Smart Innovations

Living Labs as facilitators for citizen participation?

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Sabine Baumgarten,

Arnhem, August 2018

Summary

Across the globe cities and municipalities try to become 'smart' by integrating new information and communication technologies into their practices with the goal to increase energy efficiency, livability and social, economic and ecological sustainability (Vanolo, 2014). However, our technological era also bears new challenges as ICTs infiltrate all domains of social co-existence and pose potential risks with regard to data safety, transparency or unforeseeable long-term effects (Castelnovo, Misuraca, & Savoldelli, 2016). A number of scholars warn about a technocratic development where the decision-making power is shifted towards ICT businesses and where the privacy and the needs of citizens are at stake (Greenfield, 1st 2013; Vanolo, 2014). A new way of collaboration and holistic thinking is hence necessary which allows for public involvement and participatory decision-making (Araya, 2015).

The rising phenomena of living laboratories (living labs) might represent such a new form of wide-ranging cooperation which involve citizens in the innovation and co-creation of technological products and services. Being described as 'multi-actor' environments and 'open innovation infrastructures', living labs allow for a variety of collaboration techniques (Neef, Verweij, Gugerell, & Moen, 2017). However, the question whether the design of living labs can facilitate participatory processes has not yet been answered by the literature. This thesis therefore set out to explore possible links between living laboratories and citizen participation.

The theory on smart cities gives a general framework while the literature on living labs provides a number of characteristics and assessment criteria with regard to their design and nature. The ladder of citizen participation (Arnstein, 1969) and the matrix guide to public involvement (Thomas, 1993) further contribute to the theoretical foundations for this qualitative research. An explorative multiple case study approach was chosen to investigate four living lab cases in the Netherlands. If a living lab conducted multiple innovation cases, a focus was put on one experiment per lab in order to gain in-depth information about the processes. The data collection consisted of desk research and in-depth, semi-structured interviews with initiators and project leaders of living labs as well as participating municipalities. The subsequent analysis of the primary data was based on the conceptual framework which was derived from the literature.

The results reflected considerable differences with regard to the design of the living labs. It became apparent that the meaning behind the term living lab is mainly based on individual and organizational understanding. Just one case applied a so-called 'living lab method' which was rooted in

design-thinking and open dialogue. Respondents from the other cases did not see any difference to their traditional project management approaches. The lack of a common framework and a unified definition was reflected in the divergence of living lab designs in practice. Hence, it is not advisable to speak of living labs as facilitators for citizen participation. Parallels between the cases could be found in their objectives (learning, innovation, collaboration) and their interdisciplinary setting which combined in all four cases a number of stakeholders from different domains.

Being still in its infancy, the concept of living labs might have a potential to brisk up traditional approaches in urban planning and city management. However, this requires a common understanding of the term as well as the development of further guidelines and assessment frameworks.

List of Abbreviations

DSO – Distribution system operators

HLL – Healthy Living Lab

ICT – Information and communication technologies

LLSC – Living Lab Smart Charging

POLs – Product oriented labs

SCF – Smart Cycling Futures

UTLs – Urban transition labs

WDO – Westelijke Dordtse Oever

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1   Framework of the Research

1.1   Introduction

Information and communication technologies (ICTs) are increasingly shaping our everyday life and the way we experience and interact with our surrounding. As urban environments and human interactions quickly start to change under the influence of new technologies, a new approach to urban planning and city management becomes necessary. In the last decade, a variety of scholars and experts have entered into a discourse on the potential benefits of ICTs within the urban context, giving birth to the concept of 'smart cities' (Batty et al., 2012, p. 482). The 'smart city' embodies the ideal of a perfect merge between ICTs and urban lifestyles with profits and wellbeing for all public and private stakeholders. The term has since turned into a catchphrase for innovative approaches and ideas that tackle current challenges within today's cities in terms of efficiency, economic growth, sustainability, livability and social inclusion (Vanolo, 2014).

However, a growing number of scholars warn about 'the dark side of ICT's', such as data vulnerability, lack of transparency, cyber-attacks, hidden costs or unpredictable long-term risks (Castelnovo et al., 2016, p. 735). Such a strong focus on technology, as envisioned within the smart city discourse, might increase the dependency on the ICT industry and, in turn, shift the power relations within a city, leading to a 'technocratic governance' (Vanolo, 2014). As a result, a considerable amount of research highlights the importance of a holistic approach which focuses on the interconnection of people, institutions and technology. In this context, citizen participation, has been discussed as a key concept to counterbalance the aforementioned risks (Araya, 2015).

Living laboratories (or short 'living labs') could be seen as a new form of citizen participation, as they provide an open platform for innovation and co-creation for new products and services (García-Guzmán, Fernández del Carpio, Amescua, & Velasco, 2013). Giving citizens a stake in the development cycle, living labs could be a counterbalance to the increasing technocratic nature of governance. Their increasing emergence on the landscape of smart city planning is attracting growing interest from a broad number of stakeholders, such as ICT businesses, research institutions, municipal administrations and urban planners. However, little research has been done on the particular link between citizen participation and living laboratories.

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This thesis seeks to explore the relationship between social innovation projects, in particular living laboratories, and their potential for citizen participation.

1.2 Research Objective and Research Questions

The literature research provides little in-depth analysis on living labs in practice. There are a number of case studies which attempt to establish a general framework for the characteristics and core principles of living labs. However, little research has been done with regard to their participatory quality. As the design and purpose of living labs seem to differ widely, it becomes necessary to have a close look at their realization in practice. The research objective can thus be formulated as follows:

> *To explore, describe and analyze the design of living labs in practice and evaluate whether it facilitates citizen participation.*

The following main research question shall aid to reach this objective:

> *To what extent do living laboratories facilitate citizen participation?*

1.3 **Research Design**

Figure 1 illustrates the research design and the steps that were undertaken during the research process. The literature review, as a first step, was done in order to gain fundamental knowledge about Smart Cities, Living Labs and Citizen Participation. The theory on smart cities gives a general framework for this study while the literature on living labs provides a number of characteristics and assessment criteria with regard to their design and nature. Furthermore, various theories on public involvement and participatory processes have been reviewed in order to identify different levels of participation as well as crucial barriers and success factors.

Step 1	Step 2	Step 3	Step 4

Theory Smart Cities

Framework of the study

Societal relevance

Theory Living Labs

Characteristics, design, methods…

Online research

Documents

Internal reports

Presentations

Analysis

Results and Conclusion

Theory Citizen Participation

degrees of citizen participation

success factors / barriers

Interviews case studies

List of indicators

Derived from literature review

Figure 1: Research Design

In a second step, four living labs have been chosen for an in-depth analysis. Online research and document analysis provided valuable data for the various cases. By means of interviews with living lab initiators and participants, further in-depth information could be gathered. A number of internal documents, such as reports, project descriptions, grant applications and presentations, greatly supported the data collection process. These documents were kindly provided by the participants of this study. The data from step two was then analyzed with the aid of the indicators which derived from the literature review. The results are presented in a fourth step, followed by the conclusion and a personal reflection on the research process.

1.4   Societal and scientific Relevance

1.4.1   Societal Relevance

The idea of 'having a voice' and the right of co-determination appeals to our democratic values and can be found in the concept of citizen participation. There appears to be a common consensus about the benefits of public involvement with regard to decision-making processes. In the context of urban planning, where many decisions often directly or indirectly affect a vast number of stakeholders, the benefits of participatory processes are promoted by a large number of scholars. According to them, the inclusion of citizens in the deliberative process can increase the transparency, efficiency, fairness and overall acceptance of decisions (e.g. Arnstein, 1969; Thorpe, 2017). As the number of living labs on the urban planning landscape increases, the question emerges whether this apparently new form of multi-actor collaboration answers the call for citizen participation. If so, it could present a valuable tool for decision-makers, municipalities and other actors in the urban planning and city management domain.

1.4.2   Scientific Relevance

Up until now, the literature provides little insights about the relation between living labs and public involvement (Folstad, 2008; Juujärvi & Pesso, 2013). This case study explores how living labs are managed in reality, how citizens are directly or indirectly involved in the process and to what extent they have influence on the decision making. By identifying possible hindrances and success factors with regard to the participatory quality, this thesis aims to contribute to the current lack of practical insights on the matter.

1.5   Structure

The first chapter provided a general framework for the research and introduced the reader to the matter at hand. The research objective, the research question and the general design of the research were presented to guide through the process. Furthermore, the relevance of this thesis for society and science has been discussed.

The second chapter moves on to the literature review and provides theoretical knowledge relevant to the research objective. It presents scientific insights on the concepts of smart cities and living labs and reviews a number of theories on citizen participation and public involvement. Chapter three describes the research strategy and methodology. Further information is provided on data

collection, case selection and data analysis. The cases chosen for this research are then framed and described in chapter four. At this point insights from the interviews and the results from the document analysis are presented for each case. Finally, in chapter five these results are summarized and further discussed in form of a conclusion which shall answer the main research question. Last but not least, further research recommendations are presented, followed by a personal reflection on the research process as a whole.

2 Literature and Theory

2.1 Smart Cities

The growing scientific literature on smart cities does not provide a unified definition of the concept. Instead, it is often referred to as 'fuzzy' and dependent on scale, context and perspective of the case study at hand (Meijer & Bolívar, 2015). It is pre-eminently used as a narrative for a new urban paradigm (Joss, Cook, & Dayot, 2017). In an attempt to shed light upon the concept, Nam and Pardo (2011) identified three key factors of smart cities: technological, human and institutional. They suggest that the smartness of a city lies within the interconnection of all three dimensions. However, the majority of definitions does not treat all three aspects evenly. In fact, the technological dimension seems to have gained general popularity and is at the heart of many definitions that see the smartness of cities grounded in the efficient application of information and communication technologies (ICTs) (Batty et al., 2012, p. 483; Castelnovo et al., 2016, p. 725).

2.1.1 Criticism

This one-sided view led to growing concern within the smart city literature. Scholars analyzed the role of ICT businesses and corporations and warned about the development of a 'technocratic governance' in which the interests of the ICT industry will predominantly shape our urban planning and city management. It is claimed that ICT infrastructures and services tend to follow a top-down design which reduces citizens to end-users and are geared to meet economic targets (Araya, 2015, p. 24; Townsend, 2013). In addition, surveillance practices and big data management might pose high risks with regard to privacy, transparency and data safety (Greenfield, 1st 2013; Townsend, 2013; Vanolo, 2014; Hollands, 2015). Castelnovo et al. (2016, p. 735) summarizes that current smart city frameworks "fail to account for 'the dark side of ICT's' (e.g., the digital risks, divides, and vulnerabilities), or for the hidden costs, and long-term effects. [They] are creating technological lock-in by driving fast toward a planned future (full of ICTs and ICT-enabled services), without the appropriate instruments for checking whether we are going into [the] right direction." This concern has grown in importance in the light of recent incidents, such as the 'cyber attacks' on the German government in March 2018 or the vast data breach suffered by credit-reporting company Equifax in 2017 (BBC, 2018).

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2.1.2   Smart city as a trinity: technology, people, and institutions

As a response to these concerns, various scholars promote a more holistic and process-oriented understanding of smart cities while using the term as a blueprint for an ideal future situation. Hence, the focus here lies more on the interconnections between technology, people and institutions. Araya (2015, p.xi) for instance, suggests to understand smart cities as 'living habitats' that have to face constant progress. He perceives smart cities not just in the context of smart technology, but rather as a process of participatory decision-making in which citizens can actively contribute to the creation of "livable, engaging, equitable, and fun" environments. Caragliu et al. (2011, p.70) supports this view by stating that cities can only claim the status '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."

According to Araya (2015, p. 11), the challenge lies thus in "balancing resilient communities with competitive industry [by] moving decision making into the hands of residents so that they might contribute and apply their understanding to creating cities that are humane and just". This view is supported by several authors who promote a transition from top-down approaches to more citizen-centric, participatory governance practices which can counterbalance the threats posed by the technological factors (Albino, Berardi, & Dangelico, 2015). Some scholars even go so far as to express the imperative of a 'new citizen regime' (Meijer & Bolívar, 2015;Bolivar, 2013; Joss et al., 2017).

These notions hint at a high level of citizen participation worth striving for in 'smart city' planning. It is, however, unclear to what extent current smart city initiatives actually facilitate public participation and, if they do, how public participation is understood and enabled within these initiatives. Hence, it is necessary to review the scientific literature in order to gain insights into definitions of and different approaches to public involvement.

2.2   Citizen Participation

Civic engagement has a long-standing tradition in urban planning and intentions to involve the public can be found in the majority of planning frameworks (Batty et al., 2012; Thorpe, 2017). In many cases proposals are first shaped by the city management or urban planning professionals and at a later stage presented to residents and other interest groups, e.g. in the form of community meetings, to inform or collect feedback, complaints, and suggestions for improvements (Bishop & Davis, 2002; Castelnovo et

al., 2016). However, critics observe that participatory practices are generally handled delicately "to provide the appearance of engagement and legitimacy (…) while minimizing the potential for those with conflicting views to be heard" (Thorpe, 2017, p.568).

The literature sees citizen participation as a 'contested concept' and provides much discussion on the question: How much participation is sufficient (Callahan, 2007)? Defining the concept itself proves just as challenging. As Edelman (1977, p.120) put it laconically: "Liberals, radicals and authoritarians all favour participation, a tribute to the term's symbolic potency and semantic hollowness." The questions most dealt with concern the instruments and techniques used during participatory efforts or the assessment thereof in different domains (Thorpe, 2017; Berry, Portney, & Thomson, 1993; Bishop & Davis, 2002; Gaunt, 2009; Innes, 1996; Laurian & Shaw, 2008;). As for the term itself there seems to be a general understanding: "Whatever the form, though, the idea of participation rests always on a sharing of power between the governed and the government" (Bishop & Davis, 2002, p. 14).

