolve together in urban platforms.

Another limitation of this thesis is the questionnaire. While this could have proven valuable for analysis, the aspects of this thesis were scattered throughout the questionnaire which was meant as part of a larger research project. Due to this, the concepts from this thesis were very likely to be influenced by which topics predated the concepts of this thesis. As such, the questionnaire was used only to provide descriptive statistics. For further research it is recommended to conduct a questionnaire specifically on the topics studied in this thesis to allow for actual analysis rather than just the presentation of descriptive statistics in order to present an overview.

Next to this, the answers are largely reliant on the interviewees themselves, which introduces a bias. While techniques regarding interviews, triangulation, rival explanations and case study protocols by Yin (2013a) were adhered to in order to minimize this bias, a case study will always present an inherent bias as the cases are picked by the researchers themselves. Due to the study being across Europe, this has also meant that the availability of interviewees per platform was limited due to not being able to have a face-to-face interview and being reliant on on-line contact to get a representative from a platform to participate. Additionally, the categorization of the variables into the categories of low and high are also biased as these criteria are determined by the author. This categorization of low and high leads to the scores trending towards an extreme category (as there are only two categories), while in reality the differences in these variables might be more nuanced. In this thesis this was done to apply theory regarding smart cities and the platform ecosystems and see whether it could serve to build a framework in this novel concept of urban platforms.

Additionally, some of the platforms involved in the Horizon 2020 project indicate that in the following months they will be releasing an expanded version of their platform which will take into account some of these citizen engagement aspects. However, at this point in time many of the platforms have simply not been developed far enough to compare citizen engagement extensively between these platforms. For future research it is likely that more of these platforms have progressed to a point where these specific types of urban platforms (such as comparing multiple smart city project crowd-funding platforms with each other) can be compared to each other in-depth but at the time of this thesis this was not feasible. In addition to this, not all of the platforms from the questionnaire that *did* have some insights into citizen engagement and engaged them in the development of the platform were able or willing to participate in an interview.

Lastly, in the concepts of trust and citizen engagement the citizens play a large role as this is an active relationship, but as the unit of analysis is the platform itself, the opinions of these citizens themselves have not been taken into account in this thesis. As such, this shows only half of the picture and further research must be conducted in order to take into account the perspective of the citizens and which approaches they feel would work best for them.

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A Definitions of Smart Cities. Adapted from (Nam and Pardo, 2011).

Author(s)	Definition of 'smart city'
Washburn et al. (2009)	"The use of smart computing technologies to make the critical infrastructure components and services of a city more intelligent, interconnected and efficient"
Giffinger and Pichler-Milanović (2007)	"A city well performing in a forward-looking way in economy, **people**, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware **citizens**."
NRDC	A city striving to make itself "smarter" (more efficient, sustainable, equitable, and **livable**)
Hall et al. (2000)	A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects **while maximizing service to its citizens**
Harrison et al. (2010)	An instrumented, interconnected, and intelligent city. *Instrumentation* enables the capture and integration of live real-world data through the user of sensors, kiosks, meters, personal devices, appliances, cameras, smart phones, implanted medical devices, the web, and other similar data-acquisition systems, including social networks as networks of human sensors. *Interconnected* means the integration of those data into an enterprise computing platform and the communication of such information among the various city services. *Intelligent* refers to the inclusion of complex analytics, modeling, optimization and visualization in the operational business processes to make better operational decisions.
Rios (2016)	A city that gives inspiration, shares culture, knowledge, and life, a **city that motivates its inhabitants to create and flourish in their own lives.**
Partridge (2004)	A city where the ICT strengthen the **freedom of speech and the accessibility to public information and services.**

B Definitions of Strategy. Adapted from Smolka (2015).

Author(s)	Definition of strategy
Chandler, 1962, p. 13	"Strategy can be defined as the determination of the long-term **goals and objectives** of an enterprise, and the adoption of courses or action and the allocation of resources necessary for carrying out these goals."
Glueck and Jauch, 1988, p. 11	"Strategy in management is a unified, comprehensive, and integrated plan that relates the strategic advantages of the firm to the challenges of the environment. It is designed to ensure that the basic **objectives** are achieved through proper execution by the organization"
Thompson, 2003, p. 9	"Strategies are means to ends, and these ends concern the **purpose and objectives** of the organization. They are the things that businesses do, the paths they follow, and the decisions they take, in order to reach certain points and levels of success."
Andrews, 1986, p. 112	"Strategy is a pattern of decisions ... [which represent] ... the unity, coherence and internal consistency of a company's strategic decisions that position a company in its environment and give the firm its identity, its power to mobilise its strengths, and its likelihood of success in the marketplace. "

