

Master's thesis

Multi-stakeholder collaboration in Urban Living Labs

A multiple case study on how and why stakeholders, with emphasis on citizens, collaborate to co-create sustainable mobility solutions for the cities of the future

MSc in Strategy, Organization and Leadership (SOL)

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Date of submission: 15.06.2020

Number of characters / pages: 181738 / 80

Abstract

Urbanization is spreading at a rapid pace, putting cities under heavy pressure with environmental issues such as global warming resulting from CO₂ emission. A sense of urgency to find solutions is consequently widespread, and society at large is striving to find suitable and inventive ways to adapt. As a result, Urban Living Labs (ULLs) have emerged. By comparing three different ULLs in Norway, this thesis aims to see how different actors, consisting of political, private, academic, and public stakeholders, work together to co-create sustainable mobility solutions. Through the use of an analytical framework consisting of the Quintuple Helix Model, four values of co-creation, and four roles of citizens, this thesis hence seeks to explore why and how the stakeholders collaborate, and what role the citizens are perceived to have in such collaboration.

The research suggests that the reason why stakeholders collaborate is mainly to achieve social innovation by challenging existing social frameworks. This overarching goal can further be backed up by an underlying focus on product and service innovation and how this can enhance efficient and sustainable outcomes. How the collaboration take form is characterized by the creation of a sharing culture, which focuses on bringing out the best of each other through building on each stakeholders' strength and expertise. The responsible stakeholder for connecting citizens seems, however, to be unclear, mostly varying between political and private stakeholders. It is further emphasized that the lack of experience with citizen involvement hinders the ULLs' potential of collaborating with the citizens. Consequently, a cultural shift appreciating collaboration with multiple stakeholders, i.e. multi-stakeholder collaboration, is required. Additional factors influencing the collaboration potential of enhancing knowledge creation are political budgets, laws, and time. The role of the citizens in the collaboration appears to range from being testers of products to being active contributors to the development process, where the latter is most common. It is ultimately argued that ULLs are currently being shaped by elements from both New Public Management and New Public Governance, forming the motivations, structures, and roles of the collaboration. As a result, hereof ULLs are seen to work as initiatives that facilitate a collaborative approach towards urban governance.

Keywords: Co-creation, Mobility, Multi-stakeholder collaboration, Public innovation, Roles of citizens, The Quintuple Helix Model, Urban Living Lab

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Chapter 1 Introduction

1.1 Background

In today's urbanization and accelerating climate changes, cities are facing increasing urban complexity and growing societal challenges (Chron  er et al., 2019; Evans & Karvonen, 2011). With issues such as environmental pollution, long commuting times, and congestion, the European Commission has outlined transportation and mobility as being among the main areas of concern (Alberti et al., 2019). With having demographic and societal factors continually changing in the form of technological developments constrained by organizational and legal conditions, this leads to comprehensive challenges pressuring the transport sector (Kamargianni et al., 2015). Ultimately, cities encounter the challenge of finding mobility and transportation solutions that are sustainable, scalable, secure, and inclusive for the citizens (European Environment Agency [EEA], 2019). This leaves the cities with new obstacles, demanding a holistic and systematic approach, working towards making cities more livable and sustainable in the future (Alberti et al., 2019; J  rgensen et al., 2019).

With the increasing amount of people that are moving to urban areas, cities are, however, also becoming prime platforms for knowledge generation and value creation (Baccarne et al., 2014). Cities are therefore seen as hubs of creativity, innovation, and learning. Further, by engaging citizens, businesses, academia, and local governments, cities are also perceived to provide good conditions for enabling experimentation and learning to innovate, and co-creating knowledge (EEA, 2019). As a result, there is a growing trend in making cities into innovation vehicles for urban planning processes (Scholl & Kemp, 2016), where city centers and neighborhoods are exemplary platforms for understanding the needs of citizens (Juu  rvi & Pessa, 2013). This additionally opens up for citizens and urban policymakers experimenting with collaborative ways of tackling wicked urban issues (Puerari et al., 2018), resulting in citizens getting the opportunity to influence and shape their urban environments (Foth, 2009). However, to create and raise sustainable innovations in urban areas, the need for new pathways to urban development and collaboration models is growing (Evans & Karvonen, 2011). As a result, the concept of the Urban Living Labs (ULL) has emerged (Chron  er et al., 2019; EEA, 2019; Voytenko et al., 2016).

1.2 Problem definition

Citizens' role in urban development processes is considered a key factor for achieving sustainable and socially acceptable solutions. However, previous research has shown that it is often the leading stakeholder in the given ULL that determines the role of the citizens, depending on what value they want to achieve with the ULL (Leminen et al., 2015; Menny et al., 2018). Nonetheless, by stating that the leading stakeholder provides the overarching purpose of the collaboration, and hence also the role of the citizens, previous research is not highly emphasizing the fact that the intentions of other participating stakeholders may be diverse. As the collaboration goes towards a more horizontal structure, the transparency of who is the leading stakeholder may no longer be that clear. Having varying views on the overall aim of the ULL can consequently be implied to create different views on citizens' role in the collaborations and what value citizens eventually are perceived to provide. Thus, further investigation is required on how the citizens' roles take form in a collaboration consisting of multiple stakeholders, i.e. multi-stakeholder collaboration, where the participating stakeholders may have different intentions with their participation.

1.3 Purpose and research question

This thesis aims to gain insight into how three Norwegian ULLs with one of their underlying pilot projects, referred to as pilots, collaborate to create mobility solutions for the increased urbanization and emission of greenhouse gases. The three ULL pilots will be compared to see how different stakeholders, through multi-stakeholder collaboration with an emphasis on citizen involvement, work together to co-create mobility solutions. In doing so, this thesis seeks to explore why and how the stakeholders collaborate, and what role the citizens are perceived to have in the collaboration. This leads to the following research question:

Why and how do stakeholders in Urban Living Labs collaborate to co-create mobility solutions and what role are the citizens perceived to have in such collaborations?

1.4 Structure of the thesis

1 Introduction. The background and problem definition including the overall research question forms the starting point of this thesis and outlines the framework of the thesis.

2 Methodology. The philosophy of science will be presented, along with the research design of the thesis. Data collection and an overview of how the analysis is conducted will then be explained. The section is rounded off with methodological limitations and concerns.

3 Literature review. To answer the research question, this thesis will, through a literature review, examine previous academic work related to ULLs, co-creation in the public sector, and citizens' roles in multi-stakeholder collaborations.

4 Theoretical concepts. Three theoretical concepts related to co-creation, knowledge sharing, and the roles of citizens, will further be presented. This will eventually form the analytical framework used in the analysis.

5 Analysis. The analysis will be divided into four parts: Case description (Sec. [5.1](#)), analysis of ULLs and their underlying pilots (Sec. [5.2](#)), analysis of the stakeholder groups, referred to as subsystems, and their underlying stakeholders (Sec. [5.3](#)), and lastly overall findings (Sec. [5.4](#)).

6 Discussion. To gain a broader understanding of the overall findings, these will additionally be reflected upon in the discussion.

7 Conclusion. The findings will eventually be integrated into a conclusion answering the research question.

8 Future work. Finally, suggestions on implications for businesses in practice and future research are presented.

Chapter 2 Methodology

This section will be initiated with a philosophy of science followed by a more comprehensive description of the research design. Further, it will be explained how the development of the case study has taken form. The mapping of ULLs and the method for data collection and data analysis will then be clarified. Finally, the section will be rounded off with methodological limitations and considerations.

2.1 Philosophy of Science

Given the intention to better understand the social phenomenon of a ULL, a hermeneutic approach with a focus on Heideggerian philosophy has been chosen. In hermeneutics, the ontological study of being is built around the ongoing, shared, and communicated interpretations and understandings that are based on past experiences and perceptions (Dahlstrom, 2010). To gain an understanding of the human's existential being, one hence need to do this through interpretation (Zahavi et al., 2003). A central concept in hermeneutics, explaining this relationship, is called the hermeneutic circle (Prasad, 2002). According to Hans-Georg Gadamer and his modified version of the concept, it represents a way of understanding a social phenomenon, which portrays a constant interplay between the object and the interpreter's understandings and perspectives, where both aspects complement each other and take form as a spiraled cycle. As a result, when these perspectives get combined, one can gain a more open perception and a deeper understanding of the phenomenon (Gadamer, 2004). Although these merging perspectives will never be final, the goal is to go from perception to prejudice, and ultimately to pure understanding (O'Shaughnessy, 2011). How these understandings are interpreted consequently affects the construction of the phenomenon. As every interpretation of reality is based on our underlying prejudice and individual understandings, one cannot separate our understandings from the phenomenon we are investigating (Dahlager & Fredslund, 2012; Gadamer, 2013). This thesis, therefore, sees the empirical findings as something that is created in the interplay between the stakeholders who are the objects of study and the searcher as a subjective interpreter.

2.2 Research Design

To examine how stakeholders perceive and understand the social phenomenon of a ULL, the research was conducted using abductive reasoning. By using an abductive approach, the researcher can as an

interpreter progressively go back and forth between the object of study and existing theory, and thereby shift between an inductive and deductive approach of study (Reichertz, 2014). By using an inductive approach, this study focused on finding emerging patterns in the empirical material. When the patterns were identified, the researcher could, through a deductive approach, be guided with existing theoretical frameworks and knowledge to better understand and interpret the appearing findings (Timmermans & Tavory, 2012). This additionally opened up for new insights for the researcher, and these could again be compared to the empirical work. An abductive approach could hence create an opportunity to shift between the observation and theory, gaining a new perspective of the phenomenon (Lorino, 2018). Suited for gaining an understanding of the object of study and its context, this thesis used qualitative research methods (Maxwell, 2005).

2.2.1 Case studies

The research was built on Robert Stakes' view on qualitative case studies, for which an instrumental case study was conducted (Stake, 2003). Aiming at providing insight into an overall phenomenon, a set of cases centered around similar characteristics were chosen to better understand the social phenomenon of the ULL and citizens' role in it. A comparable design using multiple case study were used, allowing a look at the cases' similarities and differences (Bryman, 2016).

2.2.2 Mapping Urban Living Labs

To identify relevant cases of ULLs with a mobility focus, a mapping of existing ULLs focusing on mobility, logistics, and transportation in Norway was done. For sampling an overview of the labs, Google was used as a search engine. The geographical scope was narrowed down to one country to reduce the risk of different ULL being affected by variations in national regulations and restrictions. The concept of an urban area was further adapted to national conditions, meaning a village constituting a minimum of 200 citizens (Butenschøn, 2019). The labs in urban areas that focused on finding solutions for rural districts, were however eliminated to direct the focus on urban solutions.

Given that ULLs are not necessarily labeled as such, the identification of ULLs was not based on the projects calling themselves ULLs. Rather, the identification was based on projects potentially being classified as ULLs. The criteria used were hence their characteristics related to geographical embeddedness, experimentation and learning, participation and user involvement, leadership and ownership, and evaluation of actions and impact (Voytenko et al., 2016). How the chosen cases meet each of

these characteristics can be found in [Appendix A](#). To find the labs that were relevant for the research, supplementary information was further gained through the use of the ULLs' home pages. After the screening, all potential labs were contacted by email, supplemented with a phone call to provide additional information about the objective of the research. The phone call also ensured a mutual understanding of the purpose behind the lab and the respective research.