In 1969, Arnstein published a seminal paper on citizen participation in which she puts the term on equal footing with 'citizen power'. She further defines it as a "redistribution of power that enables (…) citizens, presently excluded from the political and economic processes, to be deliberately included in the future." Put more concretely, citizen participation refers to the means by which citizens can actively engage in social reform by "determining how information is shared, goals and policies are set, tax resources are allocated, programs are operated (…) to share in the benefits of the affluent society" (Arnstein, 1969, p.216). Arnstein's publication (1969, p.217) lays the groundwork for most discourses on participation by introducing a provocative typology, named 'the ladder of citizen participation' (see fig. 2). As the title suggests, levels of participation are arrayed on eight different steps of a ladder, climbing from Manipulation, Therapy, Informing, Consultation, Informing, Placation, Partnership up to Citizen Control. The eight rungs are further grouped into Nonparticipation, Degree of Tokenism and Degrees of Citizen Control, implying that citizen participation increases with every step towards the top.
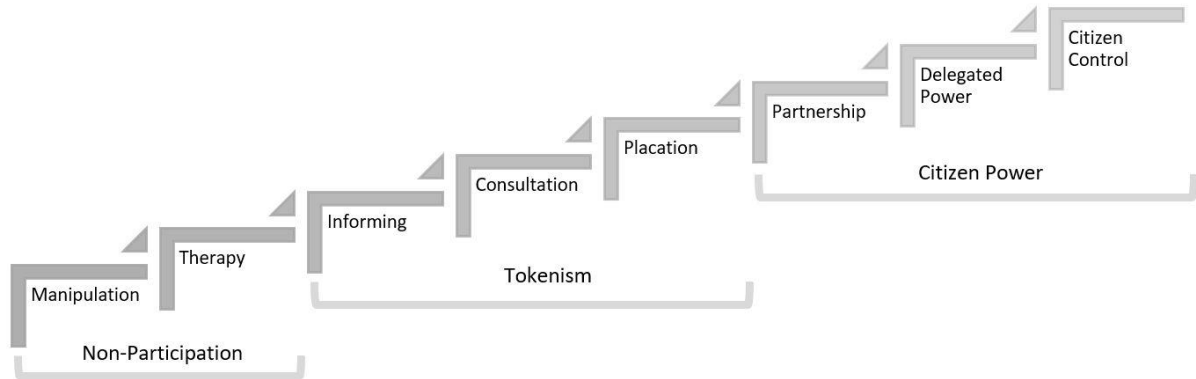
Citizen
Control

Delegated
Power

Partnership

Placation

Consultation

Informing

Therapy

Manipulation

Citizen Power

Tokenism

Non-Participation

Figure 2: The ladder of citizen participation. Adapted from "A Ladder Of Citizen Participation", by S. R. Arnstein, 1969, Journal of the American Institute of Planners, Vol. 35, p.217. Copyright (1969) by AIP Journal

The model illustrates participation along a value-oriented continuum. It implies that every effort for participation needs to be accompanied by the transfer of power from the powerholder to the citizens – the more, the better. As a civil activist Arnstein dismisses the attempts that fail to comply with direct democracy as token – something "done for the sake of appearances or as a symbolic gesture" (Oxford Dictionaries, 2018). What she calls a provocative model highlights the graduations of participation and clearly shows the preference for a 'move up the ladder'. (Bishop & Davis, 2002).

2.2.1 Benefits of citizen participation

The benefits of citizen participation are generally accepted and promoted by a considerable number of studies. Participatory processes are often referred to as a key to direct democracy as they can enhance "transparent, inclusive, and fair decision-making processes that entail some degree of power sharing between government agencies and members of the public" (Arnstein, 1969). It can further lead to an increase in the responsiveness of municipalities and governmental institutions to the needs and interests of residents (e.g., MacAllister, 1980; Stewart, Dennis, & Ely, 1984; Innes, 1996). Through participation processes, citizens can thus draw attention to local issues and raise social inclusiveness (Laurian & Shaw, 2008, p. 294). Moreover, studies have shown that citizen participation can improve the overall quality of decisions and legitimize the decision-making process as such (McLaverty, 2002; Thomas-Larmer, Susskind, & McKearnan, 1999). This, in turn, can lead to higher acceptance and trust in the respective institutions (Berry, Portney, & Thomson, 1993; Thomas, 2016). "At the individual level, participation can promote self-development, citizenship, and commitment to the public good" (Laurian & Shaw, 2008).

2.2.2 Evaluating citizen participation

Arnstein's typology provides a classification along the degree of power-sharing, underpinned by various examples. However, it fails to clarify the idea of 'power-sharing' as the pivotal variable. What is associated with 'power' and with the transfer thereof? Given the year of publication – 1969 – it is wise to have a closer look at more recent studies as the societal and organizational context might have changed over time.

In a study from 2012, Tseng and Penning-Rowsell refer once more to Arnstein's typology but at the same time add to the model by ascertaining further aspects which correlate with participation. In addition to the 'degree of power sharing', they identified the mode of 'decision making' and the 'flow of information' to be of relevance (see fig. 3).
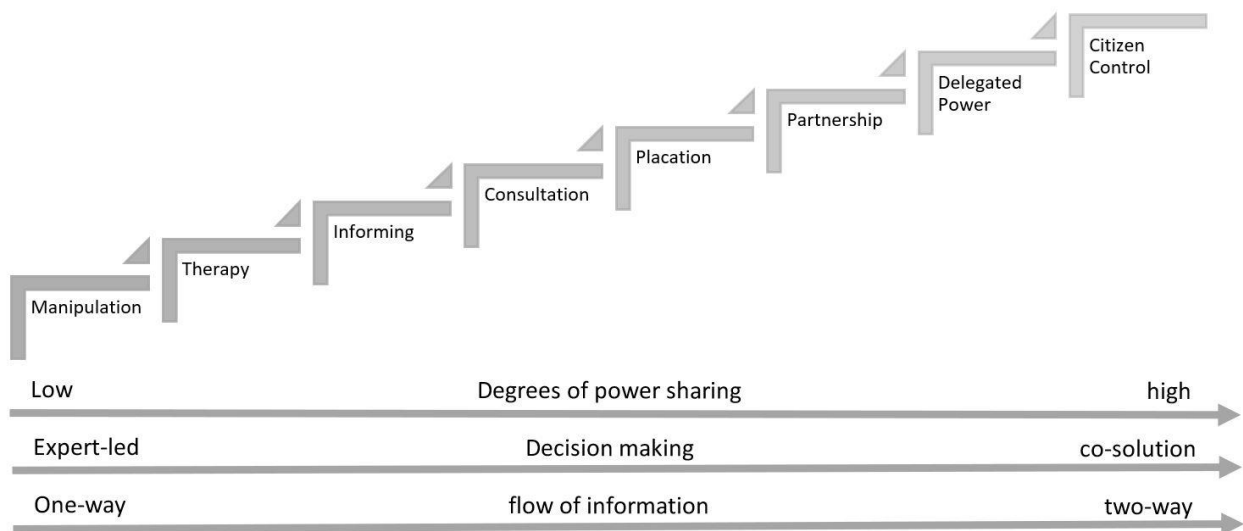
Figure 3: Three key factors that influence citizen participation. Adapted from "Micro-political and related barriers to stakeholder engagement in flood risk management", by C. Tseng and E. Penning-Rowsell, 2012, The Geographical Journal, Vol. 178, p. 257. Copyright (2012) by Royal Geographical Society

The dimension of 'power sharing' refers on the one hand to the degree to which current 'power holders' such as governmental institutions devolve their powers to other stakeholders, such as citizens or private actors. On the other hand, this aspect also considers 'asymmetric power relations' among the involved parties, such as "differences or inequalities in age, gender, socioeconomic status, culture, or educational background [… which might] exclude someone from participating" (Tseng & Penning-Rowsell, 2012, p. 256).

A second key factor to participation lies within the 'decision-making' process which ranges from 'expert-led' with low citizen involvement to 'co-solutions' where decisions are made in agreement with all stakeholders (Tseng & Penning-Rowsell, 2012). Current practices in public services are often based on the assumption that expert-led decision-making is more efficient in terms of time and quality. It is presumed that the 'expert' possesses all the knowledge and skills necessary for qualitative decisions and that he or she is aware of the political and social realities in his/her field of expertise. However, advocates for public involvement claim that our current society is, in fact, highly educated and that "many 'non-professionals' are experts in their own right, either on specific issues which interest them, or local issues which they are best placed to understand" (Involve, 2005, p.23).

The flow of information, as a third dimension, determines whether citizens will be merely informed about a certain issue or whether they can actively share their knowledge, skills and insights (Tseng & Penning-Rowsell, 2012). Studies have shown that a resistance to integrate stakeholder knowledge and/ or merely informing participants in a 'top-down' manner (one-way flow) can undermine the success of participatory processes (Warner, 2006; Haque, Kolba, Morton, & Quinn, 2002).

The continuum model presented by Arnstein and Tseng and Penning-Rowsell facilitates a general classification. It assumes a smooth graduation from a minimum to an acceptable/ desirable degree of participation. Being solely based on a value-judgement, it fails to consider the nature of the issues at hand and the circumstances that call for participation. May it be a new road proposal or an open discussion on medical procedures Bishop and Davis (2012) point out that "participation may serve different ends in each case: in one seeking community feedback, in the other testing contentious expert evidence. To portray either or both as not 'meaningful' participation is irrelevant." This raises the question: when and under which circumstances are participatory approaches relevant?

Participation is generally perceived as a process that can be designed, guided and monitored by professionals (Thorpe, 2017). Proceeding from this approach, Thomas (1993) offers a development of the previous model. He locates public involvement in the realm of officials and recognizes that rather than being an absolute virtue, participation is shaped by the matter at hand. Building on the Vroom-Yetton decision model (1973) he argues that an official or professional has to choose among five decision making approaches (Thomas, 1993, p. 448):

- *Autonomous managerial decision:* The manager solves the problem or makes the decision alone without public involvement.

- *Modified autonomous managerial decision:* The manager seeks information from segments of the public, but decides alone in a manner which may or may not reflect group influence.
- *Segmented public consultation:* The manager shares the problem separately with segments of the public getting ideas and suggestions, then makes a decision which reflects group interests.
- *Unitary public consultation:* The manager shares the problem with the public as a single assembled group, getting ideas and suggestions, then makes a decision which reflects group influence.
- *Public decision:* The manager shares the problem with the assembled public, and together the manager and the public attempt to reach agreement on a solution.

Each approach calls for certain participation methods and targets different audiences as illustrated in figure 4.

	Nature of the Public			
Style of decision making	*One organized group*	*Multiple organized groups*	*Unorganized public*	*Complex public*
Autonomous managerial decision	-	-	-	-
Modified autonomous managerial decision	Key contacts	Key contacts	Citizen survey	Key contacts / citizen survey
Segmented public consultation	Key contacts	Contacts / Series of meetings	Citizen survey	Citizen survey / Meetings
Unitary public consultation	Meeting(s) with group	CAC* or series of meetings	Series of public meetings	CAC* and/ or meetings
Public decision	Negotiate with group	Negotiate with CAC*	Series of public meetings	CAC* / Public meetings

Figure 4: A Matrix Guide to Public Involvement. Adapted from "Public Involvement and Governmental Effectiveness", by J. C. Thomas, 1993, Administration and Society Journal, Vol. 24 No.4, p. 458. Copyright (1993) by Sage Publication, Inc.

*CAC = Citizens advisory committee
**Complex Public = Some combinations of organized and unorganized groups

For example, for an issue that concerns one or more organized groups, the official is likely to seek information from his/her key contacts, but decides autonomously to what extent this information will be considered. Hence, the judgment on which participation tools should be used is put into the hands of the officials. To find the 'appropriate' balance between effective and meaningful participation based on the nature of the issue becomes the new challenge. In general, "greater needs for public legitimacy recommend more [public] involvement; greater needs for managerial efficiency and technical competence recommend less (Thomas, 1993, p. 446).

While Arnstein sees participation as an imperative and a cornerstone for direct democracy, Thomas (1993, p. 461) emphasizes that participation is never naturally 'desirable' or 'undesirable'; "its desirability depends on the particulars of the issue at hand." At the same time, Thomas recognizes that decisions have often been made with less civic involvement than the realities demanded. The question about the 'appropriate' degree of participation hence remains undecided in the academic literature.

2.2.3 Success factors

Besides the open-ended controversy on the evaluation of participation itself, the literature does provide a number of success factors which can facilitate or improve participation.

For instance, it has been widely recognized that early stakeholder engagement has a positive effect on the participation process, as it can lead to an increase in trust as well as a broader spectrum of solutions. Participants might be more inclined to support the implementation process as they feel a 'sense of ownership' and commitment (Sinclair & Hutchison, 1998; Rowe & Frewer, 2016). In contrast, being involved at later stages can cause frustration and might result in the rejection of proposals and less support for the implementation (Reed, 2008).

Whether citizens value the expected outcome of a process (e.g. policy proposal, service or product development) has considerable influence on its adoption and implementation. "Positive perceptions of a service's capability to deliver public value and the transparency and accountability of the decision-making process (…) increase citizens' trust in policy makers and public administration" (Castelnovo et al., 2016, p. 730, 2016).

Another key criteria for the success of participatory approaches can be found in the clear communication of the overall objectives and limitations of the process as well as the responsibilities of the participants involved (Tseng & Penning-Rowsell, 2012). This can prevent conflicts, misunderstandings and frustration which, in turn, could jeopardize the participation process (Involve, 2005).

Last but not least, the digital age with its advanced information and communication technologies is not solely fraught with dangers. On the contrary, "the ability for all citizens to communicate with one another and with agencies and groups that represent them, has provided a new sense of urgency and possibility to the idea that smart cities are based on smart communities whose citizens can play an active part in their operation and design" (Batty et al., 2012, p. 492). Social media channels, forums and online platforms could be used for a broader and more inclusive communication approach when dealing with public involvement.

Even though the approaches and ideas about participation remain disparate, the benefits of successful public involvement as discussed in this chapter have been supported by a considerable amount of studies (e.g. Beierle, 2002; Sultana & Abeyasekera, 2008).

2.3 Living Laboratories

In recent years, there has been an increasing amount of literature on the topic of 'living laboratories'. Living laboratories (or short 'living labs') emerged within the last ten years in a number of different domains such as healthcare, business, education, the energy sector, infrastructure development and urban planning (Neef et al., 2017) . The beginning of this new approach can be traced back to a small number of IT companies that engaged directly with end-users to analyze their interaction with technological services and products (Almirall & Wareham, 2011). Later on, the concept became increasingly popular and was adapted by research institutions, municipalities, NGO's and the ICT industry. They started to recognize the benefits of including end-users in the process of innovation and co-development to aim for more user-centric solutions (Guzmán, del Carpio, Colomo-Palacios, & Diego, 2015).

2.3.1 Fuzzy definition

The term 'living lab' has become a slogan for a number of different approaches for which the literature fails to provide a unified definition. Living labs have been generally described as "public-private-people partnerships" (Neef et al., 2017) and user-centered "open innovation infrastructures" which are accessible to a number of stakeholders who share "innovation interests and needs for a specific purpose" (García-Guzmán et al., 2013; Guzmán et al., 2015).
Folstad (2008) reviewed 32 papers on urban living labs with a focus on ICT innovation and development. His analysis yielded the following 'minimum definition' for living labs:

"Living Labs are environments for innovation and development where users are exposed to new ICT solutions in (semi-)realistic contexts, as part of medium- or long-term studies targeting evaluation of new ICT solutions and discovery of innovation opportunities."