C Data Governance Factors for Platform Ecosystems

Domain	Factor	Practice	Reference
Data Ownership /Access	Data ownership and access definition	P1. Define data ownership of all types of data in the platform (user, process and system data) P2. Define access rights based on the ownership and contribution of a data contributor	(Weill & Woodham 2002; Weill & Ross 2004 and 2005; Khatri & Brown 2010; Weber et al. 2009; Otto & Weber 2015; Tiwana et al. 2010 and 2013; Schreieck et al. 2016; Hein et al. 2016)
	Definition Criteria	P3. Identify main criteria for defining data ownership P4. Consider relevant regulations (laws, standards and cases) P5. Develop decision models for defining of data owner/access	(Kaisler et al. 2012 and 2013; Weill & Woodham 2002; Weill & Ross 2004 and 2005; Khatri & Brown 2010; Manner et al. 2013)
	Contribution Estimation	P6. Consider contributors' effort for value creation P7. Identify dimensions for a measurement model P8. Combine contribution with data ownership/access definition model	(Tang et al. 2012; Parker & Van Alstyne 2014; Chai et al. 2009; Schreieck et al. 2016)
Data Usage	Data Use Case	P9. Define data categories of a platform including various sources (user, process and system data) P10. Define data use cases including individual use case based on the data categories P11. Keep consistency and integrity of the use cases	(Jagadish et al. 2014; Khatri & Brown 2010; Weill & Woodham 2002; Weill & Ross 2004 and 2005)
	Conformance	P12. Recognize requirements for data due processes P13. Define audit process for conformance of the due processes P14. Consider the result of audit make visible to stakeholders	(Martin 2015; Ghazawneh & Henfridsson 2010 and 2013; Khatri & Brown 2010; Evans 2012; Manner et al 2012 and 2013; Tiwana et al. 2010 and 2013; Schreieck et al. 2016; Hein et al. 2016)
	Monitoring	P15. Detect and notify all activities regarding the use of the data in the platform P16. Allow all participating groups to monitor and report the use of the data in platforms P17. Achieve visibility of the data supply chain to stakeholders	(Dempster et al. 2015; Martin 2015; Weill & Woodham 2002; Khatri & Brown 2010; Manner et al 2012 and 2013; Tiwana et al. 2010 and 2014; Schreieck et al. 2016; Hein et al. 2016)
	Data Provenance	P18. Enable to trace all the derivation history of the data through metadata management P19. Facilitate data owner authentication through data lifecycle	(Weill & Woodham 2002; Khatri & Brown 2010; Hein et al. 2016)

Figure 7: Data Governance factors source: Lee et al. (2017, p. 5).

D Interview protocol

In the beginning of the interview the purpose and the duration of the interview were explained. After this, the structure of the interview was explained so that the interviewee knew what to expect from the interview. After this, the confidentiality and whether the interviewee wanted to remain anonymous was discussed. Finally, some introductory questions were asked regarding the role of the interviewee in the platform and what they view as the platform in order to ensure the the same platform was being discussed during the interview. This was a semi-structured interview so while these questions formed a guideline for the interview, there still the ability to respond to responses from the interview.

Strategy

Could you tell me about why the platform was created?
Are there certain goals you strive towards when developing the platform?
Are there goals specifically for the inclusion of citizens in the development of the platform?
Do you make use of KPIs to guide the development of the platform?
Are there citizen-centric KPIs?
Do you make use of other metrics to track platform performance?
To what extent were citizens included or consulted in the initial development of the platform?

Governance

Do you have certain criteria for what is allowed to be developed and who is allowed to develop these applications?
Do the application developers have guidelines or procedures they have to follow when developing applications?
To what degree would you say you encourage a shared system of norms and values to shape behaviors of parties in the platform ecosystem?
Are there any criteria for the data being provided or for data providers to enter the platform ecosystem?
Is a data provider able to determine what is able to be done with their data and who is allowed to access their data?
Are there parties that currently make money or could make money off of the platform?

Trust

In engaging with the community, have you found that how they perceive the city or business to affect how they view the platform? E.g. if Google would have built the platform do you think this would have had an effect in the trust users have in the platform?

Citizen involvement

To what degree are citizens made aware of the benefits of your platform and engaged through communicating the benefit participation could have?
Aside from communicating the benefits to the citizens, are there other incentives for them to make use of the platform?
Were there any major challenges you encountered in engaging citizens?
What do you think the role of citizens should be in co-creating the development of the city?

Other questions

The interviewees were also asked specific questions regarding their platform based on desk research prior to the interview, after the first interview did not result in the desired answers as some topics were too abstract and required a tangible part of the platform to be used as an introduction to the question. Additionally, due to time constraints during the interviews, not all of the questions were asked if an answer to one question included an answer to another question.

Site Report

After the interview was conducted, a transcript was sent to the interviewee so the contents of the interview could be verified.

E   Case Study Protocol

Table 14: The case study protocol source: Yin (2013a, p. 82 - p.89)

Case Study Protocol Components	Use in this study
Overview of the Case Study Project	The overview of the case study project can be found throughout chapters 1 through 4.
Field Procedures	Field procedure questions were adhered to. Interviewees were accommodated. Interviews were recorded so that they could be transcribed and reviewed by the interview. Key interviewees per platforms were chosen in addition to having access to a second interview with another person involved in the development of the platform in case the first interview proved insufficient.
Case Study Questions	The interview protocol in Appendix E formed the base for the questions in the interviews, in addition to specific questions regarding the platform of the interviewee through desk research
Guide for the Case Study Report	The conceptual framework formed the base for the outline of the case study reports as the topics of the conceptual framework are discussed.