A Work Project, presented as part of the requirements for the Award of a Master Degree in

Management from the NOVA – School of Business and Economics

Towards a Participatory Smart City

– A Closer Look at Smart City Endeavors in Berlin and Lisbon

under supervision of
Professor José Tavares

handed in by
Katharina Johanna Kremsreiter, 2411

on
January 6, 2017

Abstract

Much literature is dealing unilaterally with technology as the main success factor of the Smart City. *Towards a Participatory Smart City* aims at looking at human and managerial factors. By elucidating the citizens' as well as city governments' perspective through a survey and expert interviews, the requirements for a participatory Smart City are highlighted. As policies based on citizen involvement are more widely accepted, this thesis contends that a participatory Smart City will be a more widely adopted and successful one. Finally, a framework for such a participatory Smart City is given, integrating people, technology, and city government meaningfully.

Keywords: *Smart City, Citizen Participation, Smart Governance, Technology*

List of Abbreviations

BE	Berlin Smart City Expert
CML	Câmara Municipal de Lisboa
H1	Hypothesis 1
H2	Hypothesis 2
ICT	Information and Communication Technology
LE	Lisbon Smart City Expert
PE	Participation Expert
QH	Quadruple Helix
SC	Smart City
SDUDE	Senate Department for Urban Development and the Environment

List of Figures

Table of Contents

Appendix in a separate document.

1 Introduction

"What is the city, but the people?" (*Corolianus [1.3.199] by William Shakespeare)*

The concurrence of two major trends – global population growth and rapid urbanization – is putting cities' services, infrastructure, housing and overall quality of life to the test: In 2015, 54% of humanity lived in cities (World Bank, 2015). In an effort to adapt to this growth in population, cities are seeking for new ways to deliver the same or even a higher living standard to more people but under financial and scalability constraints (Khatoun and Zeadally, 2016). It seems that city planners have found the holy grail of dealing with these issues in the concept of the Smart City (SC) – a novel socioeconomic environment in which the integration of technology with physical, social and business infrastructure creates a more efficient, sustainable but also more livable city. While SC utopias of smart bridges sending alerts when they need repair or drones equipped with defibrillators as first-aid responders are emerging on the one hand, dystopian critiques speaking of a technology push instead of an application pull are rising as well (Poole, 2014): In theory, the improvement of quality of life for its citizens is the SC's ultimate aim, but do city planners reflect whether these scenarios indeed represent the citizens' best interests and solve their most urgent problems? Furthermore, new technology allows citizens to demand and city administration to deliver both more transparency and a greater say in how projects should be planned and implemented. Therefore, SC leaders should enable the citizens to actually participate in the process of creating the SC. As the SC concept is based on interconnectedness, integration, and collaboration (Nam and Pardo, 2011a), this is merely a logical step. Eventually it is the citizens who decide whether to resent their city turning *smart* or adopt the SC and therefore fully reap its potential.

Although a good amount of research has been carried out on the technological component, little has been written on managerial consequences as well as the citizen-centricity of smart cities (Van den Bergh and Viaene, 2016). These are the gaps which this thesis aims to fill – by the means of both quantitative and qualitative research methods, and a sound literature review as a foundation. First, the citizens' perspective on the SC in Berlin and Lisbon is evaluated through a questionnaire; this is then followed by and synthesized with qualitative expert interviews on citizen-centric SC planning

and implementation. Finally, based on these findings, a conceptual framework of a participative SC is devised to answer the research question of how the wide adoption of the SC by its citizens can be ensured.

2 Literature Review

"Cities are not the problem, they are the solution" (John V. Lindsay – 103rd Mayor of NYC)

2.1 Smart City Definition and its Characteristics

While the SC concept has been gaining traction, as more cities worldwide claim to be *smart* (Hollands, 2008), there still is no clear consensus on the definition and key determinants of a SC, neither is there an agreed-upon evaluation and certification process (Allwinkle and Cruickshank, 2011; Ben Letaifa, 2015; Hollands, 2008; Albino, Berardi and Dangelico, 2015). However, this lack has already been acknowledged by the research community and led to an increasing effort in defining the SC. Due to its complexity and the context-dependence in respect to country, government, IT knowledge and capacities (Weisi and Ping, 2014), a one-size-fits-them-all definition is not easily obtained. Consequently, there are various definitions and lines are blurred between SC and related concepts. Nonetheless, what most definition efforts share is the understanding that the use of new technologies enables the city to foster competitiveness and sustainability by connecting people, businesses infrastructures, energy and technologies, leading to a high quality of life for its citizens (Manville et al., 2014). While some definitions are very much focused on ICT (Information and Communication Technology) as a main driver (ibid), a meaningful working definition for the underlying thesis can only be one that also elucidates a broader spectrum of socio-economic, governance as well as multi-stakeholder aspects. Therefore, this thesis follows Caragliu et al. to see a city as smart, "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life with a wise management of natural resources, through participatory government" (2011: 50).

2.2 Smart City Genealogy

A plethora of concepts related to or seemingly interchangeable with the SC is found in the notions

of the intelligent, creative, digital, and ubiquitous city (among others)[1]. The first to develop was the *Intelligent City*, championing technology, and a top-down approach (Albino, Berardi and Dangelico, 2015) while possibly precluding people who are not fully compatible with this vision (Vanolo, 2014). This approach was then challenged by the *Creative City*, which is characterized by a bottom-up approach promoting participation through community-based and private sector projects, yet lacking coordination and vision (Ben Letaifa, 2015). *Smart City* is then the synthesis of these two forerunners (Kourtit and Nijkamp, 2012), integrating an institutional planning competency with an open innovation approach, therefore creating a holistic ecosystem: a concept with a balanced focus on technology, people and institutions that facilitates both co-creation and coordination (Ben Letaifa, 2015).

2.3 The Gap in the Literature

Although the SC genealogy showed that the concept has indeed an inclusive aspect much of the literature focuses on the technology component (Ben Letaifa, 2015; Albino, Berardi and Dangelico, 2015), neglecting the people component. First empirical research on actual SC projects confirms the technology-dominance over people-centricity (Neirotti et al., 2014) in practice. A fact to consider here is technological deployment playing a decisive role in the SC's *hard domains*, i.e. energy grids, water-/waste- and natural resource management, while being less decisive in *soft domains* as culture, government, innovative policies, and social inclusion (Albino, Berardi and Dangelico, 2015). This thesis contends that this discrepancy need not exist; as by integrating hard and soft, thus fostering the complementarities between ICT and human/social capital of the citizens, a much more meaningful and exhaustive SC approach can be achieved, as is also put forward by Neirotti et al. (2014).