In total three cases were picked for the study; Testsite Kongsberg By&Lab (TKC&L), Smartere Transport i Oslo-regionen (STOR), and Smartere Transport Bodø (STB). For a detailed introduction of the cases, please see Sec. [5.1](#).

2.3 Data collection

To gain a better understanding of the collaboration in ULLs, a variety of methods for collecting data was conducted. Described by scholars as triangulation (Bryman, 2016; Easterby-Smith, 2015), by using a diverse use of sources of information, it can collectively increase the accuracy of empirical findings. Both primary data sources such as interviews and observation, and to some degree secondary data sources such as written texts and reports, was hence gathered. Details on how they were gathered will be explained below.

2.3.1 Interviews

Qualitative interviews are often used because of their unique ability to capture contextual information and open up for insights that otherwise would be difficult to obtain (Easterby-Smith et al., 2015). By gaining insight into perspectives and individually experienced events, the interviews thus allowed for the discovery, understanding, reflection, and explanation of the phenomenon (Tracy, 2012). As the aim of this research was to gather data that reflected the interviewees' meanings and interpretations, an interview guide was additionally created to ensure that the collection of insights was promoted (Kvale & Brinkmann, 2015). Semi-structured interviews were conducted to account for possible insights and issues that could surface during the interviews (Easterby-Smith et al., 2015).

It was additionally preferable to have traditional face-to-face interviews, as these worked best in naturalizing the risk of differences in contextual factors affecting the interview (Easterby-Smith et al., 2015). However, remote interviews were sometimes conducted since this created both flexibility and

a low threshold for attending (Bryman, 2016). The remotely held interviews were preferably conducted through video Skype-calls, as this allowed the respondent and the interviewer to communicate through video in real-time, thus minimizing the contextual gap (O'Connor et al., 2008). Yet, since some interviewees did not have Skype available, a few were interviewed over the telephone. To avoid the risk of the respondents being affected by each other, the individual interviews were in general conducted separately. However, for the convenience of the interviewees, three interviews were held in groups of two or three.

The interview objects were mainly selected based on the information provided by the ULLs' homepage and referrals from previously contacted interviewees, i.e. using the snowball technique (Naderifar et al., 2017). Interview objects hence mainly consisted of those who had a direct role in the ULLs. The term "direct" refers in this context to being part of the board of the lab, actively contributing to the operational activities of the ULL, or being a participant in the ULL. Stakeholders that had an academic interest, but not an active role in the ULL, were also included. In total, 22 interviews were conducted with 27 different stakeholders (cf. three in groups). Table 1 below provides an overview of the interviewed stakeholders, their description and role in the ULLs, how they are referred to in this thesis, and how and when the interviews were conducted. The private names of the interviewees have been anonymized.

Name of stakeholders	Description of stakeholder	Role in ULL and pilot	Referred	Method	Date
<i>Smartere Transport Bodø (STB) with pilot Kobla Pilot</i>					
Bodø kommune	Bodø Municipally	Leader of Bodø ByLab	BK	Face-to-Face	14.02.2020
Citizen (1) – (4)	Randomized citizens	Participant in workshop	C1	Face-to-Face	13.02.2020
Citizen (5)	Nord University as citizen	Participant in workshop	C5	Skype (video)	02.03.2020
Kobla	Technology company	Co-owner of Kobla	Kobla	Face-to-Face	13.02.2020
Nord universitet	Nord University	Associate professor	Nord	Skype (video)	02.03.2020
Nordland fylkeskommune (1) – (2)	Nordland County Authority	Project leaders (STB)	NFK1	Face-to-Face	14.02.2020
<i>Smartere Transport i Oslo-regionen (STOR) with pilot Combined Mobility</i>					
Bymiljøetaten i Oslo kommune (1)		Project leader (STOR)	BYM1	Face-to-Face	19.02.2020
Bymiljøetaten i Oslo kommune (2)	Agency for Urban Environment in Oslo Municipally	Project leader (STOR)	BYM2	Face-to-Face	19.02.2020
Bymiljøetaten i Oslo kommune (3)		Service designer (STOR)	BYM3	Face-to-Face	19.02.2020
Ruter (1)	Public transport company	Design lead (Combined Mobility)	R1	Face-to-Face	12.02.2020
Ruter (2)		Project leader (Combined Mobility)	R2	Face-to-Face	12.02.2020
Statens vegvesen Oslo	Norwegian Public Road Administration Oslo	Senior Project leader (STOR)	SVO	Face-to-Face	11.02.2020
<i>Testsite Kongsberg City&Lab (TKC&L) with pilot Autonomous Bus</i>					
Applied Autonomy	Technology company	Member of Steering committee	AA	Phone	21.02.2020
Brakar	Public transport company	Pilot leader (Autonomous Bus)	Brakar	Phone	20.02.2020
Bus operator	Bus operator on Autonomous Bus	Employee of Vy	BO	Phone	04.03.2020
ITS Norge	Member association	Member of Steering committee	ITS	Face-to-Face	20.02.2020
Kongsberg Innovasjon	Technology service company	Member of Steering committee	KI	Phone	19.02.2020
Kongsberg kommune	Kongsberg Municipally	Member of Steering committee	KK	Face-to-Face	18.02.2020
SINTEF	Research institute	Researcher in SMARTFEEDER ¹	SINTEF	Skype (video)	04.03.2020
Statens vegvesen Kongsberg	Norwegian Public Road Administration Kongsberg	Member of Steering committee	SVK	Skype (video)	18.02.2020
Universitetet i Sørøst-Norge	University of South-Eastern Norway	Member of Steering committee	USN	Phone	20.02.2020
Viken fylkeskommune	Viken County Authority	Member of Steering committee	Viken	Skype (video)	28.02.2020
Vy	Public transport company	Member of Steering committee	Vy	Face-to-Face	20.02.2020

Table 1: Overview of interviewees, position, the short version of the name, medium, and date of the conducted interviews

¹ SMARTFEEDER is a project run by SINTEF that is working to "provide knowledge on how automated and seamless juggling services can contribute to a green shift in road users" (SINTEF, n.d)

The interviews consisted of an average of 30 questions, including follow-up questions, which were asked when appropriate. The questions were open-ended, and adaptations were made to fit the interviewees' position and anticipated ability to provide relevant information. With every interviewee, the interview started with general questions about e.g. the interviewees' work history in the ULL or pilot. The questions were intentionally structured in this way to make the interviewees comfortable and to gain their trust before going into topics that they might consider more personal (Kvale, 2007). For the complete interview guide, please see [Appendix B](#). For the convenience of the interviewees, the interviews were all conducted in their native language, Norwegian. By doing so, inhibition of the interviewees' vocabulary was avoided. The interviews lasted on average 60 minutes. All interviews were recorded to aid the transcriptions, as well as to ensure accuracy and avoid a biased analysis (Easterby-Smith et al., 2015). All complete transcriptions are attached in [Appendix C](#). In the analysis, these will be referred to as their abbreviated name of the stakeholder, and which page in the appendix the data source or quotes can be found.

2.3.2 Observation

As words alone cannot always convey the complexity of the situation they account for, observation can serve as a complementary role for further understanding of other people's realities (Secrist et al., 2002). To get an insight into how the different stakeholders participated and what they thought about their participation, an observation was conducted of the Kobla pilot on their workshop held in Bodø City Hall on the 13th of February 2020. During the observation, an “*observer-as-participant*”-role was adopted, meaning that my role consisted both of being an observing researcher while at the same time maintaining superficial contact with the people being studied (Anderson, 2008, p. 151). This was done by occasionally asking questions to the participants while also observing the workshop as it took place. The documentation of the observation was done by standard practice by making preliminary field notes, which later were written into more comprehensive text (Bryman, 2016). These notes can be found in [Appendix D](#).

2.3.3 Texts and reports

All secondary data were collected for providing information about the intention of the ULLs and their pilots. It hence consists of pilot descriptions, and other publications made by the respective ULLs, which were either sent by mail or found available on the respective websites. The supplementary data

consisted of the websites of TKC&L (City&Lab, n.d.-a; City&Lab, n.d.-b), Brakar (Brakar, n.d.), STOR (Statens vegvesen, n.d.; Statens vegvesen, 2020) and Combined Mobility (UIS Innovation, n.d.), supplemented by the competition application of STB (Smartere Transport Bodø, n.d.), and the agreement contract between Kobla and STB (Smartere Transport Bodø, 2019).

2.4 Data analysis

Under the understanding of the hermeneutic approach that the researcher works as an interpreter and collector of interpretations, it is a requirement that the perceptions being made of the constructed reality are documented and disclosed (Fredslund, 2012). One method that enhances such disclosures is the Thematic Network Analysis (TNA) developed by Jennifer Attride-Stirling (2001). TNA serves as an organizational principle and a representation tool that helps visualize the steps used when going from empirical findings to interpretation. Building on previous qualitative techniques such as the elements of Grounded theory (Corbin & Strauss, 1990), it is consequently a detailed method gained for maintaining the quality required for providing an overview that is both beneficial for the researcher and the reader (Attride-Stirling, 2001).

Consisting of six steps (1-6), divided into three sections (A-C), the process is highlighted in Table 2 and further described below. The analytical software program NVivo 12 was used for conducting the coding and the construction of the thematic networks (TN).

<i>A. Breakdown</i>			<i>B. Exploration</i>		<i>C. Integration</i>
1	2	3	4	5	6
Coding material into workable text segments	Themes were identified for 1) ULLs and their pilots and 2) for each stakeholder grouped into subsystems	TNs for ULLs and underlying pilots was constructed TNs for stakeholder groups was constructed	All TNs were first shortly described. Explorative work was done to create a basis for the main analysis	All TNs briefly summarized	Theoretical framework used to interpret TNs. First explored for ULLs and underlying pilot, and subsequently stakeholder groups

Table 2: Processual overview of the six steps constituting the analysis

A: Breakdown of text

1. *Code Material.* The first step was to code all the transcribed interviews. Without taking any specific theories actively into account, the objectives were in the coding to see what recurrent arguments, issues, or points surfaced the text. Due to the comprehensiveness of the text, an overall coding regime based on sentences and paragraphs were used, as word-by-word coding would be too complex. This was done with the intention of transforming the text into workable and meaningful text segments.

2. *Identify Themes.* After conducting 22 interviews, supplemented with one observation of the Kobla Pilot, the coding lead to a total of 1219 codes. These were further categorized under general categories, where duplicates were later removed or explained if there were any differences in the content of the coding. In total, this leads to 5 overall categories, 30 subcategories, and 135 underlying codes. For a detailed overview of all overall categories with underlying subcategories and their codes, please see [Appendix E](#).

For further analysis, the process was divided into two; one for the ULLs and their underlying pilots, and one for the subsystems, belonging to the respective ULLs. To find the similarities between the ULLs, the subcategories in NVivo were used with the function *Crosstab* to identify how many text segments the stakeholders had in each subcategory. To avoid making the analysis too comprehensive and in order to maintain the focus on similarities and patterns, a minimum of three text segments in each subcategory was set as a requirement for further analysis. The same procedure was then done for the subsystems. In order to be considered, each subcategory needed to be present for at least 50% of the stakeholders in each subsystem, e.g. in the case of seven stakeholders in one subsystem, four of seven needed to have text segments in subcategory X. For an overview of output tables from the *Crosstab* function in NVivo, please see [Appendix F](#).