He further identified two categories of living labs:

- Living labs as 'test-beds' for exposing applications to users for validation
- Living labs as open innovation platforms to support co-creation

The first category of living labs solely engages with end-users to present the outcome of a proceeding innovation and design process, while the latter allows for higher degrees of participation throughout these processes (Guzmán et al, 2015). Especially earlier living labs often dealt with product and service development for commerce, in particular ICTs. Later on, more and more living labs with a focus on community and urban development emerged (Hughes, Wolf, & Foth, 2017). In a more recent study Neef et al. (2017, p.8) made a similar distinction and identified two ideal types which differ with regard to their purpose, environment, methods and phases:

- *Product Oriented Labs (POLs):* Originating in innovation sciences, POLs foster a participatory mindset with a focus on innovation. The environment of the lab is usually determined by a fixed constellation of stakeholders. A process manager has high influence on the set-up and the structure of the lab which leads to a more efficient and quicker way of working. This facilitates innovation processes under (time) pressure.

- *Urban Transition Labs (UTLs):* They are based on transition management theory and are set-up by a number of different actors. The purpose lies here on transitions, defined as social processes of fundamental changes in culture, structure and behavior. The environment of the lab can be discussed and adapted if new actors come into play. Hence, a process manager has less influence on the outcome of the lab. Processes can take longer but the potential for innovation and sustainability is higher than that for POLs. In UTLs "(global) persistent problems are translated to the specific characteristics of the city and where multiple transitions interact across domains, shift scales of operation and impact multiple domains simultaneously (e.g. energy, mobility, built environment, food, ecosystems)" (Nevens, Frantzeskaki, Gorissen, & Loorbach, 2013, p. 115).

POLs and UTLs as explained above are idealistic types which often overlap or become blurred in practice (Neef et al., 2017).

2.3.2 Objectives

Living labs in practice pursue a considerable number of different goals as their design differs broadly throughout the domains. The literature review provided a general distinction between three main objectives:

1. *(Co-)creation and Innovation:* The lab focuses on social and/or technological innovations, such as new products, services, processes, systems or organizational structures (Neef et al, 2017).
2. *Learning:* The lab becomes a platform for learning and knowledge transfer. This can be with regard to scientific knowledge, (new) insights into the matter at hand (e.g. insights from locals directly affected), (new) modes of practice and collaboration (Neef et al., 2017). Almirall and Wareham (2011, p. 30) further argue that "living labs are also intermediaries that focus on the mediation between users, public, or private organizations, capturing and codifying users insights in real-life environments."
3. *Sustainability:* The living lab can be geared towards social, ecological or economic sustainability. Innovations in this case are means to an end rather than the main objective.

These goals are closely interlinked and reappear in the majority of living labs in varying degrees (Neef et al., 2017).

2.3.3 Environment of living labs

As diverse as the objectives are the organizational and geographical environments of living labs.

Geographical: The geographical environment can vary from a physical building to a neighborhood, a province or can be as broad as a country. Accordingly, the population', which is directly or indirectly affected by the objective of the lab, can range from a small number of people to thousands of inhabitants. The physical environment of UTLs is usually framed by the city, municipality or province which often initiated the lab or which is primarily concerned with a given issue.

Organizational: The organizational environment refers to the stakeholders involved and their organizational landscape. García-Guzmán et al. (2013) observed that the bigger the collaboration and

the more stakeholders involved, the bigger the societal impact and potential benefits of a lab. However, the size might also come along with a variety of challenges (e.g. communication, coordination, finances …). The literature does not provide a suggestion on the physical and organization dimensions of living labs. Baltes and Gard (2010), however, approach the question in a pragmatic manner and state that the size of a lab should be practical for the chosen innovation process as well as allow for (effective) interaction between the participants. The theory suggests that living labs "can be created and used only for one living lab innovation case. (…) However, most living labs are used for multiple innovation cases" (Schuurman, De Marez, & Ballon, 2013, p. 31).

2.3.4   Stakeholder involvement

Living labs have been framed as 'multi-actor platforms' (Neef et al., 2017) and 'public-private-people partnerships' (Folstad, 2008) which involve public and governmental institutions, companies, (ICT) industries, academia as well as individual actors such as inhabitants and/ or end-users (Almirall & Wareham, 2011; Guzmán et al., 2015).   While POL's are often led by (ICT) businesses and organizations, UTLs especially involve public actors, NGOs, urban planning professionals and residents. The constellation and number of stakeholders and varies on a case-by-case basis and depends primarily on the objective of the lab.

With regard to the multi-stakeholder aspect, Leminen and Westerlund (2012) identified the four roles – user, utilizer, enabler, and provider – amongst the participants of living labs. Keeping in mind the user-centricity of living labs, scholars have pointed out that 'users', in this sense, are at the same time understood as co-creators rather than passive respondents (Almirall & Wareham, 2011). Nevens et al. (2013) observed that (some of) the stakeholders involved usually share a creative and visionary mindset. He highlights the influence of frontrunners who can act and think without constraints from their professional background and who share a common goal. As for the motives to participate, Pallot et al. (2010) observes that 'having an impact in a process that tackles personal interests can be one of the main drivers. Individuals also engage when they feel the need to participate in the creation of new knowledge. According to Schuurman (2015), the commitment of end-users (consumers or residents) lasts as long as the lab meets their personal needs (agenda) and reflects social coherence.

2.3.5 Methods and techniques

Being called an 'everything is allowed concept', living labs seem to have a potential for a considerable number of different techniques and methods (Schuurman, 2015). As we recall the objectives of living labs, namely co-creation, innovation, learning and sustainability, we can assume that living labs primarily deal with processes. Neef et al. (2017) generally summarizes the process of a living lab as the management of stakeholder's interests and their roles as well as the management of responsibilities and performance.

Co-creation, exploration, experimentation and evaluation have been identified as the main processes which are addressed by the majority of living labs (Hughes et al., 2017). Recalling living labs as platforms for open innovation, Guzmán et al. (2015, p. 32) identified four 'innovation lifecycle phases':

1. *Incubation of ideas and projects,*
2. *Conceptual design of products and services,*
3. *Prototyping and technical development and*
4. *Validation and wide-scale roll-out.*

The methodology for stakeholder participation depends on the innovation phase that is being targeted. "In several cases, the users go to the living lab to access technology-related facilities, such as technological services, training courses, dialogue cafés, and other initiatives; in other cases, the users participate in specific activities within the scope of a particular project" (Guzmán et al., 2015).

2.3.6 Participation as a core principle of living labs

Even though neither the term nor the idea of living labs can be easily broken down, the literature does provide a number of (idealistic) principles that living labs should comply to. Neef et al. (2017, p. 19) identified participation as one of those principles by stating that participants should have real influence within a lab while benefitting equally from the lab's added value. Recalling the literature on participation, 'real influence' in this sense would require a high degree of power sharing and involvement in the decision-making process. The involvement of 'users' (end-users, consumers or residents) should happen, according to Neef et al., early on in the process to correspond to the idea of co-creation (POLs) and social innovation (UTLs). Living labs should moreover facilitate experimentation in 'real world settings' "to provide structure and governance to user participation in the innovation

process" (Almirall & Wareham, 2011). In terms of the relationship between participants in a living lab, Neef et al. highlights an open-minded attitude. This includes openness to the involvement of actors, their knowledge and experiences. In view of participation, it can be suggested that the virtue of openness should reflect itself in a 'two-sided' flow of information between residents (or users) and the project leader, meaning that all feedback, ideas and proposals are to be considered equally.

2.3.7 Success factors and barriers for participation within living labs

The literature reveals a number of factors which 'shape' the success of a living lab, amongst which (financial) resources, stakeholder composition, the issue at stake, the scope and scale as well as the political context. Participation, as described on the previous page, is a core principle for the 'ideal' living lab and hence one of its success factors. Since participation itself is not an absolute value nor a definite term (see point 2.2.) it can be suggested that the success factors for living labs correlate among each other. On this account, the following paragraph shall present a number of success factors and barriers for living labs, as suggested by the living lab literature, and their particular link to participation.

Success factors

- Political context:
  Living labs are sensitive to external interferences. A negative political climate which repels the importance of the issue at hand or which doesn't approve with the (participatory) approach of a living lab will likely have a negative impact. The higher the lab (and the underlying issue) gets on the political agenda the more likely it will receive the resources and support that are needed for its success (Nevens et al., 2013). Political support, in this sense, also includes a general acknowledgement of collaborations between social and public actors, e.g. through the provision of funding (Karré et al., 2015). Following this line of thought, it can be argued that every participatory effort (as part of a living lab) is, in turn, influenced through political and organizational circumstances. At the same time, Bulkeley et al. (2015) argues, that living labs needs to be able to act independently from local politics in order to experiment and innovate without being constraint by (too many) regulations or biases.

- Resources:

  The success of a living lab furthermore depends on the resources that are available. This includes financial means but also time and human resources. Having the 'right kind' of participants and also offering an exit option for 'the wrong kind' is crucial for a fruitful constellation (Nevens et al., 2013). Citizen participation, as the term dictates, would require that citizens (or in a broader sense: the affected public) are directly involved in the lab – the earlier, the better (Sinclair & Hutchison, 1998). As mentioned earlier, the ideal participant would be visionary, open-minded and creative. A good balance between experts and 'amateurs' which can draw from different backgrounds can furthermore contribute to the success of the lab.

- Clear goal definition and evaluation criteria:

  A clear and transparent goal definition at the beginning of the living lab process as well as an accountable ex-post evaluation are crucial for a successful process as they can prevent frustration and misunderstandings among the stakeholders (Karré et al., 2015; Schuurman, 2015). This is especially true if the lab/ experiment aims for a high degree of participation, as information should be clearly communicated and 'flow both-ways' (see Arnstein). Well defined and communicated assessment criteria furthermore facilitate the implementation and legitimization of results (Karré et al., 2015).

Challenges / barriers

The design and constellation of living labs (context, size, purpose and stakeholders) can pose a number of challenges that might undermine their success and efficiency as well as any participatory effort.

Tension of collectivity (Collectiviteitsspanning): The objective of the living lab can be in conflict with the interests of individual actors or groups of stakeholders. Neef et al. (2017) call this 'tension of collectivity'. If the participants don't find a common ground or if their actions run afoul of the shared objective, any collaborative effort (including participation) will likely fail.

Actor-space biases (Actor-ruimte vooringenomenheid): Does the chosen physical and organizational dimension determine the participation of actors (UTLs) or do the actors determine the frame of the

living lab (POLs)? If the space is defining, it might neglect the interests of certain actors. If, instead, the interests of the actors have priority, the living lab process might drift away from its initial purpose. With regard to participation, the question might arise whether the citizens involved in the living lab are actually an adequate representation of the public affected by the objective of the lab. This directly links back to the question: how much participation is 'enough'? The scale of a living lab as well as its organizational background can play an important role in the justification of a certain living lab design (Neef et al., 2017).

Fuzziness of inclusion (Inclusie onzuiverheid): Karré et al. (2015) observes that it's often white and well-educated man of older age who participate in urban planning cases or those who have much to lose when it comes to a certain decision. He hereby hints at a basic challenge regarding participatory efforts. Even if a project is open to the public there might be potential barriers which hinder certain demographic groups and individuals to participate, for instance due to lack of time, finances (travel costs), fear of public speaking, another working language etc.

Performance – innovation paradox (Prestatie-innovatie paradox): This paradox refers to the possible tension between the performance pressure (solving a given issue) and the space and time that is necessary to be innovative. In this context the 'tension of collectivity' comes into effect as a successful performance might have different meanings for different stakeholders (Neef et al., 2017). This can rise a number of questions, for example: When is the outcome of the lab successful? How many people need to be included to justify the process as participatory without cutting back on efficiency? The underlying objectives and agenda setting of stakeholders might have great influence in this regard.

2.4   Conceptual Model and Operationalization

As we have learned from the smart city literature, the future of smart urban planning will heavily rely on ICT's as they pervade our society and our institutions. However, critics warn about related risks such as insufficient data safety and poor privacy regulations. They also caution against the shift to a 'technocratic governance' heavily influenced by the interests of the ICT industry, where services are implemented in a top-down approach lacking legitimacy and transparency. The literature review has revealed the importance of citizen participation as a 'counterbalance' to this development, as it can create public value, enhance transparency and the overall effectiveness and acceptance of the

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decision-making process. With regard to the smart city development, scholars call for a more holistic approach which values the interconnection between people, technology and institutions.

Living labs are framed as 'multi-actor' platforms and 'public-private-people partnerships'. As such they seem to actively address the aforementioned concerns by involving end-users, like residents and municipalities, in the innovation and co-creation of services and products through participatory processes. Accordingly, it is possible to hypothesize that living labs have participatory quality. This thesis seeks to explore this quality to contribute to the understanding of living laboratories and their association with citizen participation.

In order to explore to what extent living labs allow for citizen participation, it is necessary to identify a number of influential factors. Participation is in the first place about the degree to which power is transferred to the governed – in this case citizens (Bishop & Davis, 2002). Arnstein's participation ladder (1969) dominates the literature on public involvement and is still a classic reference. As a continuum model, it assumes a smooth graduation from a minimum to a desirable degree of power-sharing. It thereby allows for a simplistic categorization. The transfer of power, however, is difficult to measure as it can occur in many ways. Identifying and assessing 'sub-factors' that have influence on this dimension can provide better insights.

Since the extent of participation cannot be determined in absolute values, it becomes necessary to rephrase the initial research question ("To what extent do living laboratories facilitate citizen participation?") as follows:

Do living labs provide favorable conditions for citizen participation?

'Favorable conditions' refer to factors which enable or support the transfer of power and as such contribute to the success of participatory approaches.

Proceeding from Arnstein's definition, any participatory effort requires the involvement of citizens in some way. It was furthermore highlighted that civic engagement should happen at an early stage. Additionally, Tseng and Penning-Rowsell (2012) identified two factors which can hamper or facilitate participation processes: the *decision making process* and the *flow of information*.

Critics point out that Arnstein's model is based on a value-judgement and fails to consider the nature of the issues at hand. Thomas (1993) therefore suggests to consider the particulars of the given issue, in other words *the context* of a participatory process, including the *nature of the affected public*

and the *techniques and methods* used in the process. This in turn, could indicate which decision-making style is suitable.

Due to practical constraints, this thesis cannot provide a complete overview over the many aspects that might facilitate or jeopardize participatory efforts, as they are, above all, dependent on the individual case. It is furthermore beyond the scope of this research to engage in the discussion about the appropriateness or the actual value of participation as it emerges from the cases.