2.4 Addressing People-Centric Smart City Success Factors

The above-mentioned negligence of focusing on people is even more surprising considering that this dimension has indeed been identified as crucial in SC initiatives: In a rare research endeavor, **citizen engagement**[2], which allows for involvement of the public in decisions of policy-making (Rowe

[1] More details on the difference between these concepts are found in: Albino, Berardi and Dangelico 2015, 8-10.
[2] The terms engagement, involvement and participation are used interchangeably (Rowe and Frewer, 2005, 252f)

and Frewer, 2005), is named as one of the two primary success factors (Kogan, 2014), and Neirotti et al. list **people** and communities as one of their eight success factors (2014). Another factor, which is indeed partly an enabler for the preceding citizen engagement aspect, and has also been awarded relatively little regard is that of **governance** (ibid), in this context understood as relating "to the relationship between individuals, interest groups, institutions and service providers in the ongoing business of government" (Odendaal, 2003: 587). The term includes aspects as participation and citizens' services (Giffinger et al., 2007), collective decision-making, public debate as well as providing transparency and accountability (Johnston and Hansen, 2011) – all indicating some level of collaboration. Finally, many authors contend that a city will indeed become *smart* by tapping into the intelligence of **all** urban actors (Meijer and Bolivar, 2016).

2.5 Defining the Research Question

In the course of this literature review, a broad and more inclusive SC definition was given, followed by a genealogy elucidating the SC's intended ability to integrate coordination and co-creation, after which a people-focus was identified as still underrepresented in SC literature and eventually success factors building on this gap were highlighted. Following this logic, the underlying research question has been formulated as follows: *How can Smart City leaders both plan for citizens and with their input to transform their city into a successful and widely-adopted Smart City?* In order to answer this question, two hypotheses have been constructed:

(H1) *Citizens are **favorable** towards the Smart City and **want to be involved***

(H2) *Citizens **can** indeed be **effectively involved** in the Smart City process*

While the first hypothesis is going to be tested through quantitative survey research, qualitative expert interviews are used to put the second hypothesis to the proof. Only if both hypotheses are validated, can the research question be reasonably answered. Although it is difficult at this stage to have ample and conclusive research on the adoption or rejection of SC initiatives due to the majority of projects still being in their infancy, this thesis hopes to make a small yet relevant contribution.

3 Research Methodology

The following chapter outlines and justifies the methodological approach of this research, illustrates the selection of the research setting and elucidates the chosen research method as well as its design.

3.1 Research Strategy and Research Setting

This thesis is based on a **sequential mixed-method**, two-layer research approach, starting out with a questionnaire to allow for quantitative insight into the citizens' attitude towards the SC concept. Semi-structured interviews with experts then follow to explore and explain themes that emerged from the questionnaire (Tashakkorie and Teddlie, 2002). This strategy was chosen in accordance with the hypotheses and is a way to feasibly integrate both the citizens' as well as the city officials' perspective on SC and participation. As **research locations**, Lisbon and Berlin were chosen, whose similarities in certain aspects benefit the comparison between results: Their status as two of the most vibrant European capitals, attracting and nurturing both creativity and entrepreneurship as well as being recognized as two of Europe's major startup-hubs with a tech-focus, makes them well suitable. The low cost of living, affordable rents, a gathering of international creative and tech talent, as well as a dense academic, scientific and knowledge landscape all speak for the emergence of a cosmopolitan, young and educated citizenry, which is the target group of this thesis' research (Bugge, 2016). Additionally, they show similar SC profiles with a focus on mobility, generation of clean energies and the efficient use of ICT, with all these endeavors aiming at raising quality of life for the citizens (Wendt et al., 2016; SDUDE, 2015).

3.2 Research Design

Quantitative

For the purposes of the **citizen-centricity focus** in this thesis, it was decided that a survey research in the form of a **written questionnaire** would offer the best results. It is most suitable when researching a larger number of people and when wanting to measure some parameters from a group or intending a comparison (Saunders, Lewis and Thornhill, 2012). Additionally, conducting qualitative interviews would have been more time-consuming, therefore limiting the number of respondents to only a few (ibid). Hence, a questionnaire is the most adequate choice here, delivering a baseline opinion of the city's population as it collects standardized, comparable information. Furthermore, by adding space for comments, the disadvantage concerning respondents' flexibility to react to questions was mitigated. The survey consisted of 24 questions, which were grouped into five theme blocks as shown below in figure 1. The full questionnaire is included in the Appendix I.

Questionnaire – Topic groups	
	1) **General**: Rating of quality of life in the city and how well it performs within the six Smart City domains
	2) **Relationship City & Citizens**: the city's performance concerning municipal services and city projects, whether it has the citizens' best interest at heart and the communication between city and citizens
	3) **City & Technology**: citizens' adoption, how well the respective cities use technology already, perception of the possibility to utilize technology to solve city challenges
	4) **Participation:** Willingness and involvement level, experience with participation tools and other engagement methods
	5) **Smart City:** Citizens' understanding of the Smart City concept, their attitude towards it and evaluation concerning the smartness of their own city

Figure 1: The topic groups within the questionnaire

Qualitative

For the second layer, in-depth, semi-structured and non-standardized **interviews** were chosen to analyze the view of SC and participation experts. Interviews are best-suited to collect data that cannot be easily reduced to numbers and they enable personal interaction, thus allowing to detect subtleties and complexities that are easily missed in quantitative surveys. To adapt the interview to the personal situation of the expert, non-standardized interviews were chosen, as they enabled the researcher to ask more complex and open-ended questions. A semi-structured approach was used as it allows the freedom to pursue different paths that emerged during the conversation, as well as prompting, clarifying and expanding on points that proved more viable (the whole paragraph follows Saunders, Lewis and Thornhill, 2012).

3.3 Sample and Data Gathering

To mirror the focus of the study, the cosmopolitan, young, and educated citizenry, students in Lisbon and Berlin were chosen to be the target population: First, they are born as so-called *digital natives*, are thus familiar with digitization and technology and therefore more likely to quickly grasp the concept of SCs. Second, this generation will exploit their full potential as users, because SCs are still in a testing phase and not a fully established reality in many places. Third, to win the war on talent, the SC needs to attract and retain the well-educated and innovative *creative class*[3] (Van Dijk, 2015), therefore smart cities are meeting points of better-educated individuals (Nam and Pardo, 2011a). As the whole population is too large to survey all members, a sample of 349 respondents, n_{Berlin}= 159 and n_{Lisbon}= 190, was drawn. A questionnaire was distributed online, mainly via

[3] The term *creative class* was coined by Florida (2002).

Facebook, using the researchers' extended network to overcome the disadvantage of written questionnaires regarding low response rates.

Concerning the qualitative research, the sample consists of three interviewees. In order to be able to compare Berlin's and Lisbon's SC endeavors and devise clear recommendations from learnings, experts with the necessary knowledge were chosen from both cities. In Lisbon, the interviewee acts as project manager within the SC initiative of the Municipality of Lisbon. In Berlin, a project leader from the Senate Department of Urban Development and Environment (SDUDE), the patron of the SC Berlin project, was asked to provide his expertise. Furthermore, a researcher from the Centre for Technology and Society of TU Berlin University, who conducts research on citizen engagement was asked to elucidate the participation component. Owing to location reasons, the interviews with experts from Berlin were conducted over the phone and recorded through rigorous note-taking, while the interview with the expert from Lisbon was conducted in person, recorded and transcribed (see Appendices II - IV). Naturally, for both the quantitative and qualitative data gathering, informed consent was obtained and confidentiality and anonymity were ensured. Furthermore, it was made clear that any participant was free to end the study at any moment.