3. *Construct Thematic Networks.* Microsoft Excel was further used to gain an initial overview of the resulting themes extracted from NVivo. The process was to look into the subcategories' underlying content and arrange them into groups of themes, referred to as basic themes. As this thesis uses an abductive research approach, the grouping was affected by existing theory, but not limited by it. NVivo's *mapping* function was afterward used to visualize the identified themes. The basic themes were then coupled around key statements or topics, which together constituted the organizing themes. Building on the organizing themes' main claims, arguments, and assumptions, this further opened up

for additional overarching couplings referred to as the global themes. These consequently consisted of the core meaning of both the organizing and basic themes. This process was done for each of the ULLs with their underlying pilots respectively, and then for each subsystem. For an overview of the thematic charts, ranging from basic to organizational and global themes, please see Appendix G. These couplings were then followed by a revision of the findings, where quality control of the couplings was made. This was done by going through the text segments again and double-check that the network was representing the underlying data. Together the process created seven thematic networks, for which a detailed overview can be found in Appendix H.

B Exploration of text

4. Describe and explore thematic networks. The next stage of the process was used for exploring and identifying underlying patterns in the TN. As each underlying theme could have a different meaning for each ULL and stakeholder, a comprehensive work with understanding their meaning was conducted. This was done by returning to the transcriptions and interpret the interviews while having the network in mind. A supporting descriptive and exploratory work was additionally conducted with writing out all findings that supported the thematic networks. Supporting quotes were applied to each theme to support findings. By conducting such analysis, the basis for further interpretation of the networks was laid (cf. Step 6).

5. Summarize thematic networks. The TN were summarized by shortly being described at the beginning of the analysis.

C Integration of exploration

6. Interpret patterns. As Attride-Stirling points out; the networks are only the tool in the analysis, and not the analysis itself (Attride-Stirling, 2001). The findings from the TNA were hence, as the final part of the process, used as input to produce the overall analysis. The identified themes and patterns were supported by text segments from the interviews and coupled with the research question. By additionally applying the TNs to the theoretical framework of the research (cf. Sec. 4.4), the analysis consequently aimed at investigating why and how the stakeholders collaborate, and what role the citizens are perceived to have in the collaboration.

2.5 Methodological limitations and considerations

2.5.1 Reliability

As this interpretive study is based on how the researcher continually interprets and understands the realities of the objects, the research could not be replicated, since the researcher would, through replication, have gained a deeper understanding of the social phenomenon than he or she had before. Considering the philosophy of science is hence formed by a hermeneutic approach, the concept of reliability, based on arguments from Hanne Fredslund (2012), should give away the idea of replication. Consequently, the focus of reliability is to show how the data is collected and analyzed (Yazan & De Vasconcelos, 2016), and not whether they can be replicated or not (Fredslund, 2012). Measures taken to maintain transparency about data collection and interpretation are therefore important and are also the reasons for choosing TNA as a tool. By illustrating the process of conducting the TNs, this opens the opportunity to qualify that the conclusions are based on real empirical work, and represent the objects' perspectives on the study. TNA therefore also acts as a response to the criticism given to qualitative researchers for not having adequate methods and tools for a systematic presentation of the qualitative analysis (Attride-Stirling, 2001). To qualify the empirical findings and make them more reliable, the transcribed interviews were also mailed to the interviewed objects for additional confirmation that they were correct in terms of wording and statements.

2.5.2 Validity

As previously implied through the use of the hermeneutic approach, past experiences and understandings will always affect the interpretations. In correspondence, the researcher's awareness of its understandings and prejudices is hence crucial to consider, as this will influence the understanding and meaning that is drawn from their interpretations (Dahlberg & Dahlberg, 2019). The researcher's sensitivity is therefore of importance, meaning that the researcher needs to be aware of its views and experiences by making sure that these views are not overwhelming the research (Low, 2008). This concerns both knowledge about existing theory and personal perspectives. The practice called *Bridling* is by Dahlberg and Dahlberg therefore essential for the quality of the research (Dahlberg & Dahlberg, 2019). Bridling can be seen as “*an art of being present and asking questions to one's own understanding of a phenomenon rather than taking it for granted*”, meaning that the researcher needs to acknowledge that he or she is in-between both subjectivity and objectivity (Dahlberg & Dahlberg,

2019, p. 3). Not being able to do this properly can, therefore, be seen as a methodological limitation, since this may be a comprehensive task that requires both experiences, mental awareness, and skills. This can as a result limit the research credibility. The practice of bridling has thus throughout the research been in focus.

2.5.2.1 Interviews

To get a broad range of perspectives to enlighten the problem of concern, the aim was to let at least one stakeholder from each subsystem participate in the study. This was successfully achieved for one ULL (STB), but not for the two others (STOR, TKC&L), where the main challenge was getting in touch with the citizens. The citizens were thus not directly represented in these ULLs. The analysis of citizens' views on the collaboration (cf. Sec. [5.3.2.2](#)), will hence only use sources from the interviews conducted during the workshop of STB's underlying pilot: Kobla Pilot. For STOR, the academic stakeholders were also not reached. More interviews of primarily the citizens but also the academics would although strengthen the research plausibility. Using the snowball technique may consecutively in this case be a weakness, as the "easiest" or accessible stakeholders were chosen, leading to an inadequate focus on stakeholders such as citizens and academics. However, a diverse range of views from the other perspectives was met, maintaining rigor in illuminating the area of concern.

2.5.2.2 Observation

Ideally, the researcher should achieve a close relationship with the participants to retrieve more honest answers (Fine, 2015), and a deeper understanding of participants' thoughts. Due to the limited two hours' duration of the Kobla workshop, this was however difficult to achieve. Balsiger and Lambelet (2014) also emphasize that field notes taken during observation require method, practice, and routines, which can, in this case, be seen as a possible weakness as this was the first time an observation was being conducted. A checklist provided by Easterby-Smith et al. (2015) was hence actively used to enhance the quality for both observations and the following notes. However, it must be acknowledged that the study only conducts an observation of the Kobla Pilot and not the additional two pilots. This is hence a possible weakness of the study as it may ultimately lead to a misalignment in the representation of the empirical work of the pilots. The interviews conducted for the remaining pilots worked as a means of supporting potential empirical gaps.

2.5.2.3 Texts and reports

Even though texts and documents can be perceived to be a “*window into social and organizational realities*”, they need to be met with criticism (Bryman, 2016, p. 560). This means that the context in which they were produced, and their implied readership need to be reflected upon and understood (Bryman, 2016). As these sources were found at the ULLs’ and their underlying pilots’ homepages, they were considered to be framed to work in favor of the ULLs and their pilots. The texts were hence primarily used as information sources to provide information about the ULLs and their pilots publicly described by their intentions with the collaboration.

2.5.3 Generalization and external validity

Case studies have generally been criticized by academics of the positivist school for not creating a basis for generalizing or theory building (Yin, 2013). However, as highlighted by Steinar Kvale’s (1995) analytical generalization, the results of a case study can indicate what might happen in a similar situation, and an analysis of similarities and differences between these two situations might, therefore, lead to a better understanding of the phenomenon. As such, the empirical work can additionally be tested, potentially leading towards enhancing universal theories concerning ULLs and multi-stakeholder collaborations. This is further supported by Christine Meyer, who argues that a multiple case study can, in contrast to a single case study, offer a fruitful ground for comparison, which can additionally lead to a deeper understanding of each, individual case but also the overall phenomenon (Meyer, 2001). Similarly, Siggelkow (2010) argues that case studies are exceptionally beneficial for demonstrating the importance of particular research questions, and for widening the knowledge of abstract concepts and encouraging new ideas. It can hence be argued that the insights from the analysis can be used for creating value for ULLs and pilots that work in a similar manner e.g. multi-stakeholder collaboration.

2.5.4 Ethics and confidentiality

As the current study involves human objects, it is essential to consider research ethics (Bell & Bryman, 2007). Thus, certain precautions were taken to maintain the ethical aspects of this research.

When contacting the interviewees, an informative mail was sent alongside with my contact information and an invitation to reach out if there were any concerns regarding the information given or

the purpose of the research. Before the interviews took place, a detailed document with an introduction about the scope of the research and lastly, how the data were going to be used in the study was additionally sent to the interview objects by mail. A declaration of consent was attached to this mail ([Appendix I](#)). The interview objects thus had an opportunity to ask questions before, during, and after the interview, and were throughout the study offered anonymity and confidentiality. After transcription, the interviews were sent to the respondents in a password-protected file. As such, the respondents were able to make adjustments or remove content.

It could be argued, however, that the entire thesis should have been marked as confidential, both for the safety of the interview objects and for reducing the risk of the respondent being biased with their answers. With that being said, the aim and motivation for conducting this research were to generate value for the pilots that took part in the research and potentially also for other ULLs and multi-stakeholder collaborations. By having the pilots and organizational names stated, this opened up the opportunity that others could get in touch with the pilots or ULLs of the study, ultimately learning from each other and strengthen the overall social value gained from this research. Since all pilots were additionally linked to finding mobility solutions, the research aimed at providing findings that could potentially help to strengthen the mobility pilots' success in collectively creating more sustainable and usable mobility solutions. The private names were removed, as the focus was on the pilots and the ULLs, and not the persons specifically.

2.5.5 General concerns

As an obligation to declare sources of funding, it should be stated that this research is sponsored with a scholarship and supporting supervision hours by Statens vegvesen. This can affect the affiliations of the researcher and thereby lead to a possible conflict of interest (Bell, 2008). Therefore, the partnership has as a response discussed with Statens vegvesen and agreed that the arrangement will not limit the research objectivity and freedom to research as intended.

Chapter 3 Literature review

The following section will first, based on current literature, introduce the emergence of the concept of ULLs and its origins. The state-of-the-art of co-creation is then explored from a governmental perspective before lastly citizen involvement and user roles in multi-collaborations will be examined.

3.1 The emergence of Urban Living Labs

During the creation of sustainable innovations in urban areas, a need for new pathways to urban development and collaboration models is growing (Evans & Karvonen, 2011). As a result, the concept of the ULL has emerged (Chron er et al., 2019; EEA, 2019; Voytenko et al., 2016). In a ULL, the city is viewed as an ecosystem that is taking form as a living laboratory, where citizens and other stakeholders are actively involved to collectively foster innovation (Veeckman & van der Graaf, 2015). Characterized by the presence of multiple stakeholders with shared decision-making powers, ULLs have consequently become a popular phenomenon for tackling urban challenges by *“fostering the development and implementation of innovation, experimentation, and knowledge in urban, real-life settings while emphasizing the important role of participation and co-creation”* (Steen & van Bueren, 2017, p. 1). Using cities as laboratories is nevertheless not a novel approach and correspond to past research seeing cities as governance platforms for sustainable development (Bulkeley & Betsill, 2013), economic development (Katz & Wagner, 2014), and citizen empowerment (Fung, 2015). What however makes the ULL stand out from previous methods, is its transdisciplinary approach of seeing citizens as key actors in the process of making urban areas more innovative, livable, and sustainable (Wiederwald et al., 2018). This *“urban innovation ecosystem”* hence allows the development to be shaped for, by, and with citizens (Baccarne et al., 2014, p. 145). By creating social networks centered around shared goals for the urban future, McCormick and Hartmann (2017) even state that ULL can create remarkable improvements concerning the quality of life in cities. The ULLs can consequently be viewed as a new, more collective mode of urban governance (Voytenko et al., 2016).