Instead, the thesis aims to explore a small selection of living labs with regard to the aforementioned aspects that have been suggested within the literature in a universally valid fashion. As recommended by Thomas (1993), each living lab shall be framed to put the case into perspective. For this purpose the literature on living labs provided a useful overview of common features.

Framing of the living lab:

- *Underlying problem statement*:

  The societal, environmental and/or economic challenges that led to the initiation of the lab and its experiments shall give further indication of the nature of the lab and the issues with which the participants are dealing. It is expected that the issue at hand has influence on the design of the lab, its scale, scope and stakeholder constellation.

- *Overall objective of the lab and the experiment(s):*

  To position the lab on the landscape of smart cities and urban planning, the overarching purpose of each living lab shall be described. Schuurman et al. (2013) observed that most living labs conduct more than one innovation case. In order to gain in-depth information about the design and the working process, a focus will be put on one innovation case per lab. To live up to the term 'lab', these cases will be called 'experiments'.

- *Physical and organizational environment:*

  The physical environment of a living lab can differ widely - so does the amount of people that might be directly or indirectly effected by its experiments. To frame the cases, a description about each lab's physical and virtual boundaries as well as an indication of the scope shall be provided. The organizational environment refers to the lab's organizational landscape. Knowing who are the initiators and funders is relevant to analyze the decision making process and the 'power relations' in place.

- *Stakeholder constellation:*

  The constellation of stakeholders is key to participation as participation is based on a 'transfer of power' between different parties or individuals. The 'ideal' living lab has been described as a multi-actor environment where a variety of different stakeholders come together (Almirall & Wareham, 2011; Neef et al., 2017). To put each case into context, an overview over the parties involved shall be provided.

Having framed each case, the actual analysis follows. This is based on the influential factors of citizen participation which were derived from the literature review:

- *Public involvement – points of contact:*

  Recalling the main research question, the focus lies on *citizen* participation. Whether at all citizens are involved and if so, at what stage in the process, shall be further analyzed.

  As living labs often conduct more than one experiment (Schuurman et al., 2013), it is expected that the constellation of stakeholders may vary from experiment to experiment. The description of the stakeholder constellation therefore applies to the one experiment selected for the case study and might not be applicable for other experiments of the same lab.

- *Affected public:*

  As was pointed out by Thomas (1993), the 'real challenge' for participation lies in the balance between effectiveness and meaningfulness. Effectivity is for a big part dependent on the size of the lab and the number of stakeholders included (Neef et al., 2017). For this reason, Thomas (1993) suggests to identify the scale and the nature of the public that might be directly or indirectly concerned with the objective of the living lab and its experiment. Moreover, it shall be explored whether the 'affected public' is actually reflected in the number of participants who are involved in the living lab experiment (adequate representation).

- *Collectivity of decision making:*

  The decision making as such is a complex and multi-layered process which can be influenced by a considerable number of aspects, such as the political context, micropolitics, stakeholder constellation, organizational background of the living lab etc. Given the complex design of

living labs, it can be assumed that decisions of all scales need to be made on a regular basis (e.g. Who to involve in the set-up of a lab? Which methods shall be applied? Who will lead the experiments? …). Analyzing the entire decision making process is beyond the scope of this thesis. For this reason a focus will be put on the overall objective of the lab and the main decisions made to reach this goal. In the literature for civic engagement, decision making ranges from 'expert-led' to 'co-solution' (Tseng & Penning-Rowsell, 2012) or, from a more managerial perspective, from an 'autonomous managerial decision' to a 'public decision' (Thomas, 1993). For this analysis, the latter approach was chosen as it takes into account the nature of the affected public and the methods used for a certain decision - both aspects that are already part of the analysis.

- *Flow of information:*

  For a high degree of participation all information should flow both ways (Arnstein, 1969; Tseng & Penning-Rowsell, 2012). This assumes a clear goal definition and transparent communication among all stakeholders of a living lab. Hence, it shall be analyzed how citizens were informed about the objective of the lab/experiment and to what extent feedback, suggestions or criticism were considered in the (final) decision making process.

- *Techniques and methods used:*

  As an "everything is allowed concept" (Schuurman et al., 2013), living labs provide the opportunity to apply a variety of techniques and methods. As discussed earlier, the design of a lab and its experiments -including the methods used – have a considerable influence on the participation process and the overall performance of a lab. For this reason it becomes necessary to have a closer look at the 'methods of collaboration' and how they might facilitate public involvement.

It is expected that many of the aspects mentioned above overlap in practice and cannot be analyzed without consideration for the others. For instance, the applied techniques and methods likely have an influence on the flow of information and the manner in which decisions are made. Respective links shall therefore be highlighted during the analysis.

3   Research Strategy and Methodology

In the previous chapter the revised research question has been introduced: *Do living labs provide favorable conditions for citizen participation?* In the following, the methodology that has been applied in order to answer the question shall be explained and justified. The case selection, the available data sources as well as the data analysis are presented and discussed.

3.1   Research Strategy

In social sciences there are currently three popular approaches to scientific research: quantitative, qualitative and mixed methods research. While quantitative research is mainly based on numerical data, qualitative research relies on the collection of qualitative data, such as interviews, documents or observations. Qualitative data furthermore focuses on the exploration and understanding of a social phenomenon and the meaning that is ascribed to it (Creswell, 2014, p. 4). Such a social phenomenon can be found in the participation processes within living labs. As the literature review revealed, neither the concept of living labs nor the idea of participation can be determined in absolute terms. Instead they are subject to interpretation and individual (or organizational) understanding. To answer the research question, a qualitative research design is best suited as it follows a naturalistic and interpretative approach in order to make sense of the matter at hand (Flick, 2014).

From the array of qualitative research strategies, for this research an explorative multiple case study design has been chosen. Up until now, no research has been done on living labs and their association with citizen participation. The case study design is especially suitable as it allows for exploring contemporary and new topics (Stake, 2010; Yin, 2009). As suggested by Thomas (1993), any participation effort should be analyzed with regard to its context and the particulars at hand. Case studies are best suited for such in-depth exploration of complex phenomena in real-life settings (Fridlund, 1997). This advantage is also of importance because of the many different designs that living labs can assume in practice.

Stake (2010) distinguishes between an intrinsic and an instrumental case: An intrinsic case study analyses a singular case of special interest, whereas an instrumental case study focuses on understanding a certain phenomenon or issue based on the selected cases. Citizen participation is a general phenomenon which is not restricted to a single case. Exploring this phenomenon within the setting of different living labs is the aim of this research. Such being the case, an instrumental multiple case study approach has been chosen. "In a collective case study (or multiple case study), the one issue

or concern is again selected, but the inquirer selects multiple case studies to illustrate the issue" (Creswell, 2009, 2009, p. 74).

3.2   Case selection

The multiple case study design can be challenging in terms of overall generalizations. Studying more than one case leaves less room for in-depth analysis (compared to a single case study) (Creswell, 2014). For that reason, Creswell (2009) suggests to not use more than four or five cases which have been selected through purposeful sampling. Following this advice, the research has been limited to a selection of four living lab projects in the Netherlands in an attempt to reduce the complexity of the topic and to facilitate the data collection. The sampling strategy is based on the theoretical construct from which certain criteria were deduced. These shall be further explained in the following paragraph: The literature review does not provide a universally valid definition for living labs but, instead, highlights the complexity of the concept. Being officially named a 'living lab' is therefore a trivial but necessary criteria for the case selection. This associations should also be extended to the experiments. In order to forge a bridge to the overarching topic of smart cities, a focus was put on 'Urban transition labs' with a clear ICT-component (e.g. dealing with new technological innovations). In addition, UTLs are pre-dominantly associated with participatory processes. This criteria was met in three cases. The chosen experiment of the fourth case – the Healthy Living Lab – has a social rather than a technological component. This particular lab developed its own living lab methodology based on scientific findings and claims to follow an "interdisciplinary and participatory approach" (HLL, 2018b). Since the objective of this research is to explore the link between living labs and citizen participation, this case presents an interesting addition and can provide valuable insights into social innovation processes.

   The cases have been selected based on their project state and the stakeholders involved. In order to explore the factors from the conceptual model, it was of importance that the selected projects are currently in implementation or evaluation state. This was expected to facilitate the identification of potential interview partners and contribute to topicality. Since the research draws on the concept of citizen participation as an overarching framework, living labs have been favored that claim to involve residents and municipalities.

3.3 Research Methodology and Data Collection

For this research the 'multi-method' was applied which includes more than one technique from the array of qualitative methods (Saunders, Lewis, & Thornhill, 2012). Semi-structured in-depth interviews with participants from different living labs provide the base of the data collection, complemented by secondary data such as project websites, reports, internal documents, project publications and presentations. Such a combination of data collection methods contributes to the internal validity of the research and can give deeper insights from various perspectives (Verschuren & Doorewaard, 2010). The use of semi-structured interviews supports the explorative character of the research study and allows for surprises and deeper insights that might prove to be relevant in answering the research question adequately (Wagenaar, 2011).

3.3.1 Desk research

Desk research refers to the collection and analysis of secondary data which has been published online or is available in print (Verschuren & Doorewaard, 2010). As such, desk research was conducted throughout the entire process, starting with a critical literature review in order to acquire relevant knowledge and to build a theoretical foundation for the conceptual model in chapter 2.4. Given the topicality of living labs, information about cases in the Netherlands was then gathered through thorough internet research, including living lab's websites and digital newspaper articles. Later on, all contact persons and participants who took part in this research were asked to provide further data about the selected cases, such as (internal) reports, presentations, grant applications or other related documents (see table 2).

Name of document	year	type	source	nature
Smart Cycling Futures' Living Lab: Fast Cycling Route Dalfsen-Zwolle				
Smart Cycling Futures Final Proposal	2015	grant application	personal communication, 11.06.2018	internal
Poster SCF met LL	n.d.	poster	personal communication, 11.06.2018	internal
SCF Overview	n.d.	power point presentation	personal communication, 11.06.2018	internal
Verslag_sessie belangenvertegenwoordigers	2018	report concept version	personal communication, 07.06.2018	internal

Verslag_Fietsschouw	2018	report concept version	personal communication, 07.06.2018	internal
Verslag_sessie stakeholders 23 april	2018	report concept version	personal communication, 07.06.2018	internal
Inspiratieboek met eisen SFR Zwolle – Dalfsen_ambitie	2018	report concept version	personal communication, 28.06.2018	internal
Healthy Living Lab North-East Friesland				
ANNO_Verslag_Workshop_Beweegtuin_Ferwert	2018	report	personal communication, 23.06.2018	internal
ProjectNetAanvraag	2018	grant application	personal communication, 06.06.2018	internal
Wegwijs in living labs in infrastructuur en ruimtelijke planning: Een theoretische en empirische verkenning	2017	scientific research, published	personal communication, 29.04.2018, document retrievable from: https://www.rug.nl/research/portal/files/40745283/2017_RWS_LL_report_EBook_ISBN.pdf	published
HLL SummaryEnglish	n.d.	Report	personal communication, 29.04.2018	internal
Living Lab Smart Charging Arnhem				
170701_Handbuch Smart Charging DE-WEB	2017	organizational brochure	personal communication, 17.05.2018, online version retrievable from: https://www.livinglabsmartcharging.nl/nl/Over-ons/Mediakit	published

Table 1: List of documents for document analysis

3.3.2   Semi-structured interviews

The target group for the semi-structured interviews consisted of project initiators/leaders, municipalities and local residents. Initiators and project coordinators were chosen because they can provide valuable information for the framing of the living lab. As for an 'insider perspective' into possible participation processes, municipalities and local residents formed the most suitable target group, especially with regard to the main research question. However, despite all efforts, no affected residents were willing to take part in this research. At this point it is important to mention that the roles overlapped in practice. So were, for instance, some of the project leaders employed by the municipality, where in other cases the initiator of the lab assumed the responsibility of a process leader. In total, six interviews with a duration of one to two hours have been conducted (see table 1).

Interviewee	organization/ institution	position	Date, Place	Type of Interview
Smart Cycling Futures' Living Lab: Fast Cycling Route Dalfsen-Zwolle				
Respondent 1	University of Windesheim	Senior Researcher	11.06.2018, Windesheim Campus	Face-to-face interview
Respondent 2	Municipality Zwolle	Project coordinator, advisor for traffic management	07.06.2018, Council office Zwolle	Face-to-face interview
Healthy Living Lab North-East Friesland				
Respondent 3	Freelancer	Urban planner, researcher, initiator of HLL	04.06.2018, Arnhem	Skype interview
National Living Lab: WDO Dordrecht				
Respondent 4	Municipality Dordrecht	Advisor asset management, advisor strategy and innovation	05.06.2018, Council office Dordrecht	Face-to-face interview
Respondent 5	Municipality Dordrecht	Data analyst	05.06.2018, Council office Dordrecht	Face-to-face interview
Living Lab Smart Charging Arnhem				
Respondent 6	Living Lab Smart Charging, Elaadnl	Program manager Living Lab Smart Charging, manager market development Elaadnl	17.05.2018, Elaadnl office Arnhem	Face-to-face interview

Table 2: List of interviewees

In advance of the interviews, a semi-structured interview guide was prepared in English and Dutch which guided through the process while leaving enough room for open questions and further probing (see appendix A). Following Creswell's (2013) suggestion, the interview protocol was used as a checklist to cover all relevant topics as described in the conceptual model. As it became apparent that theory and practice diverge with regard to the design of living labs, an iterative approach was required. The interview guide was thus slightly adapted after each interview, taking into account the design of the case at hand based on the available secondary data. This approach allowed for more specific questions which aimed for a better understanding of the complex organizational and physical environment of each living lab.

In order to meet the criteria of reliability, each interview was digitally recorded and fully transcribed. During this process the anonymity of the interviewees has been guaranteed. At the beginning of each interview, the respondents were informed about the objective and the scale of this research. It was further pointed out that all data is to be anonymized and treated as confidential. The approval for the digital recording and the storage of the files was sought in advance. To meet the criteria of validity, all interviewees were unrelated to the researcher.

3.4   Data Analysis

According to Yin (2011), data collection and analysis should go hand in hand within a case study design. He suggests that the analysis of the data should happen in an 'iterative' and 'recursive' manner. This can mean that adaptions of, e.g. the interview guide, become necessary or that a modification of the data collection is required if conflicting information occurs.

The acquired qualitative data gained through the interviews has been analyzed manually by close reading and interpretation. To provide a better understanding of each case and its context, the living labs are described in terms of their objectives, their physical and organizational environment, the stakeholders involved, their time frame and the state of implementation. The findings from the interviews as well as the secondary data have been analyzed based on the conceptual model and the aspects of citizen participation that emerged from the literature review. The results are presented in the following chapter.