3.4 Limitations and Validity of Research

Due to the scope of this thesis, in terms of time, financial and page restrictions, it should be noted that the researcher is aware of the limitations of this study. Since this research aims at getting insight into respondents' personal opinions, external validity – the extent to which results of a study can be held to be true for other cases – cannot be fully established. In regards to the questionnaire, face validity was ensured through executing a pretest with the aim to examine whether the questions would be understandable and lead to unambiguous answers, as well as to get feedback. After the integration of the feedback, a small pilot study of the adapted version was conducted before distributing the final questionnaire. Finally, the survey was only provided in English to overcome translation issues and keeping the exact same questions has a high benefit for the appraisal of the generated data. Concerning the qualitative research, it should be noted that due to the small number of interviews, they only represent limited insight into the cities' planning and strategies and are naturally

prone to subjectivity. Therefore, whenever possible, validity of qualitative research was substantiated through reinforcing assertions by looking up similar stances in the literature and through respondent validation. Although generalization to a larger population is not sensible, transfers and comparisons can be made to similar research endeavors.

4 Presentation of Results and their Discussion

"So, we feel there is a need for a human Smart City where the human focus is very important. Not only technology, but the citizen" (LE)[4].

This chapter aims at reporting the facts that the underlying research discovered, while at the same time discussing their meaning in the context of the participatory SC. Following the research objectives, first, survey findings to test H1 are related and are, in a second step, followed by findings from expert interviews to examine whether H2 holds. That way, the foundation to answer the thesis' research question is laid, which is done by synthesizing all results with relevant literature and then grouping findings in categories to develop a framework.

4.1 Survey Results – The Citizens' Perspective

The questionnaire to examine the citizens' view consisted of five theme blocks as mentioned in chapter 3.2 (figure 1). As only the theme blocks *Participation* and *Smart City* are relevant to test H1, these are the findings that will be discussed in detail here. Further results from the remaining three theme blocks will be analyzed within the synthesis of all findings in chapter 4.3.

4.1.1 In Favor of the Smart City

In the fifth section of the survey, the citizens' attitude towards the concept SC was polled. While most people in Lisbon were familiar with the notion (61%), more than half of Berlin residents were not (59%). After a brief definition, the respondents were asked to assess whether their city could be referred to as smart. While only 17% in Lisbon and 20% in Berlin agreed with this statement, there was a similarly high approval in both cities that their city needs to become smarter and a strong sentiment that they themselves would feel the benefit of such a transformation (see figures 2 and 3 below).

[4] The following abbreviations will be used throughout to indicate the respective interview partner: LE= Lisbon Smart City Expert, BE= Berlin Smart City Expert and PE = Participation Expert.

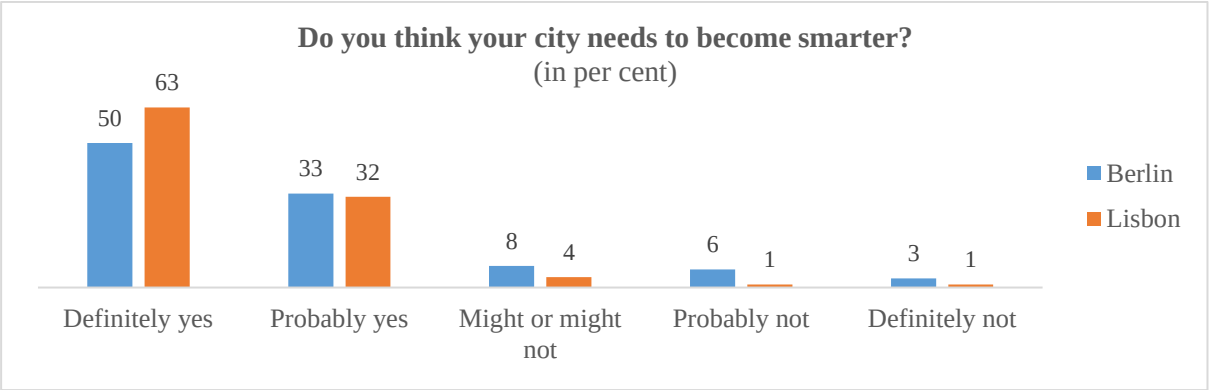

Figure 2: Citizens' opinion on their city's need for smartness

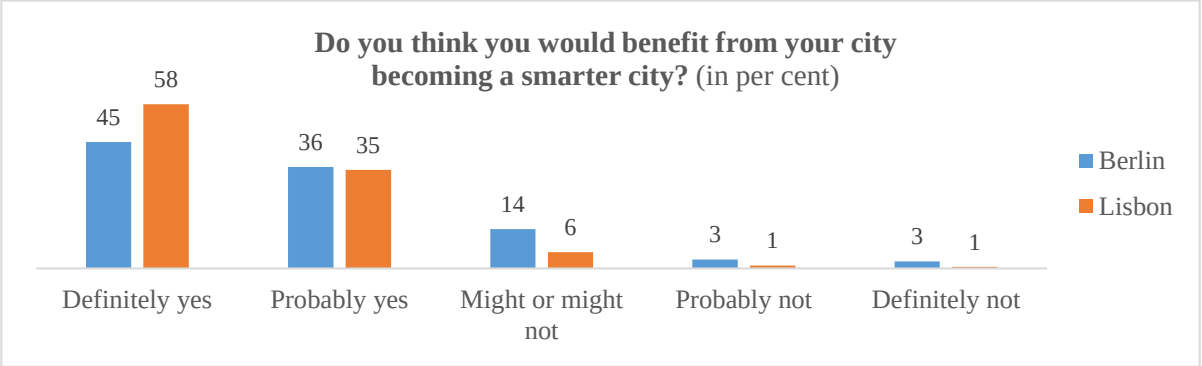

Figure 3: Citizens' opinion on the benefit of a smartification of their city

4.1.2 Citizens' Willingness to Participate

In order to establish a participative SC, participation of the citizenry is crucial. The aim of the following section is to gain some insights toward the respondents' attitude in this area. Most of the asked people in Berlin and Lisbon are ignorant about existing participation tools in their city. In Lisbon, 43% of the respondents have heard of at least one possibility to engage with public decision-making but only 23% have indeed used one, mainly the participatory budgeting, *Orçamento Partcipativo*. Out of 35 responses to the open question "Which participation tool(s) did you use?", 30 people mentioned it. While there is a similar program in Berlin, *meinBerlin*, no one of the sample had used it, yet. The main reason of those that had heard of a way to participate but chose to not use it in both cities was a lack of time (41% in Lisbon, 42% in Berlin) with minority reporting that the process was too complicated for them (21% in Lisbon, 25% in Berlin). The key take away from this section is the insight that over two-thirds of respondents from Lisbon and Berlin are willing to participate in urban decision-making (see figure 4). Out of those, however, most (59% in Lisbon, 48% in Berlin) prefer to get involved for only a moderate amount, roughly a quarter would like to invest

a lot and, interestingly, 10% would even be willing to get involved a great deal (see figure 5)[5]. As for possible ways of involvement, people are inclined to try living labs (47% in Lisbon, 38% in Berlin) and crowdfunding (71% in Lisbon, 48% in Berlin). However, it is apparent that the people of Lisbon seem to be more open towards these tools. A supply of open data by the city was also highly valued by respondents in both cities, with approval ratings over 85%.