3.2 Origin of the Urban Living Labs

The concept behind ULLs can in literature be seen to comprise of a broader umbrella term of real-world laboratories (Menny et al., 2018; Parodi et. al., 2018), which in previous academic work are

referred to as Living Labs (LLs) (Almirall et al., 2012), Open innovation networks (Leminen et al., 2012), Urban Transition Labs (Nevens et al., 2013), as part of regional innovation networks (Juujärvi & Pessa, 2013), or as Sustainable Living Labs (Liedtke et al., 2015; Baedeker et al., 2017). Overall, what seems to be the most cross-referred concepts are LL and ULL, where the ULL can be viewed as an evolution from LL (Menny, 2016). Hence, the concept of ULL sometimes builds on supporting articles that refer to LL in their empirical work. Nevertheless, even if the approaches are defined by somewhat different features, common characteristics are that the concepts can be viewed as methods of knowledge production which takes place in an experimental setting, where the goal is to create a learning environment that aims to co-create knowledge through interdisciplinary cooperation (Juujärvi & Lund, 2016).

The nature of interdisciplinary collaboration can be perceived to unfold from the concept of open innovation (introduced by Henry Chesbrough in 2003), which today is seen as an essential theoretical contribution influencing a wide range of private and public organizations (Cloodt & Vanhaverbeke, 2014). Opening up for a distinction between open and closed innovation, Chesbrough emphasizes that innovations could both come from internal and external resources. Put differently, the production of new products and innovations could additionally be utilized through collaborating with external partners (Chesbrough, 2003), consequently leading to the organizational boundaries of the firm constantly being redrawn (Cloodt & Vanhaverbeke, 2014). Whereby combining both external knowledge and new internal ideas, Gassmann and Enkel took Chesbrough's concept one step further by identifying an open "coupled" innovation process, where the company could in the innovation process "*co-operate*" with other companies in so-called "*strategic networks*" (Gassmann & Enkel, 2007, p. 12). This work was further supplemented by West & Piller's interactive approach to coupling. This approach focused on joint knowledge creation, where firms could collectively facilitate "*an interactive, collaborative process of joint value creation*" (West & Piller, 2014, p. 39). Co-creation is in this process hence seen to appear, as described when shared value creation takes place between two or more actors (Prahalad & Ramaswamy, 2004; Schuurman, 2015).

Additional theoretical work stressing joint value creation and co-creation can further be related to the Quadruple Helix Model, a model that embraces the dynamic relationships and interactions between the university, industry, government, and public society. In the model, each group of stakeholders represents a subsystem constituted as a form of knowledge capital, where the university stands for

the human, the industry for the economic, the political for the legal and political, and civil for the social and informational capital. The model further perceives the society of being constructed out of these subsystems, which through their aggregated use of knowledge, together shape the context of the society. (Campbell & Carayannis, 2009)

ULL as a helix

The concept of ULL corresponds to the Quadruple Helix in the way that the ULL works as a model suited for promoting knowledge sharing across the institutional spheres. This understanding is additionally supported by Baccarne and colleagues, who see a ULL as a collaborative ecosystem contributing to the facilitation of knowledge transformation between the stakeholders of the ecosystem (Baccarne et al., 2014). However, what is quite unique with ULLs, is that they enclose extensive features such as politics and financing models (Chron er et al., 2019), and usually have an explicit aim in the problem and goal statement of increasing urban sustainability (Steen & von Bueren, 2017). Researchers consequently connect ULLs with a fifth component helix model, referred to as the Quintuple Helix Model (Baccarne et al., 2015). To ensure that future generations can live as we do, the natural environment, functioning as the fifth component, works as an elemental subsystem that the society needs to take into account (Carayannis & Campbell, 2010). Baccarne et al. (2016) further find that a ULL can be seen as a way of putting the Quintuple Helix Model into practice, which by being designed as a single innovation development process, lowers the barriers for multi-stakeholder collaboration. They argue that ULLs can, potentially make the urban socio-ecological development more sustainable by increasing the ecological balance, ultimately securing the quality of life for future generations.

3.3 Co-creation in the public sector

In the public sector, multi-stakeholder collaboration and co-creation have transformed from being a relatively widespread practice to becoming a strategic management concept, working as key elements of the governance paradigm termed New Public Governance (NPG) (Osborne, 2006). Based on Old Public Administration (OPA), where citizens are seen as passive voters and taxpayers that in return receive the necessary services to cover their civil rights, and New Public Management (NPM), where the public sector is perceived as a service provider aiming to fulfill citizens' expectations of what value these services should provide, NPG distinguishes itself by having a focus on cross-sec-

tional collaboration for solving societal problems (Sørensen & Torfing, 2018a). By focusing on horizontal collaboration, NPG hence takes the relationship between the state and the public society on step further, consequently seeing citizens as active co-creators of public services (Tanggaard, 2018).

As NPG is increasingly taking over the agenda for public governance (Torfing & Triantafillou, 2013), there are emerging different perspectives on what co-creation is and what outcome the concept may lead to. Agger & Tortzen makes it clear: “*co-creation is a term that covers a variety of different activities and takes shapes in various forms*” (Agger et al., 2018, p. 8). However, literature shows that co-creation can be seen to unfold as a two-sided concept, with each side being shaped by different management paradigms, leading to a split between an empowerment-understanding and an efficiency-understanding of co-creation (Agger & Tortzen, 2015). The empowerment-understanding of co-creation sees co-creation as a “*network-based collaboration between different people, public and private actors working together to prioritize, plan or produce welfare*” (Tortzen & Agger, 2015, p. 14). The focus lies on long-term outcomes such as new relationships between the public sector and citizens, empowerment of weaker societal groups, and increasing the quality of life. Further, it is perceived to stem from an NPG understanding of public governance (Agger & Tortzen, 2015; Agger et al., 2018). The goal of co-creation is eventually to get a new, more equal distribution of power in civil society (Fogsgaard & de Jongh, 2018). This understanding works as a contrast to the efficiency-understanding of co-creation, which focuses on increasing the efficiency of public welfare production and on reducing economic cost (Tortzen & Agger, 2015). Effectiveness is here seen as a means of ensuring the quality of the public services, with the explicit goal of making the public get more for less (Jakobsen & Andersen, 2013). The focus is hence on output in the form of better products and services (Sørensen & Torfing, 2018), and stems from an NPM understanding of public governance (Agger & Tortzen, 2015, Agger et al., 2018).

Based on what value co-creation is perceived to achieve, co-creation can additionally be separated into three domains (Tortzen, 2016): (1) efficiency in form of economic savings and better public services; (2) innovation in form of new solutions for social challenges; and (3) democracy in form of public legitimacy and participation. In this sense, co-creation can gain value on three different levels: within public organizations, for citizens, and for the general society (Nabatchi et al., 2017). Furthermore, academics such as Bryson et al. (2016) and Agger et al. (2018) also bring forward a fourth

domain called *public value*, seen as the multi-diverse value the public sector creates through co-creation. Voorberg et al. (2014) additionally separate the outcomes of co-creation between a product and a process value. The product value refers to when co-creation helps to achieve set measurable objectives, while the process value refers to when co-creation leads to a new mindset and a change of perceived identity. The process way of seeing value hence emphasize the value of co-creation can often be found in the process itself. Building on that, many researchers state that co-creation primarily works as a symbolic process initiated by public organizations to establish legitimization (Fung, 2015; Voorberg et al., 2015b). Common features of the domains are however that the public sector is consequently becoming an area of co-creation, where the citizens are contributing to the public sectors' activities and assignments (Torfing et al., 2019). The public organizations have thus been transformed to work as a facilitator and member of a cross-sectional collaboration, consisting of participants such as citizens and local stakeholders. Through their experiences, resources, and ideas, they hence aim to develop and implement new and better solutions in the public sector (Sørensen & Torfing, 2018b). This ultimately leads to municipalities establishing arenas where citizens are offered to participate and get involved (e.g. Hatling & Aggvin, 2018; Hovde et al., 2019; Sørensen et al., 2017).

3.4 Users' role in multi-collaborations

Through the concept of co-creation, it becomes apparent that citizens as users are no longer seen as passive objects, but rather important sources of knowledge and creativity (von Hippel, 2005). There is, however, nothing new about identifying users as resources, and it has in the literature been claimed to stem from Eric von Hippel's work on user-driven innovations, where the concept of *the lead user* was introduced (van Oost et al., 2009; Piller & West, 2014; Georges et al., 2015). Referred to by Schuurman as the "*holy grail*" of user involvement (Schuurman, 2015, p. 90), a lead user can be defined as the user that possesses the general needs of the marketplace (von Hippel, 1986). Based on the idea that users possess useful information about what could potentially be a market demand, the lead users' points of view were consequently taken into consideration during the development process (Schuurman, 2015). To understand to what degree users were taken into account in the process, Sherry Arnstein's introduced the Ladder of Citizen Participation (1969). The ladder consists of three overall stages of involvement, ranging from non-participation, tokenism, and decision-making power. The ground level is when citizens are non-participatory in the process. The second level, tokenism, involves allowing citizens to "participate", meaning that they possess a symbolic, but not direct power

to influence the decision-making process. True participation is however first seen to be obtained on the highest level when citizens have the possession of real decision-making power.

Acknowledging that there are different degrees of citizen involvement, Kaulio (1998) came forward with three modes of involvement: design *for*, *by*, and *with* users. Design *for* users means a product development mode where common theories and information on users' needs and preferences are used as a ground base for designing and developing products. Design *by* users involves a product development mode where the users are actively participating in designing and forming products. Finally, design *with* users is a product development mode that focuses on both utilizing the knowledge about the users' preferences and at the same time actively involve them by encouraging them to provide feedback on suggested solutions. Consequently, users and producers are in the development process iteratively working together, consequently promoting the emergence of co-creation (Schuurman, 2015).