4   Case description and Results

4.1   Smart Cycling Futures' Living Lab: fast cycling route Dalfsen-Zwolle

Smart Cycling Futures is one of five research programs under the umbrella of 'Smart Urban Regions of the Future' (SURF), a national knowledge collaboration between the Ministries of Infrastructure and Environment (IenM) and Interior and Kingdom Relations (BZK), NOW, Platform 31 and SIA (Nationaal Regieorgaan Praktijkgericht Onderzoek). SURF avails over a joint budget of 16.5 million euros for the period 2015- 2020 (VERDUS Verbinden van duurzame steden, 2018).

4.1.1   Framing the living lab

Objective and scale

Smart Cycling Futures (SCF) explores 'smart' cycling innovations of social, technological or infrastructural nature and investigates on their potential for urban and rural development (SCF, 2018). The Universities of Utrecht and Amsterdam, Eindhoven University of Technology and the University of Applied Sciences in Windesheim each conduct a number of scientific studies in collaboration with local and provincial interest groups. Additionally, the research program involves the set-up of living labs close to each university which are to facilitate the transition to a more sustainable cycling system and to respond to local challenges. One of those living labs is currently running in the province of Overijssel and deals with the construction of a fast cycling route (snelfietsroute) between the two cities of Dalfsen and Zwolle (F. de Vor, personal communication, 11 June 2018).

Problem statement

The congestion of the provincial road N340 in Overijssel has accelerated in the last years. While the number of vehicles, including many trucks, keeps increasing, the street becomes less safe which in turn results in more accidents. The province of Overijssel has therefore started an investigation to relocate the road. As part of this effort, the opportunity arose to also reconsider the cycling infrastructure which is currently in place. The corridor between the two municipalities Dalfsen and Zwolle is 15 kilometer long and has the potential for a fast cycling route (in Dutch: snelfietsroute) (G. van der Kolk, personal communication, 7 July 2018).

The University of Applied Sciences in Windesheim maintains close collaboration with local partners, such as the municipalities of Zwolle and Dalfsen. In 2017 the university started to engage with the initiative of smart cycling futures. Since living labs were to be installed as part of this process, the researchers from Windesheim got in contact with the two municipalities and the province of Overijssel to propose the fast cycling route as a living lab Zwolle (F. de Vor, personal communication, 11 June 2018).

Organisational and physical environment:

The interest of the province to redevelop the existing infrastructure was, according to the interviewees (1 & 2), 'passed on' to the two municipalities. The municipalities of Dalfsen and Zwolle reacted to it by starting the actual planning process for the fast cycling route. The University of Windesheim recognized the opportunity to link the project with the initiative from Smart Cycling Futures and turned it into one of the SCF living labs. Whilst the redevelopment plans target the whole province, the living lab focuses on the 15 kilometer long corridor between the municipality Zwolle and Dalfsen which each govern part of it Zwolle (F. de Vor, personal communication, 11 June 2018).

The design of this case is rather complex. Smart Cycling Futures represents the overarching 'research initiative' which started the set-up of various living labs throughout the country. The living lab at hand, namely the 'fast cycling route Dalfsen-Zwolle', is directly associated with its only experiment and linked to SCF mainly by the University of Windesheim.

Stakeholder constellation and responsibilities:

As explained above, the living lab as such was 'imposed' on an existing restructuring project. Due to the geographical scale of the fast cycling track, the municipalities of Zwolle and Dalfsen represent the main interest group. The Windesheim University of Applied Sciences acts as a 'knowledge partner' and the main driver behind the living lab that is pre-eminently responsible for monitoring and advice, according to the respondents (1 & 2). One of the researchers from the University explained that they (the researchers) initiated two meetings with the municipalities and a communication specialist to come up with a "shared ambition" and a marketing strategy for the new route. At the same time, scientific research on different types of routes was presented.

However, the very set-up of the living lab appears to have caused a number of uncertainties and misunderstandings. Since the 'living lab' as such utilized an existing project with its own organizational and physical 'frame', the objectives and responsibilities became somewhat unclear.

Throughout the interviews it became apparent that the living lab was not perceived as the common setting on of the endeavour. It was rather framed as something 'external' which relates mainly to the University of Windesheim and the researchers involved. While talking about the different responsibilities of the stakeholders, respondent (2) from one of the municipalities describes the situation as a "quest" (Dutch: zoektocht) and explains:

One of the tensions between smart cycling futures and the project [refers to the fast cycling route] lies in the quest of the added value with regard to the smart cycling future idea. Most of all, they [researchers from Windesheim and SCF] observe and they join the 'thinking process', but it's not like they would deliver products ... And this is what I am searching for sometimes: What does it actually contribute? (translation SB).

Being involved in the executive project management in Zwolle, the respondent (2) states that it has been challenging to bear in mind the 'living lab aspect':

Sometimes they [researchers from Windesheim and SCF] would like to be involved in all aspects, but I'm sometimes forgetting about it because it's not part of my 'system', like involving everybody. I have a practical attitude; we are going to do this and we are going to do that. (translation SB)

Both the municipality of Zwolle and the researchers involved in the living lab openly discussed the issue. Respondents from both parties (1 & 2) stated that this shortcoming would need to be addressed for future projects. In an attempt to arrange the duties more clearly, the consultancy agency 'Goudappel Coffeng' was commissioned to take over the overall project management. During the "inventory phase" (see figure 5) a number of meetings were organized with planning experts and different stakeholders. On an organizational level the VVN Dalfsen (Traffic Safety Association), LTO (Dutch Federation of Agriculture and Horticulture) and the Fietsersbond (Cyclist Association) were invited to join a so-called "meeting for interest representatives" (belangenvertegenwoordiger). A second meeting – called "stakeholder meeting" – included representatives from the province of Overijssel, the two municipalities and the University of Windesheim, as well as Vitens (a drinking water organization) and two advisors from the fields of communication and regional management. Furthermore, efforts were made to involve (potential) users of the fast cycling route and the general public in different steps of the process (see point 4.1.2) (G. van der Kolk, personal communication, 7 July 2018).

Time frame and current phase

The Smart Cycling Future initiative officially runs from 2015 – 2020. The related living lab 'snelfietsroute Dalfsen – Zwolle' has been set up in 2017 (respondent 1). Its time frame, however, correlates with the planning and implementation process of the route as such. A kick-off meeting was held in January 2018 (SCF, 2018). The goal is to have the concept drafts ready in August 2018 in order to proceed with further (financial) planning. However, it is currently still unclear if and when the actual construction will take place (respondent 2).

Figure 5: Process phases of the fast cycling route Dalfsen-Zwolle

Figure 4 illustrates the phases of the living lab in Dalfsen-Zwolle. The first drafts for the route were presented during a public meeting on 12 June 2018. As indicated by the interviewees (1 & 2), the project has hence reached the concept phase where the drafts are discussed and feedback is gathered for further development of the plans.

4.1.2   Participation in the living lab

Affected public

The new route is supposed to provide a safer, faster and more comfortable bike experience to everyone who is using it. This includes conventional bikers and e-bikers but also pedestrians and drivers of scooters and light mopeds (25-50 km/h) (G. van der Kolk, personal communication, 7 July 2018). As apparent from the interviews, the main target group involves commuters (students and employees) who use the route on a regular basis. When asked about the number of people concerned, the respondent (2) gave an indication of 100 to 200. In addition, potential users who didn't consider using the route up until now may be attracted by the new and improved design.

Public involvement, methods and techniques used

One respondent (2) who was involved in all phases, described three opportunities for citizens to get engaged in the process. During the 'inventory phase' (see figure 5) the municipality of Zwolle organized a so-called 'fietsschouw' – a joint bike tour along the future route. For this purpose, residents who are interested in using the cycling route were invited to join the demonstration. The invitations were spread via Facebook, Twitter and other social media channels.

According to the interviewee (2), 10 people reacted to the call and participated. The interviewee described them as a group of "more or less hobbyists who like to bike". The ratio men-women was balanced but he pointed out that they were of older age. In response to the question: 'What might have been a hindrance for people to participate?', the interviewee (2) referred to the date and time of the event. Taking place on a sunny Friday afternoon from 2 to 5 pm, the time might have had influence on the response rate. He acknowledged that most people would have needed to take time off from work. It was further presumed that people might not see the benefit of such an endeavor: "Some people have little interest, others consider participation as something very important" (translation SB).

In an attempt to address employees throughout the geographical catchment area, a digital survey was sent to local companies with a response rate of "about 20" (total number of responses) (respondent 2). In parallel, students and pupils who bike along the route on a daily basis were approached at a popular waiting area in Dalfsen. While waiting for their class mates and fellow students, about 80 students and pupils filled in the survey. The responses were then reviewed by the project team during the 'inventory phase' and the feedback incorporated into further planning processes. In response to the question whether the number of citizens involved was an adequate representation of the relevant population, the representative from the municipality (respondent 2) hesitated and answered in the affirmative. However, he regretted that the students who participated in the survey did not attend the bike tour.

After the first drafts were sketched in collaboration with urban planning professionals, the public was once more invited to examine the proposals and to provide remarks. Being asked about the extent to which this feedback would still be incorporated on a scale from 0 (not at all) to 10 (being fully incorporated), the respondent (2) answered with '9'.

While reflecting on the set-up of the living lab and its potential for citizen participation, both respondents (1 & 2) stated that they see the potential but that the question remains: Who is taking on the responsibility for the living lab?

I am still seeing it as two different things and that's a bit the quest that we have constantly: you have a project running and you have a research part. And, well, you come together sometimes in a meeting and then you part again (translation SB). (respondent 2)

When asked whether different participation efforts were made compared to the traditional approach, one interviewee (2) responded: "No, except that we did a bike tour but this has nothing to do with the

living lab. This was rather our own idea, like 'this is what we are going to do'." He further explains that the current methods (e.g. sending out invitations and organizing meetings for stakeholders) are usually applied for other projects.

4.1.3   Summary and Interpretation

The users of the new route, in this case mainly commuter and students, were informed and consulted about the plans of the municipalities. An opportunity to provide suggestions and express opinions was given in form of the surveys and during the bike tour. The surveys targeted mainly people who are already using the route or who are likely to use the route as they work in companies nearby. Given the indication of up to 200 people concerned, the response rate of 100 surveys is considerably high. However, these numbers must be treated with caution as they are based on the estimations of only one respondent (2).

All citizens could – theoretically – give feedback by joining the bike tour. However, the chosen time for the tour might have been a hindrance for people to participate. It is further unclear how many were informed about the possibility, as the invitations were mainly spread via social media channels. This finding could hint at the 'fuzziness of inclusion' (Karré et al., 2015) – a common barrier for participatory efforts (see point 2.3.7).

Whereas feedback from the surveys and the bike tour was gathered and analyzed, it is uncertain to which extent it got incorporated into the further planning. While this thesis is written, a community meeting is organized to present and to discuss the concepts which have been drafted by the municipality and urban planning experts. In order to evaluate how much influence the feedback of the public had on these drafts, further data collection would be required.

Thinking in terms of Arnstein's participation ladder (1969), it can be suggested that the participation in this case ranged between 'informing the public' and 'consulting with it' (see Arnstein). The methods used targeted separate segments of the public (print survey – students, online survey – employees, bike tour – interested users). From an official's perspective, the decision making style can be described as a 'modified autonomous managerial decision' (Thomas, 1993, p. 448), where "the manager seeks information from segments of the public, but decides alone in a manner which may or may not reflect group influence."

Interestingly, the format of the living lab appears to had no influence on the methods and techniques used during the process. Apart from the scientific input and the monitoring, one of the

respondent (2) could not see any difference to the municipality's traditional approach regarding citizen participation.

4.2   Healthy Living Lab – Friesland

The Healthy Living Lab (HLL) was initiated in 2016 by Academische Werkplaats Public Health Northern Netherlands, Sandra van Assen Stedenbouw (trans. Urban Design) and MD Landschapsarchitectuur (trans. Landscape Architecture). A knowledge consortium, consisting of urban planners and health experts as well as knowledge institutions, builds the foundation for the lab (HLL, 2018).

4.2.1   Framing the living lab

Objective and scale

The lab arose from the endeavor of its initiators to connect the domains of 'health' and 'space' and, in turn, improve the well-being of the population in Friesland. The conference 'Building the Future of Health' (in Groningen, 2016) encouraged the consortium to pursue their vision and to create a space where urban planners and health experts can effectively share their knowledge and experiences. "Strengthening the academic knowledge in the consortium" and the "development of a research agenda" have thus been formulated as objectives of the lab (S. van Assen, personal communication, 23.06.2018).

A solely theoretical approach does not suffice, according to one of the initiators (Interviewee 1), as "the ultimate goal is the realization of tangible innovative solutions that help the inhabitants of the Northern-Netherlands to gain more healthy years" (S. van Assen, personal communication, 29 April 2018). For that reason a number of real-life experiments were brought into being in collaboration with various municipalities in North-East Friesland. These experiments "aim at the creation of new products, collaborations and/or organizational forms (…), for instance, [raising] awareness, product adjustments, process insights and policy changes" (J. Bleeker, personal communication, 6 June 2018).

After a successful pilot in Dongeradeel, seven more municipalities expressed their interest to participate in the Healthy Living Lab. Up until now six experiments have been successfully conducted. However, as the project period ends in 2018, a new proposal for a 'Healthy Living Lab 2.0' is currently in progress. In this grant proposal, participation for all demographic groups was stated as an objective within the HLL (J. Bleeker, personal communication, 6. June 2018).

Problem statement

The same document gives insights into the underlying problem statement which led to the creation of HLL. North-East Friesland, as the primary field of the HLL, is describes as a socio-economically weak region which struggles with an overaging population. This combination of older people with a low socio-economic status causes a number of problems, from diabetes and heart diseases to psychological issues. Solution-oriented approaches which take into account physical as well as social parameters should be pursued. The HLL approach is supposed to aid in this regard (J. Bleeker, personal communication, 6. June 2018).