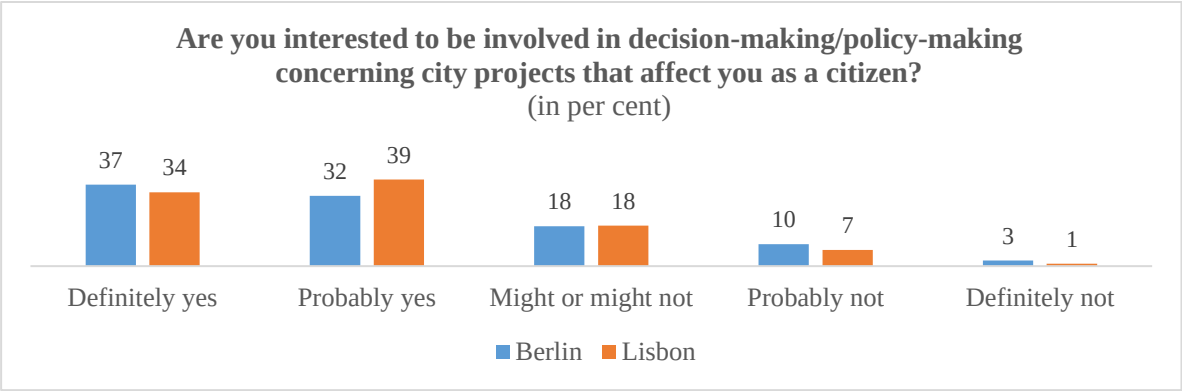

Figure 4: Citizens' interest in getting involved

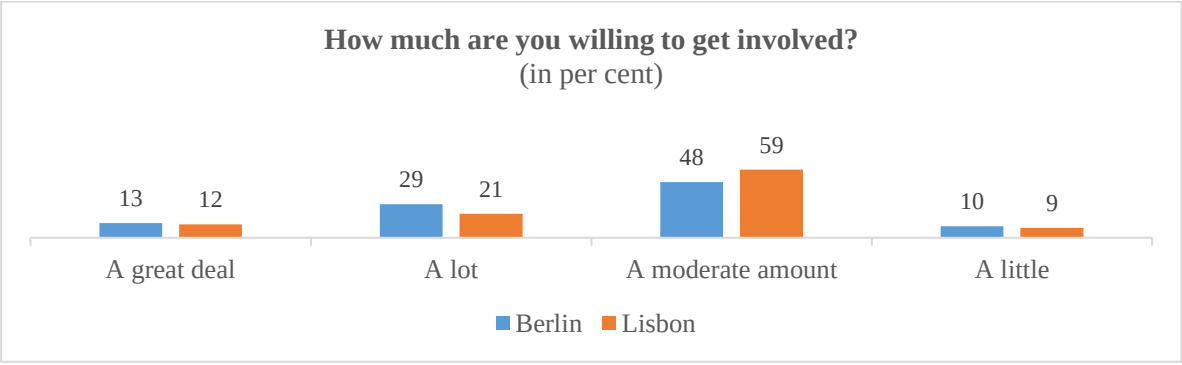

Figure 5: Citizens' level of willingness to get involved[4]

Considering these insights from the questionnaire, H1, claiming that *citizens are **favorable** towards the Smart City and **want to be involved***, can be verified.

4.2 Interview Findings – How Public Participation Can Be Managed Effectively

Citizens' willingness to participate is only one side of the coin, the other deals with the feasibility and management of this participation process, in the specific context of a SC. Although all experts agreed that citizens can in fact be effectively involved, it became evident that there are certain requirements that need to be met to ensure the efficacy of the process.

[5] The levels are defined as follows: A great deal: "interested in co-creating new ideas"; A lot: "interested in participating in conceptualizing and testing new ideas"; A moderate amount: "through providing ideas, opinions and feedback"; A little: "providing feedback rarely and just on occasions where it is in your personal interest".

First, from interviews with municipality officials that are involved in Berlin's and Lisbon's SC projects insights about the effective participation in a SC were extracted. While both interviewees stressed the need for citizen involvement, the cities approach it differently: In Lisbon, where the citizens and their involvement were named as the center piece of the strategy, **participation** is deemed **especially effective when it is already rooted within the SC strategy** (LE). In Berlin on the other hand, the citizen is not the centerpiece of the vision, but indirectly included in the strategy where it says that the SC's goal is "to serve the common good" (SDUDE, 2015: 3). These findings establish the fact that both Berlin and Lisbon see the citizen indeed as a crucial factor in a SC.

However, further findings show that they have a **different conceivability of how to involve the citizen**: Insights from Lisbon suggest that citizens are not only involved in early stage participation (i.e. ideation phase), but can in some cases actively participate in decision-making and are even consulted during the implementation phase. The reasoning is that the relationship with the citizens can be strengthened and participation be more effective, if they are involved in all stages of the process and not only at one single point in time. As the expert from Lisbon put it: "Nowadays it's an interactive process where we can even discuss with the proponents: How do they want their idea to be implemented? So, it's not something that you say: 'Let's do this' and five years from now I tell you it is done" (LE). This view of an **involvement in all stages of the participation continuum** is somewhat contradicted in terms of feasibility by insights from Berlin, which contend that in many cases it is not useful to include the citizen in a plethora of decisions, as they might lack the necessary expertise and it overcomplicates the process. Instead of trying to involve the citizen in every stage, Berlin rather suggests to discern within a **clear participation strategy** beforehand, "what is indeed shapeable by citizen input, what should be achieved how and within which timeframe" (BE), identifying in which stage public participation can indeed meaningfully be integrated. Thus, while both cities try to facilitate efficacy in citizen participation they follow different management strategies: Whereas Lisbon includes the citizen in all stages, hence follows the *quadruple helix* (QH)[6] approach (LE), Berlin believes the QH to be more suitable for the implementation stage of individual projects, the

[6] The QH extends the traditional *triple helix* model (Etzkowitz, 1993), the triadic relationship between government, universities, and industry by a fourth dimension, the citizen.

micro-level that will most likely affect the citizens in their daily lives and sticks to the *triple helix* for decisions that concern the macro-level (BE).