Citizens role in Urban Living Labs

A concept that enhances co-creating solutions *with* users (often referred to as citizens), is ULL (Bulkeley et al., 2017). Empirical research on users' roles in ULLs shows however that even though there is a potential for co-creation, this potential is not always exploited (Menny, 2016). Findings from Nyström and colleagues also demonstrate that the role of users can fluctuate between being an informant, tester, contributor, and co-creator (Nyström et al., 2014). They highlight that users' roles shifts as the network evolve, meaning that users can during the collaboration have multiple roles, consequently ranging between being of a passive and active character. The dynamic relationship between users' way of shifting between a passive role (as a role-taker), and an active role (as a role-maker), is further explored by Leminen and colleagues, who links the roles to the outcome of the innovation (Leminen et al., 2015). Through their exploration of the creative consumer, they put forward four types of users: (1) customizer, (2) fabricator, (3) designer, and (4) inventor. Through these roles, they found that the ambition level of the innovation activities and their outcomes (incremental or radical innovation) varied considerably depending on the driving stakeholders of the labs. Ranging from being provider-, utilizer-, enabler-, or user-driven, these classifications were in a ULL setting transformed into the roles of the participatory stakeholders, seeing the educational institutions as providers, firms and local service provides as utilizers, city representatives as enablers, and users as residents (Juujärvi & Pessa, 2013). These findings further correlated with Leminen's previous work on user roles, where he emphasizes that users' participation depends on whose needs one attempts to fulfill: the needs of the

leading stakeholders (inhalation-dominated) or the needs of other stakeholders (exhalation-dominated) (Leminen, 2013). Through the study on ULLs and how citizens can contribute to achieving their transformative potential, Menny et al. (2018) further support that the degree of citizen involvement highly depends on the leading stakeholders of the ULL and their additional aims. They also emphasize that the goal is not always to achieve co-creation and highlight that involvement should rather be considered to fit “*the right form and the right time*” (Menny et al., 2018, p. 76). This consequently leads to contextual questions concerning if co-creation should always be the overall purpose of the ULLs and additionally when it is the right time to involve citizens. These studies, however, emphasize that there is one leading actor setting the final purpose of the collaboration. The collaboration form and citizens' roles formed by these hence still needs to be explored.

Chapter 4 Theoretical concepts

Based on the academic work presented above, a theoretical framework will be presented, working as the foundation for answering this thesis' research question. The framework consists of four values of co-creation (Agger et al., 2018), the Quintuple Helix Model (Carayannis & Campbell, 2010), and four roles of citizens (Nyström et al., 2014).

4.1 Four values of co-creation

Agger et al. (2018) have, through their literature review on co-creation in the public sector, presented four ground values of co-creation. These values conclusively portray four perspectives on what value co-creation is perceived to create: democratic, quality and efficiency, innovational, and public value. These perspectives will be described below (Agger et al., 2018):

4.1.1 Democratic value through empowerment, social capital, and trust

Empowerment is seen to develop when citizens and civil society get the opportunity to exert influence. When the citizens are allowed to co-create a public service, *trust* is further expected to evolve between citizens and public institutions. *Social capital* is about the social relations and collective competences in the society, which can further be understood using Bovaird & Löffler's definition as "*the capacity of a social group or area to act together to achieve an agreed outcome*" (2018, p. 271). The connection between these democratic elements and co-creation can also be characterized by a two-folded relationship, where having these elements present in the co-creation process can be both a prerequisite for and possible gains of co-creation. For example, most trusting citizens are also the ones participating in co-creation activities. To what extent these elements are present and further achieved will as a result influence the democratic value of co-creation.

4.1.2 Value as quality and efficiency for better and/or cheaper public services

With increasing performance, quality, and tailoring public offerings, the purpose of co-creation is in this perspective to achieve better and cheaper public services. The explicit objectives of co-creation are thus to streamline and improve public services so that the public ultimately gets "*more for less*" (Agger et al., 2018, p. 10). By combining both the collaborating stakeholders and the public's knowledge and resources, it is argued that the public will, as a result, achieve cost-savings. The focus

of the collaboration hence lies in increasing the value of the output by gaining better or cheaper services or activities.

4.1.3 Innovational value as new solutions for social challenges

In this perspective, co-creation intends to achieve either social or product and service innovation. Social innovation can be defined by Voorberg et al. (2015) as “*the creation of long-lasting outcomes that aim to address societal needs by fundamentally changing the relationships, positions, and rules between the involved stakeholders, through an open process of participation, exchange, and collaboration with relevant stakeholders, including end-users, thereby crossing organizational boundaries and jurisdictions*” (p. 1334). By establishing new roles and collaborative relationships between stakeholders such as the government, citizens, and private companies, social innovation is ultimately about modifying the roles and functions of society. For product and service innovation, the focus is rather on innovating public offerings by either modifying or developing solutions to respond to the social challenges faced by society.

4.1.4 Societal value as a public value

This perspective focuses on the diverse value(s) the public initiatives create for the public sphere. It brings forward the role that the public sector has in enhancing a broader range of social values, consisting of five subtypes of public value: economic, social and cultural, democratic and political, environmental, and innovation and learning value. The economic value is about entrepreneurship and achieving economic growth, while the social and cultural value is about creating social relations, cultural identity, and joint wellbeing. Democratic and political value is developed through dialogue and local engagement in society, whereas the environmental value is achieved through enhancing sustainable development. Lastly, the innovation and learning value is created by adapting to new learning through experiments and innovative initiatives. Consequently, the public value provides a holistic set of sub-values, that emphasize a long-term perspective in terms of what effect the public initiatives have for upcoming generations.

As a final note, Agger et al. (2018) stress that the four ground values of co-creation have the intention of cross-referencing, meaning that e.g. the indirect outcome of product innovation can lead to the creation of values in other ground values such as democracy and efficiency. Due to the scope of this

thesis, the analysis will nevertheless be made based on the primary value identified in the collaboration, while acknowledging that there might be other values present, without being discussed.

4.2 The Quintuple Helix Model

The Quintuple Helix Model is an innovation model that was introduced in 2010 by Campbell and Carayannis. The model, illustrated in Figure 1, sees the society being constructed out of five subsystems (or helices) which through their aggregated use of knowledge, together shape the social context of the society. Knowledge can, in this case, be defined as: “*the theoretical or practical understanding of a subject*” and is seen as something that is gained either through education or practice (Carayannis & Campbell, 2010, p. 42). The model emphasizes that this ensemble of subsystems can, through their collective knowledge base, promote sustainable development in society. (Carayannis & Campbell, 2010; Carayannis et al., 2012)

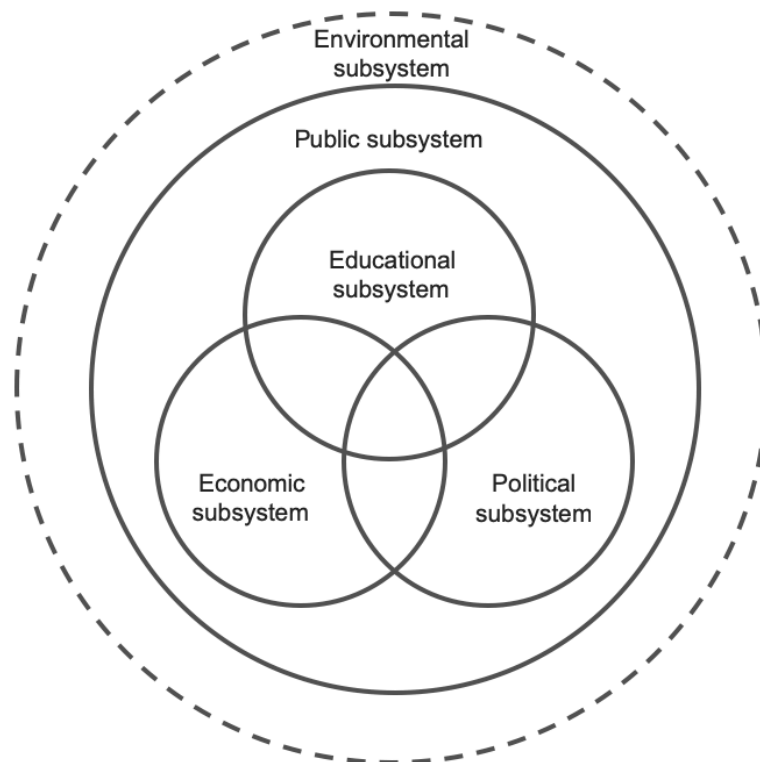


Figure 1: The Quintuple Helix with its five constituting subsystems

The development and structure of The Quintuple Helix Model

The Quintuple Helix can be seen as an extension of helices introduced earlier in literature. The Triple Helix was first introduced by Leydesdorff and Etzkowitz in 1995, where the relationships and interactions between the university, industry, and government were emphasized (Carayannis & Campbell, 2010; Etzkowitz & Leydesdorff, 1995). Seen as interconnected, but separate subsystems (Carayannis et al., 2012); the educational subsystem includes universities, academia, higher education systems, and schools, and is seen as the human capital of the state. The economic subsystem consists of firms and industries and represents the economic capital of a state. The political subsystem is seen as the political and legal capital, which formulates and influence the direction of present and future society and includes ideas, laws, plans, politicians, etc. Each subsystem is consequently perceived to possess unique capital, understood as a base of knowledge.

The helix is built upon a systematic approach on how knowledge, know-how, and innovation are created, meaning that knowledge as a resource gets developed when circulating from subsystem to subsystem (Barth, 2011). When knowledge as input from one subsystem gets combined with another, knowledge-creation presently takes place. By additionally converting knowledge into practice through e.g. problem-solving activities, it gets transformed as output to the society. If the knowledge however does not transform, it will continue to circulate in the form of know-how that works as potential input for the other helices (Carayannis et al., 2012). The Triple Helix Model hence works as a framework suited for promoting knowledge sharing throughout various institutional spheres, argued to be a necessity for innovation, knowledge, and economic development (Carayannis et al., 2012; Etzkowitz & Leydesdorff, 2000).

Building on the Triple Helix Model, the Quintuple Helix Model adds both a fourth and fifth component to the framework: the civil and the environmental society. Initially, the Quadruple Helix Model was introduced by Carayannis and Campbell in 2009, who aimed at filling the gap between state and the public. By stating that innovations cannot reach their full potential without being suited for the demand and needs of the civil society, a subsystem was added and called the *public*. The additional subsystem emphasized that the public stakeholders were important brokers for knowledge production and construction of the public reality (Campbell & Carayannis, 2009). The last subsystem was however first introduced by the same authors in 2010 when the Quintuple Helix Model was created, seeing the natural environment as the fifth element. The natural environment is here defined as an elemental

subsystem that the pre-existing subsystems need to account for to ensure that future generations can live as we do (Barth, 2011; Carayannis & Campbell, 2010). It does so by providing a natural capital, as a sustainable knowledge, that consists of natural resources, plants, and animals. This ultimately provides knowledge about the limitations and possibilities that exist within the natural element (Carayannis & Campbell, 2010). A sustainable development² is seen as an overall concern for the society, and consecutively also for the rest of the underlying subsystems. The Quintuple Helix Model can hence, as Carayannis and colleagues nicely put it, “*represent a suitable model in theory and practice offered to society to understand the link between knowledge and innovation, in order to promote a lasting development*” (Carayannis et al., 2012, p. 2). It can be applied to areas of ecological concern, such as global warming, as a way of stimulating knowledge production and innovation to master these challenges by generating a greater sustainable potential.

4.3 Four roles of citizens

While investigating stakeholders' role in LLs, Nyström and colleagues came in 2014 forward with four main roles of users: the informant, the tester, the contributor, and the co-creator (Nyström et al., 2014). Users are in this thesis modified to the context of ULL and will from here on be referred to as citizens (as done by e.g Juujärvi & Pessa, 2013; Veeckman & van der Graaf, 2015).

The first role is seeing citizens as passive providers of information on citizens' needs and preferences. This means that the informant provides diverse data about citizens' everyday problems and needs, which will further be used by the developers in the innovation process.