The HLL experiments deal with local questions and real-life issues which are situated between the poles of health and urban planning. They are brought forward by the municipalities and range from the building of a new sports hall to the improvement of public space such as the usability of a fitness garden for elderly people (respondent 3). The respondent (3) explains that the lack of communication and collaboration between urban planners, health experts and the affected residents can result in flawed solutions which, in turn, have a negative effect on the well-being and the utilization of facilities. By "looking through the health glasses" (respondent 3), the actors learn to acknowledge the psychological, physical and social effects of a healthy and green (living) environment. This awareness, so the respondent (3), can positively influence urban planning solutions as well as the behavior of everyone concerned.
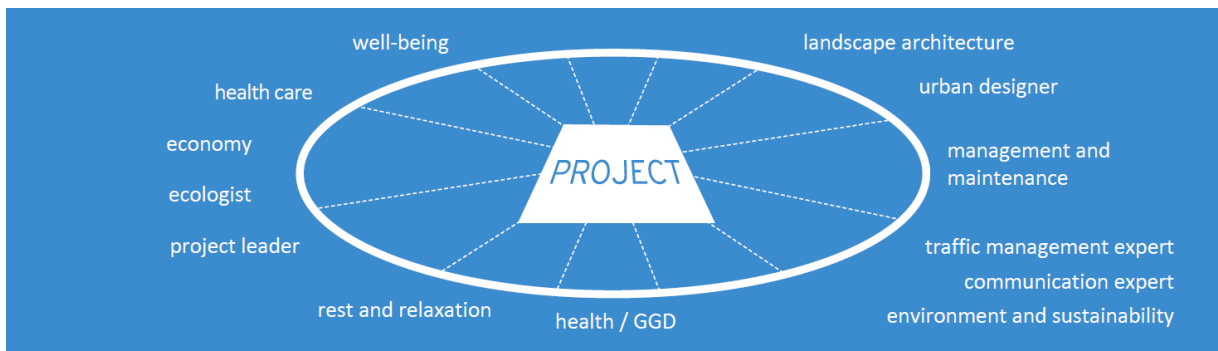

Figure 5: Bringing together theory and practice in an interdisciplinary collaboration. Adapted from "Healthy Living Lab. Gezondheid en Ruimte in Ferwert.", by HLL, 2018. Copyright (2018) by HLL

4.2.2   Framing the experiment

As mentioned in the previous section, the Healthy Living Lab conducts a number of different experiments. In order to gain more in-depth information about the methods and processes used, a focus was put on a single experiment: 'Health and Space in Ferwert' (translation SB).

Objective, problem statement and affected public

Ferwert is a village located in the North of Friesland with a population of about 1600 inhabitants (Overzicht buurt Ferwerd, 2018). The Healthy Living Lab experiment revolves around the local nursing home and its 'fitness garden' (Dutch: beweegtuin). The fitness garden was initially set up to encourage the inhabitants of the nursing home (about 90 people) to move more and stay agile. It provides a number of sports facilities, such as a parkours and a crosstrainer, and is accessible to the residents of the nursing home as well as to the inhabitants of the village. The plan to create a meeting place for young and old, however, seems to have failed as the facilities are barely used (S. van Assen, personal communication, 23 June 2018). The interviewee (3) explains the issue as follows:

> *And then you come there – because they asked us to have a look – and then we came there and then we found out that the people living in the elderly home – the average age is 80 and higher – they all have wheelchairs and they walk difficult. But they had to go through four doors and these 'drempels' [translation SB: speed bumps for traffic] to reach the garden. Yeah. No wonder nobody would enter the garden.*

Another challenge lies, according to the respondent (3), in the lack of collaboration:

> *We also found out that they were making a health boulevard, which is like having a doctor and a physio therapists in one center. They were building this next to the fitness garden. But they weren't making any doors between the fitness garden and the health boulevard. (…) So what we found out during this project is that what we thought was a fact: that people from the health sector and the public space are not working together.*

With the aid of the HLL approach, new ideas and solutions were to be found to improve the existing structure, increase its utilization and raise awareness for interdisciplinary collaboration (S. van Assen,

personal communication, 6 June 2018). However, the respondent (3) puts the objective into perspective and states that all participants were informed about the experimental nature of the workshop. "If nothing comes out, no problem. There is always something we learn from each other" (respondent 3).

Organizational environment and stakeholder constellation

The core team of the HLL consists of experts from the three initiating organisations (knowledge consortium): Academische Werkplaats Publieke Gezondheid, Sandra van Assen Stedenbouw (urban planner) and MD Landschapsarchitekten (landscape architects). The 'Academische Werkplaats' (translation: Academic Workspace) is a collaboration of the Friesian Public Health Services (GGD), the University Medical Centre Groningen and the University of Groningen. The set-up of the living lab experiment was commissioned by the 'DDFK gemeenten' – a union of four municipalities in Friesland (S. van Assen, personal communication, 23 June 2018).

The Healthy Living Lab methodology

The Healthy Living Lab methodology, as it has been phrased on the website (Sandra van Assen Stedenbouw, 2018), is based on 'design thinking'. The process consists of (1) the step-by-step determination of the field, (2) the definition of solution-oriented concepts and ideas, (3) the exchange of future scenarios or drafts and (4) the evaluation of the proceeding steps. This process is usually done in a workshop format with a duration of four to six hours. The interactive and interdisciplinary setting shall provide new insights and awareness for the chances and hindrances of the project at hand. The ideas that emerge during the process are then translated into guiding principles and documented in a final report (S. van Assen, personal communication, 23 June 2018; Sandra Assen Stedenbouw, 2018).

4.2.3 Participation during the experiment: 'Health and Space in Ferwert'

Constellation of participants and selection process

For the experiment in Ferwert, experts from the HLL knowledge consortium were first invited by the municipality to view the fitness garden. In a second step, the HLL workshop was prepared and held on 18 January 2018 by three core members of the consortium. When asked about the selection process for the participants, the interviewee (3) explains that one person from the nursing home and another

person from the community were responsible for the invitations. According to an internal report (HLL, 2018b), thirteen people from the village joined the workshop, including volunteers from the elderly center, the local school and the children center. Talking about the accessibility of the workshop, the respondent (3) acknowledges that the selection process could have been biased as it was not a public meeting. She expresses interest to pick up the idea of a public meeting for the next time, as it would fit better to the HLL idea where "everyone is welcome" (respondent 3).

In response to the question what positions and roles the participants had, the respondent (3) refers to the small size of the village and explains that most people are wearing 'multiple hats'. She further negates the question whether those different roles and interests had influence on the process:

If you live in a village like that, then of course you have multiple roles, but in the end you have to live together, so you can be very unethical about your own interests, but then you lose all your friends [laughs]. (…) There is always a natural process in these really small societies that people in the end choose the common interest – the mutual game – as the main interest, because in the end they have to live together and meet each other again at the village barbecue.

Methods and techniques used

The workshop, as the main and most important part of the HLL, started with a brief presentation from the experts about contemporary notions of health and space and relevant findings from academic studies. The case at hand together with an aerial picture of the fitness garden was then presented. For the following workshop phases the participants were divided into three groups, each guided by one of the three experts. In advance of the workshop, a number of stickers with possible solutions/ options were prepared by the urban planning and health professionals. These stickers were handed out to the participants with the invitation to place them on the map and to start a discussion (see figure 6) (S. van Assen, personal communication, 23 June 2018). According to the interviewee (3), the stickers inspire and facilitate a "design-thinking" process which focuses on solutions rather than problems:

And what happens is that – because they are solutions – people start to say: 'Ah well, I don't want this' or 'this is a good idea'. And after three or five [solutions] they start: 'oh, but I have an even better idea. (…) And this is really important because then, within three quarters of an hour or an hour, they have a map full of solutions and they're completely inspired.

In a second step, all ideas are sorted based on the matrix 'healthy living environment', which is divided into the following aspects: physical (bodily), mental (meaningful), social (encounter) and environment (climate). This step is supposed to guide the process to a more abstract level by discussing the backgrounds and purposes of the solutions proposed. As a result, the participants gradually develop 'guiding principles' for the case, for instance: 'Stimulating encounters between the age groups' (S. van Assen, personal communication, 23 June 2018).
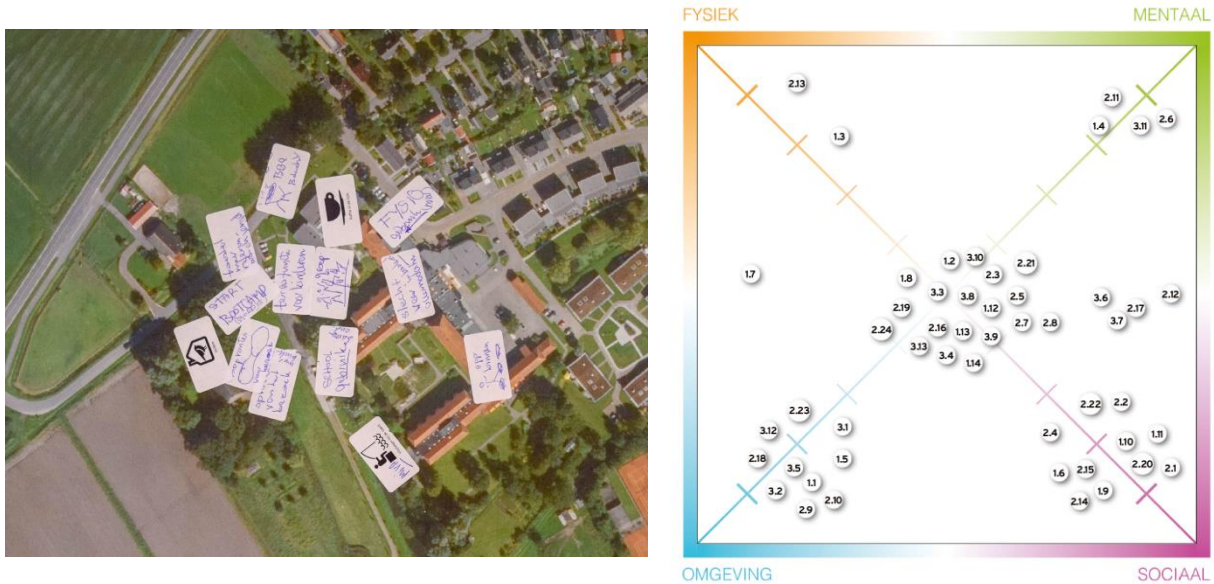

Figure 6: aerial map of fitness garden and matrix 'healthy living environment'. Adapted from "Healthy Living Lab. Gezondheid en Ruimte in Ferwert.", by HLL, 2018. Copyright (2018) by HLL

A SWOT analysis, as a third step, gave insights into the strengths, weaknesses, opportunities and threads posed by each suggested solution. In this phase, the participants also started to deliberate how the changes could be applied and who might have to take on responsibility. Finally, the findings from all three groups were discussed, resulting in a list of core principles, main chances and hindrances. A written report about the meeting represented the factual outcome of the experiment, summarizing the objective, the problem statement, the general approach of the HLL as well as the findings from the workshop (S. van Assen, personal communication, 6 June 2018).

Having gathered a variety of ideas, it often becomes necessary to focus on the ones which are most feasible and which possibly combine all four dimensions of the matrix. The Interviewee (3) explained that a follow-up meeting is planned to select the 'top three projects'. When asked what is necessary to guarantee the implementation of these projects, the respondent (3) referred to the

constellation of the participants and the importance to involve decision makers and people who have access to financial means:

Because if you only work with people who have to ask their boss [laughs], then nothing is going to happen. So you need to have the right mix between volunteers, normal people from a village, people from all kinds of societal organizations, but you also need the directors and the people who can reach the money and who can decide on money. So you need decision makers at the table. That's really important.

Another success factor lies, according to the interviewee (3), in intrinsic motivation and a sense of empowerment. Having witnessed this kind of feeling during the HLL experiment, the respondent (3) was positive about the execution of the selected ideas. However, she also emphasized that it can often turn into a long-term process: "As an urban planner, most projects that I work on, they take five to ten years before they are realized. And this of course deals with public space. (…) It always means years before anything becomes reality."

While talking about the decision making process another challenge became apparent, as the ground of the fitness garden is in ownership of the elderly home whereas the fitness machines were paid for by the community.

So it's actually not only the community deciding, but it's also the elderly home. And then a lot of entrepreneurs and sports coaches from the village offered to start cooperating and to make fitness groups from the village also use this area. So actually the whole conversation is moving towards a co-ownership of an area to make it much more effective. (respondent 3)

4.2.4   Summary and Interpretation

The experiment in this case was conducted as an interactive workshop with a duration of about 6 hours. Besides the three planning and health experts, 13 local residents participated in the experiment and, at the same time, represented the main interest group. Hence, citizens were involved from the start of the experiment. Even though the 'selection procedure' might have been biased as it was not a public meeting, it can be assumed that the participants formed a relevant representation of the affected public. This assumption is based on the fact that the participants were selected by two people directly

concerned with the case, namely a volunteer from the community and one from the nursing home. However, it remains unclear how many elderly people from the nursing home were actually involved in the meetings and whether their interests might have been fully represented by the volunteers.

As for the decision making process, it is important to register that the final decision about any changes to the fitness garden lies with multiple actors, amongst which is the elderly home – a non-governmental institution. How exactly the issue of co-ownership will be handled is still unclear and would require further long-term research. The experiment as such can merely be seen as a first step in a long process of decision-making. However, by animating citizens to initiate change through open dialogue and design thinking, a sense of empowerment and enthusiasm was created. According to Sinclair and Hutchison (1998), participants who experience this kind commitment might be more inclined to support the implementation process. Whether this holds true for a long time span of five or more years is, however, questionable. Keeping up 'the good spirits' would require continuous involvement of the citizens and the positive approval of the final outcome (Castelnovo et al., 2016).

Solely analyzing the participation during the workshop, it represents a good example for a button-up approach through means of co-creation and collaboration. While the problem statement was brought forward by the municipality, citizens were asked to come up with possible solutions and to formulate a proposal backed by scientific findings. The written proposal, as the result of the experiment, hence reflects the interests of the citizens. At this current state it can be argued that 'power was delegated' to the citizens (see Arnstein, 1996). Once more it is important to bear in mind that the data at hand refers only to the first step in a long-term process. Having said this, participation in this case can still 'move up or down' the ladder. The same applies to the style of decision making from an official's perspective (see Thomas, 1993, p.458). An "unitary public consultation" might well describe the current state of affairs. Nevertheless, it remains unclear whether the final restructuring of the fitness garden will be based on a "public decision" or whether all efforts will be neglected by the municipality when it comes to the financing of the project."

4.3 Smart City Living Lab: Data sensors in Dordrecht (Westelijke Dordtse Oever)

The Smart City Living Lab was officially launched during the 'Smart & Safe City Event' in Scheveningen on 8 June 2017. The lab is affiliated with the 'NL Smart City Strategy' – a co-creation of 40 representatives from different cities, 60 employees of various companies and 30 scientists. The strategy is a direct response to the minister president Mark Rutte's request to create a vision for the future of smart cities in the Netherlands – originating in society and practice (Agenda Stad, 2017; Mikkers & Van Beurden, 2017).