A point in which all experts agreed and which they named as the most crucial to ensure efficacy of the participation process is to **establish confidence of the citizens** that the city is indeed interested in implementing their proposals: "The issue of trust and the feeling of efficacy of the citizens when they are participating is something that has to be built up" (LE). This view is not only validated by efforts in Berlin, "To build trust, mere information of the citizen may not be disguised and marketed to the citizens as participation, making them believe they can actively influence a decision when it has in fact already been made" (BE), but was independently reinforced by the participation expert stating that it is a grave mistake to "put results from participation in a drawer that is never reopened again" (PE). Therefore, an effective participation strategy also needs to include the **transparent communication** of "results and how we dealt with those" (BE), to gain the full **trust** of the citizen.

Eventually, real life examples of citizen involvement make the most compelling case for its efficacy. The interviews show that concrete participation tools in Lisbon and Berlin are not too dissimilar: In Lisbon, the best-known and most widely used tool is called *Orçamento Participativo*, participatory budgeting, which allows citizens to propose and vote on which projects city budget should be spent. Its innovative potential lies in the fact that it is not only advisory but *deliberative*, it gives effective decision-making power to citizens to truly impact policy-making of their municipality (LE). In Berlin, a similar online participation tool called *mein.Berlin*, my Berlin, also aims at democratizing decision-making by bundling all participative procedures of the city administrations on one platform (BE). Participation here includes proposals, providing opinion and feedback and voting on the proposals, and ranges from information on budget utilization to land-use plans that will have a large impact on the city. In both cities, the number of participants as well as public reactions regarding these participation tools has demonstrated the effectiveness of these methods: In Berlin, the lively participation during two online dialogues regarding the future utilization of the Berlin Tegel Airport area, which is to be decommissioned in 2018 can be seen as a success and proof of effectiveness (SDUDE, 2016). In Lisbon, an increase of 373% in votes from 2011 to 2015 (CML,

2015), impressively shows how well the citizens receive the online budgeting and that it is in fact an effective tool for them to "be heard and participate in city management" (LE).

Within the participation expert interview, it became clear that when participation happens via technological means, there are still challenges to be overcome: "Technology is not yet fully understood, as the skills and the knowledge to deal with new technologies are not fully developed within the broad mass" (PE). The expert further added that an **action logic for e-participation** or any participation via technological means must make sure to think more from a human perspective in order to bridge the technology-participation-chasm. As another challenge, it was noted that cities might still think in old patterns, trying to translate offline participation one-to-one to online participation, which has different requirements. For *smarticipation* – participation in a SC context – to be successful, there is a need for **deeper understanding**, first within the municipalities **of what smartness means** and in a next step transferring this knowledge and educating the citizens (PE).

If these requirements are met, participation in a SC context can indeed be effective as it has already taken root within civil society, especially in the last years: "What we can see is a stabilization and continuation of the participation-culture. Participation has become an integral part, this has really changed, […] and the internet definitely has the potential to further drive this trend forward" (PE). Hence, the interview findings presented above validate H2, which states that *citizens **can** indeed be **effectively involved** in the Smart City*, under the condition of adhering to indicated requirements.

4.3 A Synthesis of Results – The Five Pillars of the Participatory Smart City

Various research on public participation advocates that the acceptance and adoption of political decisions that reflect citizens' preferences and were formulated in accordance with public participation are higher than those without engagement (Irvin and Stansbury, 2004; Evans-Cowley and Hollander, 2010). Therefore, this thesis contends, that a participative approach is key to ensure the wide adoption by citizens and therefore success of the SC. The necessary foundation has already been laid by successfully verifying the two hypotheses: a participative SC is feasible to undertake from both the citizens' and the government's perspective. In the following, remaining research findings on SC success factors will be introduced and grouped with already established survey and interview

findings as well as with relevant literature. The latter is used to reinforce arguments and to scrutinize the insights from interviewees who might show a certain degree of bias to promote their SC. Following an inductive approach here, all data was grouped to identify patterns and generate a theory: As a result of this synthesis, a conceptual framework that includes five pillars of a participative and therefore more successful SC is presented, thus answering the overarching research question of *how Smart City leaders can transform their city into a successful and widely-adopted Smart City.* The proposed pillars cannot be achieved isolated, but are to a high degree interdependent, building on each other so that each following pillar is partly the result of the preceding one(s).

4.3.1 Relationship City & Citizens

A well-functioning SC is reliant on a healthy relationship between the city and its citizens. This relation can be broken down into three crucial aspects: *Trust, communication, and transparency*. As shown in 4.2, all three experts agreed on the importance of trust and communication. Lisbon even extends this beyond regularly and honestly informing citizens. Instead of a one-way-stream, communication became an *interactive dialogue* (LE). The success of this strategy can be seen in the questionnaire: Lisbon citizens attest their government a job well done in terms of information (70%). While there are many ways to enhance transparency in a city, a *smart* way of doing so is offering *open data* to the public, meaning the municipality makes its data-sets openly available with nonrestrictive licenses and in a format that is easy to reuse (Mellouli, Luna-Reyes and Zhang, 2014). All of these measures assist in building a good relationship by establishing understanding and acceptance through trust, communication, and transparency. As has been shown within citizens' survey responses concerning the relationship with their city, this ensures the confidence of the citizen in the city government to have their best interest at heart, trusting that SC leaders indeed work towards the SC final goal of an increased quality of life for its citizens (87% in Lisbon, 80% in Berlin). Therefore, a **sound relationship with its citizens** represents a successful and participative SC's first pillar.

4.3.2 Smart Governance

Addressing what was named the number one success factor in the Berlin interview and one of the biggest challenges in Lisbon, *smart governance* is an essential feature of a SC. However, there are various definitions and understandings of what smart governance implies. First, smart governance can be understood in *managerial terms* meaning that leadership is necessary to coordinate joint efforts across municipal departments (Belissent, 2011), a fact that was highlighted as one of the main challenges, yet also success factors in Berlin – "having a dedicated political lead" (BE). These efforts, albeit, need to be based on a comprehensive strategy and rely on project management processes. Furthermore, to ensure the effectiveness of this governance structure, clear performance measurements need to be defined to monitor and evaluate quality and progress (LE). In Lisbon, a transition from a fragmented and scattered management approach towards a centralized governance that coordinates the execution of the SC vision and strategy with designated roles and responsibilities has proven fruitful (LE). Literature on the topic reinforces this view that smart governance ensures to achieve goals and objectives, by the implementation of defined processes (Johnston and Hansen, 2011). Second, Lisbon's transformation in terms of restructuring and simplification of the municipality to realize synergies, eradicate the prevalent silo-mentality and include cross-departmental teams (LE) also speaks for the collaborative nature of smart governance: An aspect which is validated by another definition of smart governance focusing more on developing and managing the interactions between SC actors, fostering the idea of *smart urban collaboration* (Meijer and Bolivar, 2016). Its importance is demonstrated by Berlin's experience, where an uncertainty about responsibilities still hinders reaping full gains from collaboration within smart governance (BE). A successful participative SC ought to solve these uncertainties and excel in both managerial and collaborative governance – making **Smart Governance** its second pillar.