The second role is as a tester, who works with experimenting with innovation in a real-life context. The citizens can additionally express their opinions, which may be taken into consideration by the other stakeholders of the lab.

The third role is the role as a contributor, which means that the citizens are together with the other stakeholders cooperating and helping during the development of new solutions. This means that the

² Sustainable development is something that “*meets the needs of the present without compromising the ability of future generations to meet their own needs*” (United Nations, 1987, p. 37)

citizens are actively contributing to forming the product or services with the other stakeholders of the lab.

The fourth role is the role as a co-creator. Citizens are first seen to have the role as co-creators when they are equally participating in co-designing a service, product, or process together with other stakeholders of the lab. This means that all actors are equal in terms of decision-making power, and might at times even be self-organized, leading to innovation completely formed by citizens.

Nyström and colleagues additionally found that in most cases, more than one role is present. It also became evident that the meaning of these roles depended on the individual labs and therefore needed to be understood within their existing contextual frames. With inspiration from these findings, the presented roles are in this thesis being placed in a circular model (cf. Figure 2). The circular shape hence represents the concepts as fluent, since the understanding of the citizens' role may vary depending on the eye of the beholder and can consequently be used as a tool for understanding how citizens' roles are perceived by each stakeholder in the ULL.

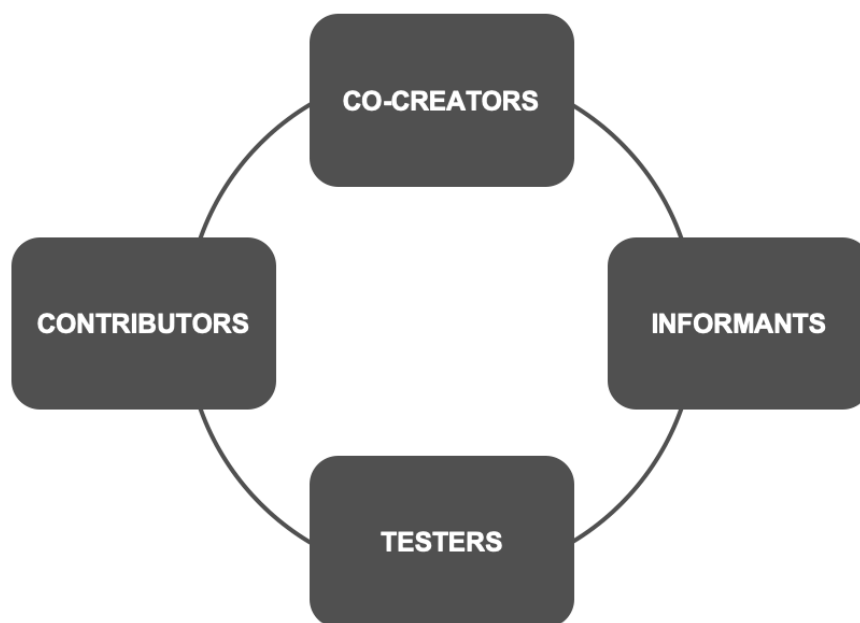


Figure 2: Circular model of four roles of citizens

4.4 Analytical framework

Based on the four values of co-creation, the Quintuple Helix Model, and the four roles of citizens, this collectively leads to the following analytical framework illustrated in Figure 3:

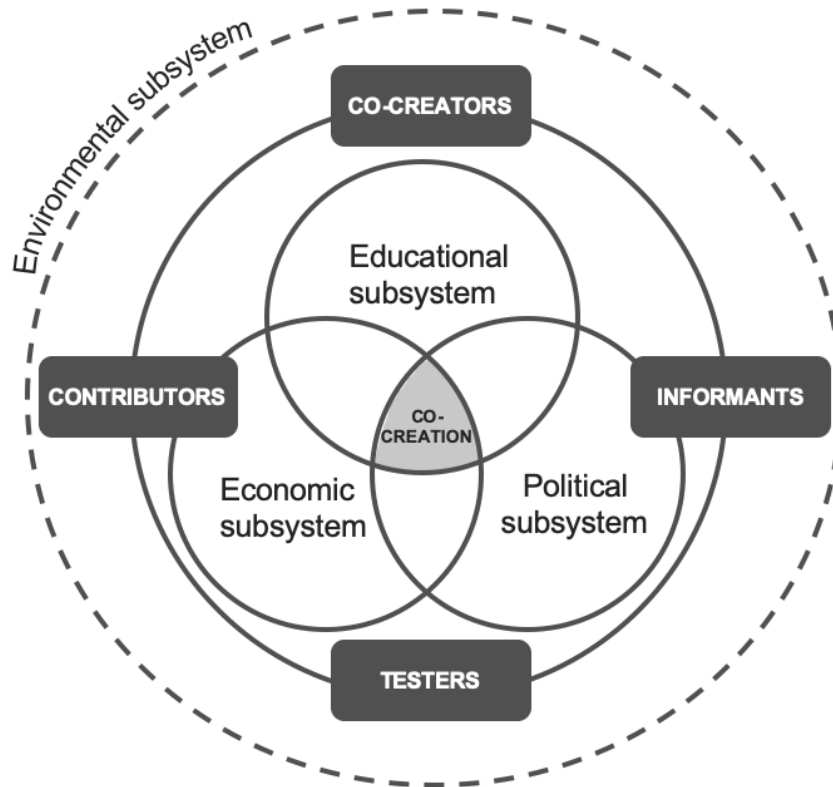


Figure 3: Analytical framework with the three theoretical works combined

The framework will work as an analytical tool used to explore the scope of this thesis' research question. To understand the connections between the research question and the analytical framework, the framework will be used as follows:

The four values of co-creation will be used to understand **why** stakeholders are collaborating. The focus lies on the co-creation value that the ULLs and stakeholders aim to achieve with the collaboration in terms of democratic, quality and efficiency, innovational, and public value. The four values are represented through the use of the word *co-creation* placed at the core of the model.

The Quintuple Helix Model will further set the overall structure of the analytical framework and be used to better understand **how** stakeholders collaborate to enhance knowledge creation throughout the five different subsystems: political, public, educational, environmental, and economic. The focus is on how stakeholders collaborate to promote knowledge sharing across institutional spheres.

The four roles of citizens will additionally be used to understand **what** role citizens are perceived to have in the collaboration by the stakeholders. The focus is hence on what role citizens have among informants, testers, contributors, and co-creators in the collaboration and what value they consequently contribute with. As these roles represent the citizens' contribution to the collaboration, the public subsystem has, in the Quintuple Helix Model, been shifted with the circular model of the four roles of citizens.

Summarized, this constitutes what will be referred to as a why, how, and what-analysis, which will in this thesis be used as a tool to answer the overall research question.

Chapter 5 Analysis

The analysis will be divided into four parts. The first part (Sec. 5.1) will be initialized by introducing the cases of inquiry, meaning the ULLs and their underlying pilot projects and subsystems. The second part (Sec. 5.2) will narrow down the scope, focusing exclusively on the ULLs and their pilots. The TNs of the different ULLs will here be described, before the empirical findings from the TNA will be analyzed using the analytical framework presented above. These findings will further be compared and summarized at the end. In the third part (Sec. 5.3), the same procedure will be conducted for the subsystems including their underlying stakeholders. A comparison between the ULLs with their respective pilots and subsystems will in the fourth and final part (Sec. 5.4) of the analysis be summarized, eventually leading to the overall findings of the analysis.

5.1 Case introduction

The ULLs will first be introduced, followed by an investigation of their underlying pilots. The stakeholders will afterward be introduced using the classifications of the subsystems presented in the theory of the Quintuple Helix Model³ (cf. Sec. 4.2).

5.1.1 Testsite Kongsberg City&Lab

Testsite Kongsberg City&Lab (TKC&L) is a collaboration concept that aims at “*contributing to sustainable urban development through sustainable mobility*” (City&Lab, n.d.-a). The ULL consists of a steering committee and a pilot portfolio run by different operational teams, that through providing test sites and a toolbox of shared experiences, work together to enhance knowledge sharing (City&Lab, n.d.-b). The pilot under investigation is called Autonomous Bus and is owned by the public transport company Brakar. The project was first initiated in 2018 and focuses on first mile/last mile⁴ problems by exploring how autonomous buses can tackle these issues in Kongsberg (Brakar, n.d.). TKC&L consists of five stakeholders within the economic subsystem (Vy, KI, BO, Brakar,

³ Some special cases are here worth mentioning, as they require an explanation for their placement in the given subsystem: Member associations such as Intelligent Transportation Systems Norway (ITS) is considered to be of the educational subsystem, as they work on building up the competence with IKT systems in the mobility sector by enforcing the human capital of the state. Publicly owned companies such as Brakar, Vy, and Ruter, are considered to be part of the economic subsystem since they generate income. The same goes for their employees, e.g. bus operators (BO).

⁴ The first/last mile connection describes the beginning, or the end of a trip made primarily by public transportation (EEA, 2020). It is often referred to as the distance between a commuter’s transit stop and his or her home.

AA), three stakeholders in the political subsystem (KK, SVK, Viken), three in the educational subsystem (SINTEF, ITS, USN), citizens of Kongsberg as passive representatives of the public subsystem and eventual environment as the overarching subsystem.

5.1.2 Smartere Transport i Oslo-regionen

Smartere Transport i Oslo-regionen (STOR) is an alliance between Bymiljøetaten i Oslo kommune (BYM), Statens vegvesen (SVO), and Ruter, aiming at both improving current and innovate new mobility solutions for providing “*good and seamless mobility services for the future*” (Statens vegvesen, n.d.). The collaboration goes under the umbrella of the STOR initiative, where each member organization has responsibility and ownership for separate mobility pilots (Statens vegvesen, 2020). The pilot examined in this thesis is named Combined Mobility and is owned by the public transport company Ruter. The pilot was launched in 2018 and works with developing a Mobility as a Service (MaaS)⁵ solution for the citizens of Oslo (UIS Innovation, n.d.). STOR consists of two stakeholders within the economic subsystem (R1, R2), four stakeholders in the political subsystem (SVO, BYM1-BYM3), none in the educational subsystem, citizens of Oslo as passive representatives of the public subsystem, and eventually the environment subsystem.

5.1.3 Smartere Transport Bodø

Smartere Transport Bodø (STB) is a partnership originating from a competition in 2018, where Avinor, Telenor, Nordland fylkeskommune (NFK), and Bodø kommune (BK), together won 50 million NOK to create a foundation that strives towards “*reducing climate emission by changing travel habits*” (Smartere Transport Bodø, n.d.). In the same way as STOR, STB can be seen as an umbrella concept where each participating organization has responsibility for separate pilots. The pilot under investigation takes place in CityLab Bodø and is referred to as the Kobla Pilot. By creating an application that tracks citizens' travel habits in terms of CO₂ emission, time, and cost, the pilot strives to change the citizens' travel habits into being more environmentally friendly (Smartere Transport Bodø, 2019). STB is represented by one stakeholder within the economic subsystem (Kobla), three stakeholders in the political subsystem (NFK1, NFK2, BK), one in the educational subsystem (Nord), five citizens of Bodø as participants in the workshop presenting the public subsystem (C1-C5), and eventually the environment as the final subsystem.