4.3.1 Framing the living lab

Objective and scale

The Smart City Living Lab was initiated to support the development of smart cities with a focus on the overall topic 'healthy living'. Participating municipalities predefine their own casus (experiment) and set their own learning objectives. At the same time, the Smart City Living Lab provides the technological and organizational infrastructure with the aim to facilitate the experimentation process. Learning about all aspects with regard to sensors, data measurement and data analysis is one of the central themes next to the more general objectives of collaboration and inter-municipal knowledge-transfer (RIVM, 2017; slimste stad, 2018).

Problem statement

As the idea of 'smart cities' becomes increasingly popular, a considerable number of pilots were conducted under its name – with varying success. The next step is to improve inter-municipal exchange of experience and knowledge and to upscale promising solutions throughout the country (ASTRIN, 2017). The National Smart City Living Lab aims to address some of the concerns which has been described in the smart city literature (see 2.1) (slimste stad, 2018). The changes caused by the technological developments have a major influence on city management and urban planning. Municipalities, for instance, can have access to the latest data in order to evaluate the current 'state of the city' with regard to air pollution, water levels, noise exposure etc. As a result, they can effectively react to negative trends, initiate prevention measures and improve the overall sustainability of urban areas. However, this assumes that the cities has hardware infrastructure as well as skilled personnel at

its demand. The National Smart City Living Lab aims to promote and aid this learning process (slimste stad, 2018).

Organizational and physical environment

The living lab is organized by the eponymic Dutch foundation. The program is supported by various institutes, profit- and non-profit organizations, such as the National institute for Public Health and the Environment (RIVM), OVLNL (Public Lighting), Connected Worlds, Smart Emission, National Smart City Strategy, Smart City Academy and others. In the first period from 2017 to 2018 seven municipalities took part in the living lab program (ASTRIN, 2017).

4.3.2 Framing the experiment: WDO in Dordrecht

From the seven participating municipalities Dordrecht agreed to take part in this research. For that reason, the following information exclusively apply to Dordrecht and its experiment 'Westelijke Dordtse Oever' – in the following referred to as WDO.

Objective, problem statement and environment of the experiment

The city of Dordrecht is facing, as many other regions, a number of challenges: from climate change and urbanization to a lack of (financial and human) resources. In a response, the city created a long-term and task-oriented strategy in 2014 (respondent 4 & 5). The municipality recognized the potential that comes along with the technological development and set itself the goal to become a 'smart city'. One respondent (4) explains his perception of the term as follows:

> *Smart city is about doing things more clever than you did before and it takes, it has to do with technology. But most Important it has to do with connection between people. (…) Our main goal is to create a nice environment for the citizens and the companies in the city. So they want to stay here. That's, that means the quality of life and mobility should be high. And a smart city can contribute that.*

The industrial area WDO is Dordrecht's major business hub and 'job engine' with about 750 businesses and 14000 jobs. Expanding, restructuring and improving the existing infrastructure has hence become

a priority which is supported with a budget of 150 million euros for the coming years (Gemeente Dordrecht, 2018).

In 2017, Dordrecht had the opportunity to join the National Smart City Living Lab with WDO as an experimentation space. Taking part in this program presumes a financial contribution. In order to increase the attractiveness of the area and to appeal to potential investors, the municipality aims to improve the current traffic routing and decrease traffic congestion (mainly caused by lorries) (Gemeente Dordrecht, 2018; respondent 4 & 5). Gaining insights into air quality, noise exposure and climate parameters are the primary objectives of the experiment. One interviewee (5) emphasizes that it is about more than just gathering data:

All of these experiments, they're also for developing the city. A huge part is about learning to get our organization ready for this. What do we have to do? How do you have to handle data? What kind of work does it bring? So the main part of all these experiments is getting ready to use IoT [Internet of Things] sensoring [sic] on a large scale in the future.(…) This is the city of doing, a lot of experimenting, learning, falling, getting up, improving.

With regard to the 'smart city' agenda, one respondent (5) states that it is often difficult to draw a line between the living lab experiment and other municipal 'smart city' projects as they are of similar design and follow similar objectives. The insights gained from all those projects will eventually lead to up-scaling and wide-range application. When asked about the meaning behind a 'living lab', respondent 5 replied:

[It's] like many terms, buzzwords, etc. It's a hype and if there's a hype, people want to get attached, want to get involved. So If it works - no problem. For me, it's just a way of work, to constantly innovate, experiment with the municipality, with the inhabitants, with companies. It is just a way of work and if it needs a term like smart city, I don't mind. But to get used to innovate, used to use technology, use data and to cooperate, cooperate together - called a living lab, called a smart city, whatever - It's a way of work.

Time frame and current phase

Dordrecht takes part in the first program period which run from June 2017 to May 2018. At the time of the interviews, the final date had passed. The interviewee (5) explained that the municipality is allowed to keep a number of sensor units for an extended period of time and to continue the experimentation. Nevertheless, the first results and conclusions over the previous months have been documented as the data is constantly analyzed.

4.3.3 Participation during the experiment: 'WDO in Dordrecht'

Stakeholder constellation and responsibilities

The National Smart City Living Lab acts as a knowledge partner and accompanies the experimentation process. It furthermore supplies the technological infrastructure in form of sensor units and data links to measure air and noise parameters (slimste stad, 2017). Guaranteed access to data from all seven municipalities is supposed to enhance the knowledge transfer and give deeper insights into various areas of application. In addition to the open data platform (slimstestad.nl/data-analyse), the living lab and its partners provide a number of optional workshops, for instance a two-day training on 'smart city' for two participants from the municipality (slimste stad, 2017; Gemeente Dordrecht, 2018). Contrary to the other municipalities, Dordrecht undertakes the data analysis on its own since it has data advisors and data analysts at its command (interviewee 4 & 5). The core group therefore consists of employees from the municipality (data analysts, data advisors, project leader) who are directly concerned with conducting the measurements and analyzing the data. As the experiment targets a particular area, namely the WDO industrial area, both respondents (4 & 5) referred to the local firms and their employees as another group of stakeholders.

Affected public

According to the interviewees (4 & 5), the WDO is intended for industry purposes, meaning that there are very few housing units. Having said this, the people affected by the experimental measurements as such are primarily business owners and their employees together with the transit traffic, including the (mainly international) lorry drivers (interviewee 4). When looking at the underlying problem statement – traffic congestion, air pollution and noise exposure – it is likely that the effects exceed the geographical boundaries of the WDO area and perhaps stretch even beyond the municipal borders.

Accordingly, the number of affected people might be (considerably) higher. Further research would be required in this regard.

Methods and techniques used, flow of information and contact points for citizens

The methods and techniques that come into effect for this experiment are mainly of technological nature. The municipality received ten sensor units that were installed at different locations within the WDO area. The sensors are identical for all participating municipalities to allow for data comparisons. When asked to what extent other stakeholders were involved in the process, one respondent (5) explained that the companies located in WDO have been informed about the ongoing measurement activities. Up until now all measurements from the area have been below the norm and did not require immediate action (interviewee 4 & 5). For this reason, one respondent (5) further explains that "there's not many [sic] interaction with the companies." At the same time he wonders: "If the measurements were above the norm I think we have a lot more interaction. But actually we don't have a problem." Talking about further public relations activities, it was stated that the living lab experiment as a whole was communicated via press releases. However, the location of the sensors was not enclosed. Since the data is available on an open data platform it was stressed that it's accessible to everybody online (respondent 4).

In an reply to the question whether the measurement activities as such and open data management in general caused any opposition, one respondent (5) stated: "No, actually not yet. Surprisingly. Actually, not yet. Of course we are aware of possible issues, like the privacy parts or ethical questions. We are very aware of that." Having said that, he remembered a situation where their team set up signs in the area warning about 'surrounding measurements' in order to prevent any privacy issues.

Being asked what happens after the analysis of the data, respondent 5 states: "Well, most of the times it's internal dialogue and internal decision and we have to become more adult [sic, mature] with it, to share more, to interact more with the inhabitants. But this is a growing process." Highlighting the early stage of the whole process, the second respondent (4) supported this view and stated:

Now we are taking the decisions because we have the knowledge. In the future we expect everyone has the knowledge or has access to the knowledge. Not everyone will continue. But a few, a group of enthusiastic people will. You have to create a sort of community or portal where we can meet -

physically or visually -where we can exchange information about the decisions we want to make, so

they can respond to it and give good suggestions so we can collectively make decisions.

While the interview focused on the topic of public involvement it was once more stated that WDO is an industrial area where few people live. Instead, one interviewee (5) pointed to a number of similar municipal projects which are not associated with the National Smart City Living Lab. These projects also deal with IoT and data measurement, especially with regard to ground water levels and meteorological data. Here, a number of residents is actively sharing their data as open data, partly with sensors provided by the municipality.

At this point it became apparent that the WDO living lab experiment as such did not actively involve citizens. In order to learn more about possible hindrances and success factors for citizen participation in such a 'data-driven' setting, the focus shifted towards future scenarios and the 'lessons learned'.

When asked about possible reactions to the experiment, the data analyst (respondent 5) highlighted the need for more standardization with regard to networks and IoT protocols. The experiment also reinforced the municipality's ambition to "create an IoT platform for the municipality as well as for the inhabitants" (respondent 4). In this context he referred to the smart emission data platform (http://data.smartemission.nl) as a promising example where residents are equipped with sensors to share data on a collective platform. He considers this collaboration between municipality and citizens as "the most effective way" which can create "empowerment but also synergy". Gathering, analyzing and visualizing data which is then shared as open data allows for everybody to have access to the same information which, in turn, can pave the way for sustainable solutions and participatory decision making (respondent 5). "If they [the citizens] are more involved, I think they become more proud of the city as well. They're more attached to developments in the city. Maybe they themselves can do improvements in the city (…) like being a collective, work together on the city, that's I think is the most beautiful way to cooperate." (respondent 5). The other respondent (4) shares this view and emphasizes the link between smart city, technology and citizens:

The main goal of smart city in our case is to create a nice living environment for the inhabitants. And

to use technology as a mean to achieve that goal. So the people have to engage in technology and

(…) we want them to be a part of the development, so they can create own ideas and use it. So the

whole city becomes one living 'living lab'.

Whilst both employees from the municipality recognized the importance of public involvement when it comes to open data and IoT, one respondent (4) points to the early stage of the overall process:

The measuring's we are doing now are on such a low scale that privacy isn't an issue yet. So you can't by measuring air quality in a few points … there is no relation with inhabitants or with companies. That will be different when you've got sensors every 10 meters in the city.

As the sensors used in the experiment did not sufficiently address the issue of traffic congestion and parking, further experimentation with different sensors will be required (respondent 4 & 5).

In the meanwhile, the municipality set up an innovation fund where citizens can apply for subsidies in order to (partly) finance projects that are related to the municipality's smart city agenda. When asked whether the municipality plans to involve more citizens in experiments like the one at hand, the interviewee (4) replied:

Yes, but we don't know yet how to do it. We are talking with a few inhabitants who want to create communities about [the] Internet of Things so that people can measure all kinds of things in their own backyards and share the data. But it's not .... it hasn't led till now to good results [sic].

When asked to think about possible challenges with regard to public involvement and the current experiments, respondent 5 imagines that it will be difficult to involve everybody. While younger people might be more inclined to share their data and deal with advanced technology it might be more challenging for elderly people or people with a low socio-economic status.

4.3.4 Summary and Interpretation

The experiment in question has a strong technological focus and revolves around small-scale sensor measurements of air quality, noise and other meteorological parameters in the industrial park WDO. While the National Smart City Living Lab provides the basic infrastructure and hardware, the measurements and analysis are conducted by IT experts from the municipality. Local companies and employees working in the WDO zone as well as passing traffic and lorry drivers constitute the group most affected by the experiment. The team of the municipality informed all companies about the measurements and set-up warning signs for this period. Whether the underlying issues which led to

the initiation of the experiment (e.g. traffic congestion and noise exposure) have an impact on more people than the ones mentioned above is likely and would require further research. However, according to both respondents (4 & 5), the current data analysis gave no occasion to immediate action as all parameters fit the norm.

As for public involvement, citizens have been informed about the ongoing experiment but are not further involved in the actual process up until now. The industrial character of the region as well as the small-scale nature of the experiment were brought forward as arguments for this choice. In order to analyze the decision-making style, it is necessary to discuss the actual basis of the decision-making process. Interestingly, the purpose of the experiment is less tangible compared to the other living labs as it pre-eminently revolved around learning and knowledge-creation. So far the insights gained did not lead to perceptible reactions, such as urban restructuring or the introduction of new services or products. Due to that reason, it is difficult to evaluate the decision making style according to Thomas (1993). The same holds true for the degree of citizen participation as introduced by Arnstein (1969).

It became apparent throughout the interviews that the National Smart City Living Lab experiment in Dordrecht is just one of the many municipal 'smart city projects' with the aim to learn about and apply the latest IoT and sensor technologies. The objective of the experiment must hence be seen in a broader context. With the ambition to become a data-driven 'smart city' the municipality is experimenting in various areas of the city, some actively involving citizens, others not. Many open questions will have to be answered in the (near) future: What (further) conclusions will be drawn from the data and what actions will follow? How will big data and IoT influence the citizens of Dordrecht in the coming years and how will they be involved in the technological process? In this sense, a long-term study of this or any comparable case could provide valuable insights.

4.4   Living Lab Smart Charging – Arnhem

The Living Lab Smart Charging (LLSC) is a nation-wide networking platform which brings together stakeholder concerned with the innovation, development and implementation of smart charging services and applications for electric vehicles (Living Lab Smart Charging, 2018). The living lab was initiated by Elaad in 2016 as part of the 'Green Deal Elektrisch Vervoer 2016-2020' (Green Deal Electric Transport), an agreement between the government of the Netherlands and a number of parties, such as national representatives from the automotive industry, environmental NGOs, universities, municipalities, DSOs and energy suppliers (Electric Transport Green Deal 2016-2020, 2016).

4.4.1 Framing the living lab

Objective and problem statement

Energy transition and sustainable mobility solutions are high on the national agenda. With more than 100.000 electric vehicles and 65.000 charging units the Netherlands are one of the forerunners for 'Smart Charging' (Living Lab Smart Charging, 2017). However, electric vehicles have been subjected to criticism with regard to their efficiency and operating range, the existing infrastructure and the overall affordability. The Living Lab Smart Charging has hence set itself to facilitate the development by creating an international network for all stakeholders to 'combine forces' and share the latest technological achievements (Living Lab Smart Charging, 2017). 'Smart Charging' refers to an 'intelligent' and sustainable charging approach for electric vehicles:

> *Smart Charging links renewable energy with the charging of electric vehicles. It (dis)charges electric vehicles at the most optimal moment using smart technologies that remotely control the charging transaction. Smart Charging takes into account a number of aspects, including the price that consumers pay, grid capacity and the availability of renewable energy. (Living Lab Smart Charging, 2018)*

One of the major objectives, according to the living lab's business brochure, is the "roll-out of a Europe-wide comprehensive public charging network that is Smart Charging Ready." The interview with the project leader of the lab revealed that the related projects primarily aim at the commercialization of smart charging services and products (respondent 6).