4.3.3 Partnerships

Interviewees from both cities stressed the challenge of the complexity of the SC – a project that cannot be planned, steered, executed as well as financed all by one entity – and therefore the need for finding partners. Following the afore-mentioned *helix approaches*, the close collaboration be-

tween city, academia and industry has already been established: First, cooperation with universities and research facilities can support SCs in becoming smarter, as for instance in Lisbon it gave the municipality access to a highly talented workforce otherwise not available to them (LE). Second, collaboration with the private sector in the form of *private-public-partnerships* can solve one of the most profound challenges of both cities' SC projects: Securing the necessary funding (BE; LE), by sharing risks and burdens between public authority and private enterprises (Manville et al., 2014). Additionally, involving companies can benefit the SC with technological expertise and entrepreneurial spirit, as the *Smart Open Lisboa* project has proven: it encourages local start-ups to use government open data to tackle city challenges and involves the municipality of Lisbon, as well as Cisco, Turismo de Portugal, and Startup Lisboa Incubator (SmartOpenLisboa, 2016). A further possibility pointed out by the Berlin expert is that of *stakeholder dialogues*, where relevant "interest groups are invited to discuss solutions together with the municipality" (BE). Additional insights show that the *exchange with other smart cities* about challenges and best practices is important to grow as a SC, as has been done in Berlin and Lisbon; the latter being part of the *Eurocities*' Sharing Cities Lighthouse program together with London and Milan (LE). Therefore, an **ecosystem of sustainable partnerships** is a driver of success of the participative SC – extending civic participation to include further crucial stakeholder of the SC: companies, interest groups and research institutions.

4.3.4 Innovation

While interviews showed that city governments welcome and even ask for citizen involvement, citizens are, to various degrees, interested in not only participating by giving their opinion, but *co-innovating* their SC (see figure 5). Being innovative is at the heart of any SC. Nam and Pardo even define SC not as a status of how smart a city is but as a city's effort to make itself smart (2011b). In line with this definition and the preceding pillars, Berlin and Lisbon show their willingness to make themselves smart collaboratively, thus transcending from closed innovation to *open innovation*[7]. Some successful ideas for this open urban innovation incorporating civic participation have been found in *open data platforms* and *living labs*, among others, which are well-received by the citizens:

[7] *Open innovation* describes creating and innovating together with external stakeholders, e.g. customers, suppliers, or partners. The term was coined by Chesbrough (2003).

Although it is a high-involvement concept, respondents (46% in Lisbon and 39% in Berlin) are interested in trying out a living lab, furthermore, they concurred on open data being a most useful tool (88% in Lisbon, 87% in Berlin) to foster innovation with a participatory aspect. This view of linking open innovation mechanisms with the participatory aspect of the SC is also well established in research: While Schaffers et al. contend that using the whole city as a laboratory or ecosystem for user-driven innovation can be a driving force for new business models, collaborations, or improvements in city life (2011), Masip-Bruin et al. suggest that enabling users to utilize data to create own business ideas or solve city challenges is indeed a way to foster collaboration and participation (2013). It becomes evident, that the aforementioned concepts rely on a mutual success factor: *Co-creation*, where end users are actively involved in various stages of the production process (Prahalad and Ramaswamy, 2004; Vargo, Maglio and Akaka, 2008), thus proving the Lisbon Expert right saying that "co-creation is a fancy word, but it is a reality". In sum, open innovation, the switch from supplier-centered design to user-centered design of solutions allows for a SC that includes the citizen on the one hand while fostering innovative solutions on the other, therefore arriving at solutions that better serve the citizens' needs. The fourth pillar of the participative SC is therefore based on **innovation**.

4.3.5 Civic Engagement

In Lisbon, citizen participation was named as both a challenge and a critical success factor for the prosperity of the SC. It is challenging in mostly two ways: Facilitating *citizens' willingness* to engage is important, but this engagement must be *managed properly*. These aspects have been discussed in 4.2, where all three experts agreed that the most crucial factor for citizens' willingness is to ensure the citizens feel that their input matters and will be acted upon, that it has positive consequences – an argument that is backed up in theory by what Rowe and Frewer call **fairness** (2005), by Mellouli, Luna-Reyes and Zhang (2014), as well as Voorberg, Bekkers and Tummers (2015). The validation of H1 indeed evidences that both Lisbon and Berlin do a solid job in stimulating willingness of its citizens. The second aspect, management, is not to be disregarded, however: "The minimum requirement to ensure effective participation is to have a clear strategy" (BE). By looking

at survey and interviews a syndetic conclusion can be drawn: Not only do citizens choose different intensity levels of their engagement (supply), also city government controls the levels that they allow citizens to get involved (demand) – ranging from communication, to consultation, to active participation, based on their reservation that citizens do not all show the necessary expertise (BE; Heikkila and Isett, 2007). Consequently, this thesis finds that an array of participation opportunities must be provided and it is key to find a good mechanism to easily match participation supply of citizens and demand of the government of same intensity levels. Eventually, as the survey showed in 4.1.2, many citizens are not yet aware of the possibilities to participate and refrain from it if it is too complicated or the search too time-consuming. By establishing **central contact points** the costs for both administration and citizens can be overcome and raise awareness of participation opportunities (Vogt and Haas, 2015). Incorporating **civic engagement** in SC planning, as it came about in creating the Lisbon 2020 and Berlin 2030 strategies, for instance, which were developed in accordance with citizens (BE; LE), will thus create an important pillar of the successful participative SC.

These five pillars have shown the individual factors that are necessary for a participatory and thus inclusive SC, but without a strong foundation to build upon, they will not yield their full potential.

4.3.6 The Framework's Foundation: Technology

From the literature review we know that technology is undoubtedly and irrevocably intertwined with the SC, being seen as the main facilitator for innovative SC solutions – a view which is endorsed by citizens, who strongly feel (97% in Lisbon; 84% in Berlin) that embracing more technology to solve city challenges would benefit their city greatly. Technology has the potential to improve the performance in the pillars: The survey has shown that 86% of Lisbon's and 89% of Berlin's citizens would prefer to handle most transactions with the municipality over the internet, as they are currently dissatisfied with the convenience (56% in Berlin and 36% in Lisbon) of and access (78% in Berlin and 34% in Lisbon) to municipality services. Therefore, by further digitizing the pillar Smart Governance to include more e-government services, the pillar Relationship City & Citizen can as well be improved, as the citizens become more satisfied. But also the pillar of Civic Engagement within a SC context can benefit from drawing on ICT: First, we know from the survey

that there is a technology readiness amongst citizens (66% in Lisbon and 84% in Berlin frequently use apps or websites to make city life more convenient), and second, research states that technology-driven participation is better suitable for knowledge creation, commitment, and satisfaction than traditional forms of participation (Conroy and Gordon, 2004). Combining these two findings, it can be concluded that participation tools based on technology have great potential to make the SC more user-oriented. Especially in light of the surveyed population – young, educated, mobile citizens – it seems that participation in a SC needs to make more use of new, mobile technologies. A first practical implementation response to this demand is Berlin's *Ordnungsamt Online-App* and Lisbon's equivalent *Na minha rua*, where users can report problems like pot holes or broken streetlights to the authorities for fixing. By designing technological participation offers more from a human, user-perspective, the action logic which was demanded by the participation expert (see 4.2) can be ensured. Thus, it was shown that **Technology is indeed the cornerstone** of this framework, influencing all five pillars and working towards the goal of a participatory SC.