⁵ MaaS is about “*merging different modes of transport into one service to suit the mobility needs of individual customers*” (EEA, 2020, p. 5)

In summary, the relationship between ULLs, pilots, and stakeholders is presented in Figure 4 below. Please see Table 1 for the description of the stakeholders.

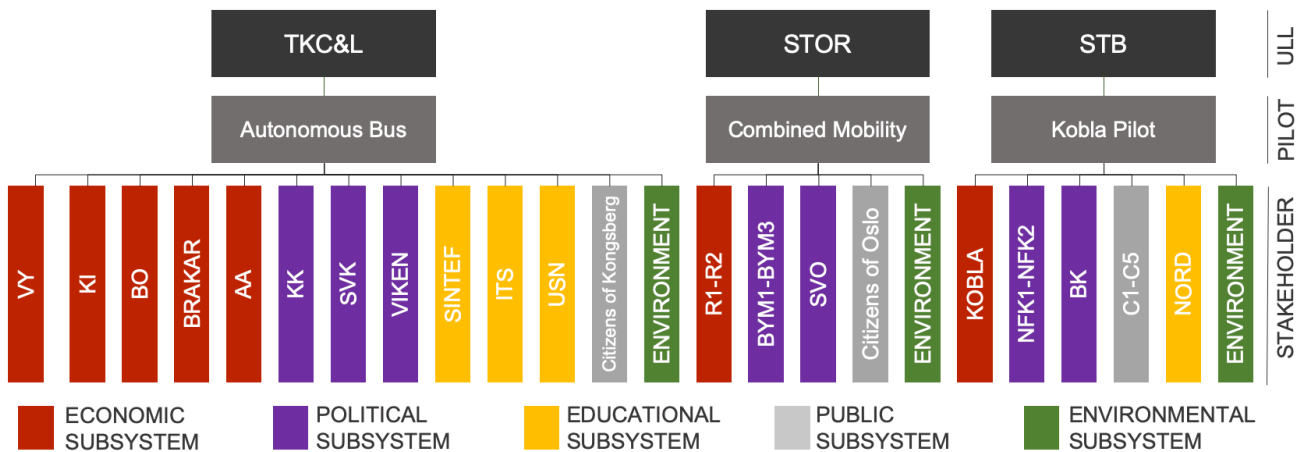


Figure 4: The relationship between ULLs, pilots, and stakeholders. The colors in the figure indicate the different subsystems under which the stakeholders belong.

5.2 Analysis of ULL and underlying pilots

Following the case introduction presented above in Sec. 5.1, the TNs of the different ULLs with their underlying pilots will now be described. Afterward, the empirical findings from the TNA will be analyzed using the analytical framework. The findings will finally be compared and summarized at the end of the section.

5.2.1 The thematic networks of ULLs and their pilots

The content of each TN will briefly be explained by its global and organizing themes, where the names of the global themes will be presented in **bold**, and the organizing themes in *italics*. The relation between global themes and the ULLs is further visualized in Figure 5. For a full version of the TNs with the basic themes included, please see [Appendix H](#).

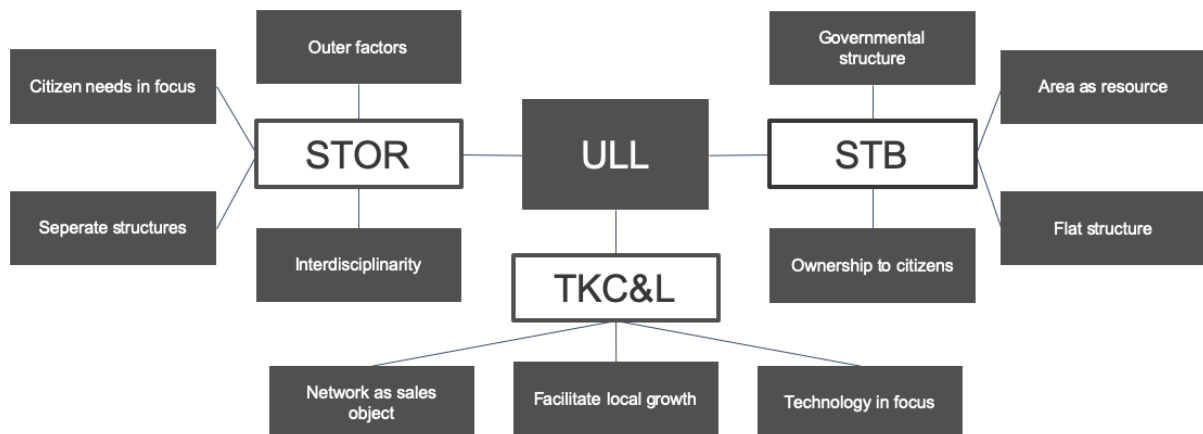


Figure 5: Overview of global themes for the ULLs

5.2.1.1 TKC&L

Network as sales object is about how the network works as an entry point for collective knowledge sharing. It consists of the organizing themes *Win-Win collaboration*, *Together for change*, *Dynamic network*, and *Collective decision making*. Together they constitute the essence of the organizing structure of the ULL and the building blocks that make TKC&L work as a dynamic platform for knowledge sharing. **Facilitate local growth** covers the essence of the network and its underlying pilots. The global themes are constructed by *Driving forces* and *Sustainable business model*. Collectively they represent the overall goal of stimulating local growth, where sustainable business models are seen as the foundation for further work. **Technology in focus** is a statement that builds on technology considered as the main area of interest, and the global theme is constituted of *Technology determines usability*, *Citizen involvement as real-life testing*, *Citizens as feedback providers of attitudes*, *Split responsibility*, and *Citizen involvement not prioritized*. Together they cover thoughts on citizen involvement and its importance for developing proper technological solutions.

5.2.1.2 STOR

Separate structures concern the overall structure of the network and how the autonomous structures between the stakeholders lead to both positive and negative outcomes. It is built upon *Decide structure themselves*, *Meets for updates*, *No common platform*, *Time and prioritizing*, and *Diverse meaning of value of network*. Together they cover elements related to having a separate structure. **Outer factors** cover factors which influence both the ULL, but also the pilot in their operating activities. It

consists of *Economics sets frame* and *External factors* and covers issues within hierarchical frames and aspects that need to be considered when working with development in the mobility sector. **Inter-disciplinarity** deals with the reason for participating in the collaboration. It is built upon *Door opener*, *New competence*, and *Build position*. Together they represent what different stakeholders benefit from by opening external silos. **Citizen needs in focus** concern the stakeholders' view on citizens and how to involve them in the mobility sector. Through *Citizens as creators*, *Detailed methods*, and *Citizen involvement require experience*, they represent how citizens are included and taken care of in the pilot.

5.2.1.3 STB

Governmental structure covers elements that stem from the public sector which influence the collaboration. The global theme is constructed of *Financing*, *Framing collaboration*, *Culture*, and *Common goals*. Together they represent how the public sector affects further development and collaboration between the involved stakeholders. **Area as resource** primarily covers the motivations for stakeholders to participate in the Kobla Pilot and is built upon *Testers and feedback for innovation*, *Motivated citizens*, and *More experience with citizen involvement*. Together they cover the intentions for participating in the collaboration. **Flat structure** is about factors that influence the collaboration in terms of choice of structure. It is constituted by *Only a part of daily assignments* and *Trust*, which all are considered underlying elements affecting the overall collaboration. **Ownership to citizens** is about thoughts on the role of citizens and challenges related to their involvement. The organizing themes *Power to citizens*, *Citizens needs to learn how to participate*, and *Economy vs citizens* represent critical factors that influence citizen involvement and reasons to provide citizens with the necessary decision-making power.

5.2.2 The why, how, what of the ULLs and their pilots

In the following section, the TNs will be further analyzed using the analytical framework presented in Sec. 4.4. This will be done respectively for each ULL with its corresponding pilot, where the analysis will first analyze TKC&L (Sec. 5.2.2.1), followed by STOR (Sec. 5.2.2.2) and STB (Sec. 5.2.2.3). The overall findings will then be summarized with a comparison between the ULLs (Sec. 5.2.2.4). The analysis includes excerpts from the interviews, where the complete interviews can be found in [Appendix C](#).

5.2.2.1 TKC&L

Why do they collaborate in TKC&L?

Findings from the global theme **Facilitating local growth** show that urban growth and sustainable business models are seen to be the primary focus areas for why stakeholders of TKC&L want to collaborate. These findings get further supported by the underlying organizing theme *Sustainable Business model*, where it becomes clear that TKC&L intends to make it possible for the participating stakeholders to finance and maintain projects over an extended period:

“[...] we also have a wish that Testsite Kongsberg is going to be attractive for everything from private companies to public institutions to be able to test different things in such an arena. And then you have to have someone who facilitates it and then we have to establish a business model for it, so that we get a certain revenue stream in order to have resources available for it to be attractive, also for the external actors to come and test their solutions here” (KI, p. 1)

The statement “*have a wish*” can further imply that this is something they want to achieve in the future, but that is yet not fulfilled. The ULL can hence be seen as a means for building a business model that is attractive to “*everything from private companies to public institutions*”, meaning both economically profitable and socially acceptable. The sustainable business model is consequently understood as a model that is suited for multiple stakeholders. Thus, seeking to benefit various stakeholders, TKC&L can be perceived as an initiative for challenging the pre-existing relationship between political and private stakeholders. In this regard, TKC&L ultimately aims at achieving social innovation by challenging existing forms of collaboration.

This argumentation gets further supported by the organizing theme *Win-Win collaboration*, which represents the foundation of the relationships and builds on the fact that everyone ultimately gains something from the lab. By *win-win*, it becomes evident that through collectively joining forces, the stakeholders can together challenge existing structures within the mobility sector (AA, p. 3; KK, p. 4, 10). By cooperatively building a position in the mobility market that benefits all partners (AA, p. 1, 3), this can, as explained by Vy, potentially gain new customers and scalability into further markets:

“No... I think the motivation here is... the municipality wants this to work. They find it exciting because this is business development from Kongsberg that they would like to show off to the outside world. The same goes for Viken really. And for our part, we are very interested in using this as a showcase, so that we can gain competence in a way that when others demand this type of service, can we hopefully be

competitive to make a tender... and Applied wants this to work, so it is... there have been rather natural common goals in all this” (Vy, p. 10)

Having a collective goal of showing off Kongsberg to the rest of the world by using it as a “*showcase*”, demonstrates that it can in the long run benefit the society in terms of economic income for both public and private organizations. By challenging existing collaboration structures, the underlying motivation may, as a result, appear to be connected to achieving economic gains. This is further supported by findings from the organizing theme *Technology determines usability*, where the goal of the Autonomous Bus pilot may eventually be to avoid the need of a bus driver (KI, p. 4; KK, p. 7; Vy, p. 10). Consequently, as the overall cost of running the service will decrease, this can again benefit by “*lowering the cost for the users*” (KI, p. 4). With that said, this motivation can also be argued to rather be a long-term goal, as currently, the costs of running the pilot are much higher than the overall received revenue stream (Vy, p. 10). The aim of the pilot can thus be, eventually, to achieve value in terms of efficiency and cheaper public services.

How do stakeholders of TKC&L collaborate?