Organizational and physical environment

The LLSC was initiated by ElaadNL in March 2016 and is located in Elaad's headquarter in Arnhem. ElaadNL is a joint foundation of the most influential grid operators in the Netherlands with the purpose to create a knowledge and innovation center in the field of electric mobility and smart charging (ElaadNL, 2018). According to the program manager, the LLSC currently works with a team of four who also fill positions at ElaadNl (respondent 6). The website of LLSC features a considerable number of partners, among which 325 Dutch municipalities, many grid operators, automotive businesses, energy suppliers, DSOs, electromobility businesses and knowledge institutions. The interviewee (6) clarified the kind of collaboration as follows: "All the stakeholders who started projects dealing with smart

charging are partners in our living lab and we contracted them. So they really had to sign a paper that they want to collaborate in the living lab."

Time frame and current phase

Since the Living Lab Smart Charging is part of the Green Deal, it has the same official time frame: 2016 to 2020. However, the respondent (6) indicated ongoing negotiations about an extended period up until 2023.

4.4.2   Participation in the living lab

Stakeholder constellation, responsibilities and methods

In almost all cases projects are initiated by the contracted stakeholders. The size, scope and content of the projects as well as the stakeholder constellation differ widely. However, the projects themselves are perceived as independent projects rather than experiments of the living lab. Hence, the link between the living lab and its contracted stakeholders lies mainly in the shared objective of improving and spreading 'smart charging' – and the relevant products and services. Interviewee 6 explains the situation as follows:

> *Sometimes we are a part of the project plan in the working packages but in some projects we only get the information or the results from the different projects and they [contracted stakeholders] ask us to share them with the other stakeholders in the living lab.*

The website of the LLSC features over 20 projects, from smart charging app developments to 'EU Horizon 2020' programs. When asked whether the LLSC initiated and or accompanied any of the featured projects on their website, it led to confusion by the respondent (6). He stated that there have been a few projects in the past where the team of the living lab took over the analysis and dissemination. He made clear that all projects related to the lab differ according to their content and stakeholder constellation. In fact, the respondent (6) did not see any difference to traditional project management. When asked what he associates with the term 'living lab', he refers to it as "dynamic learning" and states: "For me, it's a, it is working on a specific topic and it connects the different stakeholders who are dealing with it and who are enthusiastic about this topic to get it a step further in development."

When asked whether citizens are involved in the projects the respondent (6) replied that this, again, depends on the particular projects and the stakeholders involved. Some initiatives, such as the 'slim laden app', invites people to share their charging proposition, in other projects people contribute with their experiences as test drivers (Living Lab Smart Charging, 2018c).

It soon became clear that the living lab does not apply a certain approach nor does it 'conduct its own experiments'. Instead, it represents a (promotional) platform for a variety of projects and initiatives which are loosely connected by the single topic of smart charging. For that reason the interview could not reveal any further insights into a specific experiment. Following an iterative approach, the next questions focused on understanding the design of the living lab and its 'field of work'.

Besides promoting existing projects that revolve around electromobility and smart charging, the lab also features a research agenda that has been created in collaboration with all partners. The idea is that every partner brings in specific knowledge and experience that can be shared with the network. At the same time successful results can be adapted as new standards for future projects (Living Lab Smart Charging, 2018b). The program manager highlights the importance of a common ground for collaboration:

I think the special thing is that normally you have a project from a starting to an endpoint and then you're finished with your collaboration. But most of the time for us, it's the beginning of a collaboration between the old and the new projects. You're in contact with each other and talk about the results of other projects from other stakeholders. And from there you start a new project.

It is furthermore pointed out that the research agenda is also used to stimulate explorative research into fields which are less developed, such as consumer behavior (respondent 6). As a response to the question about the biggest challenges, the interviewee (6) referred to the vast number of living lab partners (over 300). It poses a great challenge for the small team as the coordination becomes difficult. In fact, the respondent (6) described it as 'almost impossible'.

4.4.3 Summary and Interpretation

The Living Lab Smart Charging can be described as a single-topic network which consists of a broad variety of national and international stakeholders. As such, it features best practice projects and the latest developments in the field of electromobility and smart charging. With over 300 contracted

partners, the living lab aims to push smart charging to the next level. This process is facilitated by a shared research agenda and interdisciplinary knowledge exchange.

The most surprising aspect about the LLSC lies in its design. Compared to the other cases, the LLSC cannot be associated with any particular experiment. The term 'living lab' in this case rather represents a topical umbrella for a broad variety of projects and developments. Moreover, the featured projects cannot be associated with a specific 'living lab approach'. Instead, the respondent (6) emphasized that the projects are not different from 'traditional project management'.

One case selection criteria requires that the experiments would be clearly linked to the living lab. As this turned out during the interview to not be the case, the data collection focused on 'what is named the living lab' – in this case the overarching network. It can hence be suggested that the LLSC operates on a higher level compared to the other living labs. Citizens or individual residents did not directly act as 'contracted partners' in the lab. However, they do seem to play various roles in the projects which are independently handled by the official partners. Given the fact that over 300 municipalities are part of the network, it is also likely that the interests of citizens might be represented to a certain degree.

Reflecting on the literature on living labs, it could be argued that the living lab in question lacks a physical infrastructure which appears in a number of definitions as '(semi)-realistic setting or environment' (Almirall & Wareham, 2011; Folstad, 2008; Hakkarainen & Hyysalo, 2013). However, one must bear in mind that the current literature does not provide a concrete framework nor an unified definition for living labs. In fact, the case as presented above, would fit some of the broader definitions which loosely describe living labs as "open innovation infrastructures" where various stakeholders share "innovation interests and needs for a specific purpose" (García-Guzmán et al., 2013, p. 29). Due to the extensive scope of the network and the unique design it is, however, not possible to draw further conclusions about the link between this particular living lab and citizen participation.

5   Conclusion and Reflection

The objective of this research was to investigate the design of living laboratories and their link to participation. For this purpose an explorative multiple-case study was conducted and has been guided by the main research question: *Do living labs provide favorable conditions for citizen participation?*
The four selected cases underlined the complexity and vagueness of the concept 'living labs'. As suggested by previous studies, the term is used for a broad variety of ideas and methods. Each case demonstrates a unique 'living lab design'. The approaches range from technological innovation processes and small-scale community projects to large-scale networks.

The respondents from two cases (SCF Zwolle-Dalfsen and LLSC Arnhem) did not perceive any difference in the methods and techniques used when compared to traditional project management. Even though the experiment in Dordrecht (WDO) used specific sensors from the living lab, the process as such was not different from similar experiments that took place at the same time and which did not fall under the label 'living lab'. Again, no link could be drawn between the living lab experiment and a specific participatory approach. The Healthy Living Lab in Friesland represents the only case which applied a so-called 'living lab method'. Being based on design-thinking and open dialogue, the process actively involved citizens in a 'social innovation process'. Even though this approach seemed to create a sense of empowerment and ownership, the method was - until now - solely used in the early phase of a long-term restructuring process.

Despite the fact that all living labs varied considerably with regard to their objectives and designs, some parallels could be found in all four cases: All respondents mentioned, at a certain point, the words 'learning', 'collaboration' and the 'sharing or exchange of knowledge'. 'Innovation' and 'experimentation' are further key words that emerged from the interviews. Additionally, all cases displayed an interdisciplinary environment by involving stakeholders from a number of different domains, including knowledge institutions.

Nevertheless, it became apparent that the meaning behind the term living lab is mainly based on individual and organizational understanding. This divergence in notions and the lack of an unified conceptual framework fundamentally complicates an analysis of participatory processes within living laboratories. As the designs and approaches differ from living lab to living lab and sometimes among the experiments, it is not advisable to speak of 'a general suitability' with regard to citizen participation. Instead, the case-by-case evaluation shows that some labs (or rather experiments) provide more

favorable conditions for participation than others. Hence, this research could not establish a link between a 'living lab design' and citizen participation.

Being still in its infancy, the concept of the 'ideal' living labs as presented in the literature might have a potential to brisk up traditional approaches in urban planning and city management. However, this assumes a (somewhat) common understanding of the term as well as the development of further guidelines and assessment frameworks. As long as it lacks these foundations, living labs might be no more than a buzzword.

5.1 Restrictions of this Research and Recommendations

Several questions remain unanswered at present. The *extent* to which living labs allow for citizen participation could not be determined as the evaluation criteria for participation have been the subject of an unabated discourse within the scientific community. So has been the value judgement of participation as such. Whereas the benefits of successful participation are presented in the literature review and generally promoted by scholars, the general notion of participation still seems to be a matter of opinion. How much participation is 'enough' and when is a participatory effort successful? Due to its scale and the given time frame, this thesis could not engage with these fundamental questions.

Another shortcoming lies in the constellation of participants as the data from the interview process does not provide the perspectives of all stakeholders involved in the living labs. The original research strategy targeted residents and end-users as primary interview partners. Despite all efforts, contacts from this target group were not able to take part in this research. Gaining insights on the individual perceptions and experiences of some of the citizens involved would have considerably contributed to the credibility of the findings.

There is abundant room for further research in determining the specific success factors for the involvement of citizens in living labs. More research on this topic needs to be undertaken before the association between living labs and citizen participation can be clearly understood. Taking into consideration the diverse manifestations, it might be wise to do further in-depth and long-term studies on living labs with similar objectives and organizational settings. Comparisons between cases with resembling stakeholders could provide valuable insights about the participatory efforts and the techniques and methods used to channel them.

5.2   Personal Reflection

Even though the literature review suggested a complex and rather vague background to the topic, it quickly became apparent that the understanding of the living lab idea differed even more broadly in practice – on an individual but also on a concept level. Hence, a more iterative approach was already required during the first interview as more time was needed to understand the 'framing' of each living lab as such. This posed a number of personal challenges and had likely influence on the quality of the interviews. However, it also taught me to think quickly and to keep the research objective in mind at all times – a valuable learning experience for future research.

As a native German speaker conducting interviews in English and in Dutch, it occurred to me that the language barrier on both sides of the microphone clearly affected the quality of the interviews. Conducting future interviews in the interviewee's native language (where possible) might further improve the quality of the data.

After having done a thorough preceding desk research on all cases, it was still surprising how much the official (or rather the promotional) description of living labs on websites and in brochures diverged from the perceptions of the interviewees. This reoccurring issue proved to be one of the main challenges of this research. Spending more time on the case selection process, e.g. by detailed inquiries about the design/ idea of the living lab, could provide valuable insights and facilitate the research process.

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Interview Guide

Date, Location: **Start and end times:**

Name, position of interviewee:

Living lab project (name, context):

Contact details of potential interviewees:

Introduction

- o   Topic and frame of the research
- o   Purpose of the interview
- o   Anonymous / confidential
- o   Explain what will happen to the data
- o   Duration of the interview
- o   Ask if it is okay to record
- o   Any questions?

1. **Background of interviewee/ link to project**
   - Personal introduction: professional background and link to the Living Lab [name]?
   - How would you describe your responsibility within the project? Has your role changed over time? (for later)

2. **General information about and context of the living lab:**
   - Could you tell me more about the Living Lab [name of the lab] in general?
   - How would you define the concept of a 'living lab' in your own words?

   Probing questions:

   - What is the official purpose/ objective of the lab? (if not clear, ask more about goal definition – Urban transition vs. Product oriented)
   - Could you explain to me the underlying issue / problem statement which shall be tackled/ solved within the lab?

- In case of POLs: who is the end-user/ consumer of the product/ service that shall be developed? Are the residents of … directly affected?

3. **Environment of living lab:**
   - (if not clear yet): Where is the lab (physically) situated?
   - How many people are concerned with the lab? Where are its boundaries? (municipality? city? Not defined?)

4. **Current experiments:**
   - Could you give me an overview over current living lab projects/ experiments?
   - Various projects with different partners? What role does the Living Lab play here?
   - Are there projects in the making that involve municipalities or (individual) citizens?
   - What is the time frame of the lab and at what stage are you standing right now? (current phase e.g. kick-off, experimentation, evaluation …)

If possible focus on one project:

5. **Objective and problem statement of the experiment** – in case it differs from the lab

6. **Stakeholders / Participants**
   - Who is participating? Who are the official partners? (if not clear, ask for domain/ area of competence, NGO/ business/ public/ governmental?) How many people are (currently) involved?
   - Who initiated the process?
   - Has the lab been open to anybody?
   - Was there a preceding selection procedure for participants?
     - At what stage of the process have people been invited?
   - Can you think of any barriers that might have hindered citizens to participate in the process?
   - Did you observe any inequalities within the group (e.g. when you think of gender, educational, ethnographic background)?
   - Would you say that the involved citizens were an adequate representation of the relevant population for the lab?

7. **Mode of cooperation:**
   - Which methods/ techniques have been used during the process and with what purpose?

8. **Power relations / responsibilities**
   - Was there a clear distribution of responsibilities? How did this look like?

- Was there a clear distribution of roles and responsibilities? How did this look like?
  - Did the roles change over time?
  - Who allocated the responsibilities?
  - Was there a person/ a group that led the process?
  - Balance between experts and amateurs?
  - Do you feel that the authority and decision-making power has been evenly distributed among all participants?
  - If not clear: what role was given to the participating residents/ the municipality?

- Do all participants share a common goal or did you observe different interests?
  - If so, how did this effect the process?
- Could the participants act independently from their organizational background?
- Had the political context an impact on the process?

9. Collaboration and Communication
- How would you describe the collaboration among the participants?
  - Did you observe any challenges or tensions? If so, what do you think were the reasons for that?
  - Were there citizens/ participants who stopped their participation? Why?
- Have all participants been informed about the objective of the lab, the methodology, the performance criteria from the start? Was there room to discuss expectations and responsibilities?
- Were there any (other) communication issues?
- How would you describe the decision-making process?
- In what ways could citizens/ the municipality contribute to the process?
  - Did they play an active role in the decision making?

10. success factors and challenges
- How would you personally evaluate the outcome of the lab / the process so far?
  - Has it been successful in your eyes?
  - Did it reach its goal? If so, did it accomplish the goal that has been defined at the beginning? (or has it been re-defined/ changed)
- Looking back, did you experience (other) challenges or difficulties during the process?
- What do you think about the long-term effect of the living lab and its outcomes?
- Will the decisions made in the lab be implemented?
- What do you think about the living lab process in general as a platform for collaboration and participation?