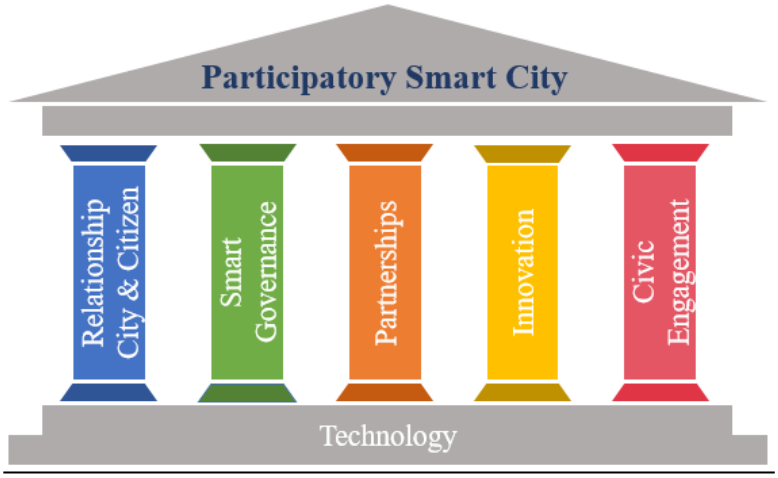

Figure 6: The five pillars of the participatory Smart City

5 Conclusion and Recommendations

The demand for involvement in policy-making processes amongst citizens is growing, as governments all over the world are confronted with legitimation issues (Breindl and Francq, 2008). Research on public engagement has indeed shown that it can foster the relationship between city and citizens and solve these legitimation crises (Phang and Kankanhalli, 2008; Coleman and Gøtze, 2001). Especially in a SC, which claims to connect people more efficiently and has an increase in quality of life for its citizens as the overarching goal, involving those who it is designed for to co-create solutions is not nice to have, but imperative. This thesis aimed at analyzing the duality of citi-

zens' willingness to participate in a SC and the conduciveness of this process as attested by its administrators. Moreover, under the supposition that policies derived from participation processes are better accepted, a framework of five pillars constituting the participatory SC was devised, whose consideration will assist city planners in creating a more user-centric, co-created and therefore successfully adopted SC.

Although it is expected that the elaborated conceptualization can contribute to a better understanding of the success factors for a people-centric SC, this thesis has its limitations. For further research on this topic it would be beneficiary to not only include more cities in the sample to increase generalizability of findings, but to get a more differentiated picture by not just interviewing city government, but all other SC-stakeholders, to truly arrive at a holistic view of a participatory SC. Furthermore, based on the insights from the qualitative research, there seems to be a cultural difference concerning the attitude towards the term *smart* within the SC context. While the Lisbon expert did not see an obstacle in adoption from the citizens, but rather advocated their readiness, the two German experts independently elucidated the uncertainty, wariness and tentativeness associated with the term *smart*, on the citizen as well as the municipality side; indicating a need for a definition or at least for finding a common ground. Hence, it would be worthwhile to delve deeper into the cultural difference concerning the understanding of *smartness* and its implications for the success of the SC.

To tie up loose ends, by shifting the focus from a technocratic determinism to people and partnerships, the SC can become a more collaborative place, where all actors work together to make their city smarter. Revisiting the predominance of the technological focus in all things concerning SC at the expense of the human perspective – as addressed in the literature review – this thesis can declare that no dichotomy between technology and people needs to exist in a SC. Rather, by showing that technology is indeed the foundation upon which the participatory SC builds, ICT are not the prime source, but a crucial facilitator that needs to be used by the SC administration in order to reach the beneficial combination of technology and participation – *smarticipation*. Therefore, by meaningfully connecting city, technology and people, the dystopian version of the SC can turn into a successful reality that reflects citizens' input and wishes and thus truly caters to their needs.

References

Albino, Vito, Umberto Berardi, and Rosa M. Dangelico. 2015. "Smart Cities. Definitions, Dimensions, Performance, and Initiatives." Journal of Urban Technology, 22(1): 3–21.

Allwinkle, Sam and Peter Cruickshank. 2011. "Creating Smarter Cities. An Overview." *Journal of Urban Technology*, 18(2): 1–16.

Belissent, Jennifer. 2011. *The Core of a Smart City Must Be Smart Governance*. Cambridge, MA: Forrester Research, Inc.

Ben Letaifa, Soumaya. 2015. "How to strategize smart cities. Revealing the SMART model." *Journal of Business Research*, 68(7): 1414–19.

Breindl, Yana and Pascal Francq. 2008. "Can Web 2.0 applications save e-democracy? A study of how new internet applications may enhance citizen participation in the political process online." *International Journal of Electronic Democracy*, 1(1): 14.

Bugge, Axel. 2016. "Lisbon startup entrepreneurs aim to create Berlin-style 'tech buzz'". Reuters.com. Accessed November 23, 2016. http://www.reuters.com/article/us-portugal-websummit-tech-idUSKBN12W34G.

Caragliu, Andrea, Chiara Del Bo, and Peter Nijkamp. 2011. "Smart Cities in Europe." *Journal of Urban Technology*, 18(2): 65–82.

Chesbrough, Henry W. 2003. *Open innovation. The new imperative for creating and profiting from technology*. Boston, MA: Harvard Business Review Press.

CML – Câmara Municipal de Lisboa. 2016. Relatório Orçamento Participativo de Lisboa 2015/2016". Lisboaparticipa.pt. http://www.lisboaparticipa.pt/documentos/57fd2eda47e62a09005ea5b8.

Coleman, Stephen and John Gøtze. 2001. *Bowling Together: Online Public Engagement in Policy Deliberation*. London: Hansard Society.

Conroy, Maria M. and Steven I. Gordon. 2004. "Utility of interactive computer-based materials for enhancing public participation." *Journal of Environmental Planning and Management*, 47(1): 19–33.

Etzkowitz, Henry. 1993. "Technology Transfer: The second academic revolution." *Technology Access Report*(6): 7–9.

Evans-Cowley, Jennifer and Justin Hollander. 2010. "The New Generation of Public Participation. Internet-based Participation Tools." *Planning Practice & Research*, 25(3): 397–408.

Giffinger, Rudolf, Christian Fertner, Hans Kramar, Robert Kalasek, Nataša Pichler-Milanovic and Evert Meijers. 2007. *Smart Cities: Ranking of European Medium-sized Cities*. Vienna: Centre of Regional Science.

Heikkila, Tanya and Kimberley R. Isett. 2007. "Citizen Involvement and Performance Management in Special-Purpose Governments." *Public Administration Review*, 67(2): 238–48.

Hollands, Robert G. 2008. "Will the real smart city please stand up?" *City*, 12(3): 303–20.

Irvin, Renee A. and John Stansbury. 2004. "Citizen Participation in Decision Making. Is It Worth the Effort?" Public Administration Review, 64(1): 55–65.

Johnston, Erik W. and Derek L. Hansen. 2011. "Design lessons for smart governance infrastructures." In *Transforming American Governance: Rebooting the public square*, ed. Ink, D., Balutis, A. and Buss, T. F., 197–212. Armonk: M. E. Sharpe.

Khatoun, Rida and Sherali Zeadally. 2016. "Smart cities." *Communications of the ACM*, 59(8): 46–57.

Kogan, Natalie and K.J. Lee. 2014. "Exploratory research on success factors and challenges of Smart City Projects." Masters of Sciences Thesis. Graduate School of Kyung Hee University.

Kourtit, Karima and Peter Nijkamp. 2012. "Smart cities in the innovation age." *Innovation: The European Journal of Social Science Research*, 25(2): 93–95.

Manville, Catriona, Gavin Cochrane, Jonathan Cave, Jeremy Millard, Jimmy K. Pederson, Rasmus K. Thaarup, Andrea Liebe, Matthias Wissner, Roel Massink, and Bas Kotterink. 2014. *Mapping smart cities in the EU*. http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf.

Masip-Bruin, Xavi, Guang-Jie Ren, Rene Serral-Gracia, and Marcelo Yannuzzi. 2013. "Unlocking the Value of Open Data with a Process-Based Information Platform." In *2013 IEEE 15th Conference on Business Informatics (CBI)*, 331–37.

Meijer, Albert and Manuel P. R. Bolivar. 2016. "Governing the smart city. A review of the literature on smart urban governance." *International Review of Administrative Sciences*, 82(2): 392–408.

Mellouli, Sehl, Luis F. Luna-Reyes, and Jing Zhang. 2014. "Smart Government, Citizen Participation and Open Data." *Information Polity*, 19(1,2): 1–4.

Nam, Taewoo and Theresa A. Pardo. 2011a. "Conceptualizing smart city with dimensions of technology, people, and institutions." In *the 12th Annual International Digital Government Research Conference*, ed. John Bertot, Karine Nahon, Soon A. Chun, Luis Luna-Reyes, and Vijay Atluri, 282–91.

Nam, Taewoo and Theresa A. Pardo. 2011b. "Smart city as urban innovation." In *the 5th International Conference*, ed. Jim Davies, Theresa Pardo, Ivar Tallo, Elsa Estevez, Marijn Janssen, and Nele Leosk, 185.

Neirotti, Paolo, Alberto de Marco, Anna C. Cagliano, Giulio Mangano, and Francesco Scorrano. 2014. "Current trends in Smart City initiatives. Some stylised facts." *Cities*, 38: 25–36.

Odendaal, Nancy. 2003. "Information and communication technology and local governance. Understanding the difference between cities in developed and emerging economies." Computers, Environment and Urban Systems, 27(6): 585–607.

Phang, Chee W. and Atreyi Kankanhalli. 2008. "A framework of ICT exploitation for e-participation initiatives." *Communications of the ACM*, 51(12): 128.

Poole, Steven. 2014. "The truth about smart cities: 'In the end, they will destroy democracy'". Theguardian.com. Accessed September 18, 2016. https://www.theguardian.com/cities/2014/dec/17/truth-smart-city-destroy-democracy-urban-thinkers-buzzphrase.

Prahalad, C. K. and Venkat Ramaswamy. 2004. "Co-creation experiences. The next practice in value creation." *Journal of Interactive Marketing*, 18(3): 5–14.

Rowe, Gene and Lynn J. Frewer. 2005. "A Typology of Public Engagement Mechanisms." *Science, Technology & Human Values*, 30(2): 251–90.

Saunders, Mark, Philip Lewis, and Adrian Thornhill. 2009. Research methods for business students. 5th ed. Harlow: Financial Times Prentice Hall.

Schaffers, Hans, Nicos Komninos, Marc Pallot, Brigitte Trousse, Michael Nilsson, and Alvaro Oliveira. 2011. "Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation." In *Lecture Notes in Computer Science*. Vol. 6656, *The Future Internet*, ed. David Hutchison, Takeo Kanade, Josef Kittler et al., 431–46. Berlin, Heidelberg: Springer Berlin Heidelberg.

SDUDE – Senate Department for Urban Development and the Environment. 2015. "Smart City Strategy Berlin – Status: 21 April 2015". Accessed July 30, 2016.

SDUDE – Senate Department for Urban Development and the Environment. 2016. "Dokumentation der Veranstaltungen". Stadtentwicklung.berlin.de. Accessed November 4, 2016. http://www.stadtentwicklung.berlin.de/staedtebau/projekte/tegel/stadtumbau/dokumentation.shtml#!/r/isek/tegel/.

SmartOpenLisboa. 2016. "Upgrade Lisbon's City Life" Smartopenlisboa.com. Accessed November 7, 2016. http://www.smartopenlisboa.com/.

Tashakkori, Abbas and Charles Teddlie. 2007. *Handbook of mixed methods in social & behavioral research*. Thousand Oaks, Calif.: Sage Publ.

van den Bergh, Joachim, Stijn Viaene, and Hans J. Scholl. 2016. "Unveiling smart city implementation challenges. The case of Ghent." *Information Polity*, 21(1): 5–19.

van Dijk, Andries. 2015. Smart Cities. How rapid advances in technology are reshaping our economy and society. https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/public-sector/deloitte-nl-ps-smart-cities-report.pdf.

Vanolo, Alberto. 2014. "Smartmentality. The Smart City as Disciplinary Strategy." *Urban Studies*, 51(5):883–98.

Vargo, Stephen L., Paul P. Maglio, and Melissa A. Akaka. 2008. "On value and value co-creation. A service systems and service logic perspective." *European Management Journal*, 26(3): 145–52.

Vogt, Sebastian and Alexander Haas. 2015. "The future of public participation in Germany. Empirical analyses of administration experts' assessments." *Technological Forecasting and Social Change*, 98: 157–73.

Voorberg, W. H., V. J. J. M. Bekkers, and L. G. Tummers. 2015. "A Systematic Review of Co-Creation and Co-Production. Embarking on the social innovation journey." *Public Management Review*, 17(9): 1333–57.

Weisi, F. U. and Peng Ping. 2014. "A Discussion on Smart City Management Based on Meta-Synthesis Method" *Management Science and Engineering*, 8(1): 68-72.

Wendt, Willi, Marielisa Padilla, Nora Fanderl and Tom Hawxwell. 2016. *City Lab Lisbon – Executive Summary*. Fraunhofer Institute for Industrial Engineering.

World Bank. 2016. Urban Development. Accessed September 30, 2016.