From the organizing theme *Together for change*, findings show that collaboration is perceived as necessary if the participating stakeholders want to find innovative solutions within the mobility sector (Viken, p. 4, 7-8). Thus, to achieve success, they need to acknowledge that interdisciplinarity is a strength and that they must collaborate through building on each other's expertise and strengths (Vy, p. 9; Viken, p. 4; SVK; p. 3, AA, p. 6, KK, p. 2). By doing so, the stakeholders can cover each other's blind spots and steer the development together by collectively agreed goals:

“Innovation, then you have to work together ... It is, in a way, one of the prerequisites for innovation. I also think that perhaps one of the strengths of City&Lab is that you have set the framework for collaboration across actors in the collaboration at an early stage. (...) This somehow does that you lose some of those “blind spots” that you often get when you just come from your standpoint” (SVK, p. 2)

“*Blind spots*” can, in this case, be seen as the different subsystems’ knowledge gaps or missing perspectives on specific concerns. Through interacting with other stakeholders of TKC&L, these can be filled by building on each stakeholders’ unique know-how. Collectively agreed goals can hence be developed to make sure that the existing knowledge base of the different subsystems is evened out and that they together achieve a holistic understanding of what the collective aim is for the collaboration.

Additional modes for intensifying such knowledge circulation can be found through the organizing theme *Dynamic network*, where findings show that TKC&L is considered a dynamic network shaped by a flat, hierarchical structure (SVK, p. 4). Explained by KI, the ULL takes shape through a steering committee, which works as a gathering point where new concepts can be linked and further transformed into pilots:

“If you take all the actors who are interested in this domain ... are coordinated and through that, if a project evolves, then the other stakeholders can join and strengthen that project by seeing how they can contribute [...] so that we are a group that examines: How can we with our networks, from each of our angle, join and contribute to success in this domain?” (KI, p. 3)

The statement “*from each of our angle*” hence support findings related to how each subsystem possess important knowledge in each of their existing knowledge bases. Combined, these can help contribute to finding the best possible outcomes. Opening their network can, in other words, promote knowledge sharing through the various institutional spheres and conclusively allow for more knowledge circulation between the subsystems. Findings through the organizing theme *Collective decision making*, however, suggest that the dynamic relationship may lead to potential challenges in terms of elements such as trust, cross-sector understanding, and not being used to sharing knowledge (KI, p. 7-8; KK, p. 2). As these challenges can be seen as barriers to knowledge sharing, they need to be treated by humbleness and understanding (AA, p. 3).

The organizing theme *Driving forces* additionally shows that there are essential key stakeholders that can be seen to be responsible for the existence of TKC&L. Through their strong, personal willpower and motivation, they strive for contributing to the progression of local urban development (KK, p. 7; SVK, p. 4) and the development of autonomous vehicles (AA, p. 8). The municipally can be considered as such a key driver:

“We were all around Norway and told about the national test arena and tried to get partners to join. And that is where the sharing philosophy comes in. If you want to be good, you need to get more people with you.” (KK, p. 2)

The statement “*If you want to be good, you need to get more people with you*”, can in this context represent the core of the expressed “*sharing philosophy*”, which is described several times by other stakeholders of the ULL as the “*sharing culture*” (KI, p. 7; USN, p. 6; Viken, p. 7). By adding more

people to the ULL, this can lead to more unique and diverse knowledge circulating through the subsystems. Building a collective trust that enhances knowledge sharing across the institutional spheres ultimately seems to be of importance (KI, p. 4, 7; KK, p. 3-6; SVK, p. 6; USN, p. 3, 7). By working towards creating a culture that compliments this circulation, the knowledge can more easily be transferred into problem-solving processes focusing on finding e.g. sustainable business models. The municipality can consequently be argued to be acting as a facilitator across the subsystems that are working with promoting knowledge sharing for enhancing collaborative innovation and sustainable mobility solutions.

In terms of bringing the citizens into the collaboration, findings from the organizing theme *Split responsibility* show that there are diverse views concerning who is responsible for including the citizens. Some stress that since the political stakeholders have a social responsibility to include the citizens in the public space, this is something they must do (KI, p. 5; KK, p. 7). It is further claimed that TKC&L is not currently actively reaching out to the citizens and that the operating teams in the pilots should be the ones responsible for including them in the process (USN, p. 5). This responsibility role of the pilots is additionally supported by other stakeholders of TKC&L (AA, p. 4; Brakar, p. 3; SVK, p. 6; Vy, p. 3). Bus operators are, through their daily contact with citizens, important stakeholders for the involvement, and can through transferring citizen feedback back to the operational stakeholders in the pilot, consequently, also be an important connector between the public subsystem and the rest of the stakeholders (BO, p. 2; Vy, p. 4). Recognizing the operational team as responsible for the involvement also correlates with findings from the organizing theme *Citizen involvement not prioritized*, where interviewees confirm that TKC&L, in the past years, has mostly concentrated on building up a cross-sector collaboration arena (SVK, p. 1). Consequently, involvement through TKC&L has mainly concerned bridging the economic, political, and educational subsystems, whereby the sustainable subsystem has been incorporated by having a focus on finding sustainable mobility solutions. The relationship with the public subsystem has, however, not been prioritized in TKC&L and the citizens are therefore argued not to be equally represented in the ULL.

What role do citizens have in TKC&L?

Findings from the organizing theme *Citizen involvement as real-life testing* show that by testing the autonomous busses in real-life conditions, this can provide valuable knowledge about how the buses operate with other road users and vehicles:

“...if you ask me [about the main purpose of the project] then it is to try out new technology and self-driving technology in an urban environment that is not in a laboratory. This are actual operations. In the city. It is to test how the technology works in urban environments like other buses and together with buses, but also to involve the users, i.e. the customers, to see how they experience the technology and how the self-driving buses work in the public transport system along with others” (Brakar, p. 2)

This means that citizens can “*experience the technology*”, both through being passengers on the bus and as being a part of the traffic image as road users. When citizens are customers of the service, they can actively experience how the bus works upfront, and as road users, they can passively experience how to manure around the autonomous bus in the traffic circumstances. As such, citizen involvement can take place when citizens are allowed to test the product in live traffic. Findings through the organizing theme *Citizens as feedback providers of attitudes*, however, show that the stakeholders of TKC&L are positive towards having a dialog and received feedback from citizens (AA, p. 6; Brakar, p. 4, 5; KK, p. 9; Vy, p. 7). Citizens can also be seen as providers of knowledge, by providing feedback on what they think of the service. Conclusively, this can provide value for TKC&L in the sense that they can see “*how the self-driving busses work in the public transportation system*”, working as a piece in the overall traffic picture. In these terms, the role of the citizens can hence be both active and passive testers of the innovation in a real-life context.

5.2.2.2 STOR

Why do they collaborate in STOR?

Through the organizing theme *Citizen involvement require experience*, it becomes clear that gaining experience with citizen involvement is a necessity for understanding citizen needs (R1, p. 8-9; R2, p. 10; SVO, p. 8). Without having the right expertise, this is argued to create the risk of applying existing or new technology without actually solving the underlying problems (R1, p. 11; SVO, p. 4-5). Eager to find user-friendly solutions in the mobility sector, SVO (p. 9) and BYM are actively participating in STOR to gain the necessary competence needed to be able to involve and understand citizens’ in current and future projects:

“It is about making it sit on the backbone on how to work with this [citizen involvement]. And that is part of the learning for us in the organizations and ... not only cognitively understand what it is, but actually understanding what it means in practice” (BYM2, p. 13)

It can further imply that the statement “*making it sit on the backbone*” implies more than just understanding what citizen involvement is about and that it rather concerns incorporating a new habitual way of working. Since SVO and BYM are both within the political subsystem, an attempt of changing existing governmental working habits is consequentially argued to be present. Through gaining a new mentality that sees citizens as active participants, they are by challenging the present cultural identity of the political subsystem, ultimately aiming at achieving social innovation.

Findings from the organizing theme *Diverse meaning of value of network*, however, show that the stakeholders of STOR have different underlying intentions of being a part of the ULL (BYM1, p. 10; BYM2, p. 10; R1, p. 4). Through findings from the organizing theme *Build position*, it becomes clear that, by collaborating with service providers and third-party-actors, Ruter attempts to build a position within the mobility sector (R1, p. 4). Combined Mobility can hence be argued to be an initiative to help Ruter build a position as a public transport company that works to provide citizens with the best solutions for current and future demands:

“But from Ruter's part, it [the focus of collaboration] is exploring Combined Mobility under the umbrella of a public service provider because of [...] the public transport and in a way the mass mobility, a type of mobility that ensures that a large part of the population has low average travel times, is, after all, a part of Ruter's social mission” (R1, p. 4)

By providing “*low average travel times*” the statement implies that good services to the citizens are fulfilled by achieving an efficient service characterized by high quality. As Ruter additionally operates “*under the umbrella of a public service provider*”, it can be stated that by combining resources of both the citizens and the government, the pilot aims to customize a MaaS-service that fits both needs. Consequently, the goal of the collaboration can be argued to primarily concern optimizing both current and future mobility solutions to get better and cheaper public services, so that more people can use public transport and leave their private cars at home.

How do stakeholders of STOR collaborate?

STOR is through the organizing theme *Decide structure themselves*, seen to be composed of separate, interdisciplinary teams responsible for individual pilots (BYM1, p. 2; R2, p. 5; SVO, p. 3). To maintain and qualify knowledge sharing, findings from the organizing theme *Meets for updates*, shows that the contact persons from the different organizations meet regularly to give status updates and share learning experiences (BYM1, p. 5; R2, p. 7; SVO, p. 1). STOR can, therefore, be seen to operate

as a connecting force across subsystems, getting its input of knowledge based on what the separate teams report. These findings hence show that since STOR's primary source of knowledge comes from the operational area of the pilots, the teams decide what knowledge becomes circulated or not. The teams can ultimately possess the knowledge creating power in the collaboration.

Through the organizing theme *Door opener*, it becomes apparent that STOR sees its interdisciplinary collaboration as a door opener to organizations that otherwise would be difficult to approach: “*The big advantage of the STOR project is that we have an entrance ticket to the other organizations*” (BYM2, p. 8). STOR consequently works as an “*entrance ticket*” which allows the stakeholders to gain unique knowledge from the participating organizations. By operating as a door opener, STOR connects different subsystems by crossing pre-existing organizational boundaries and opening up for the external silos. This makes the participating stakeholders gain access to cross-sector knowledge and knowledge transfers that otherwise would be difficult. Through the organizing theme *New Competence*, it additionally becomes evident that learning more about citizen involvement and sharing this throughout the organization is considered important (BYM2, p. 1; SVO, p. 1). Participating in STOR for connecting newly acquired information and knowledge to the rest of the organization, therefore seems to be one of the primary drivers of the collaboration.

Nonetheless, through the organizing theme *Citizen involvement require experience*, findings suggest that it often takes time to understand citizen involvement in terms of what it takes to ask the right questions (R1, p. 8) and how to process insights from citizens (R2, p. 2; SVO, p. 6). Stakeholders' experience with citizen involvement from previous pilots will hence influence their ability to understand citizens' needs and underlying problems, indicating that experience is needed to correctly understand their needs. This statement is furthermore supported through findings from the organizing theme *Detailed methods*, where specific methods, such as a detailed segmentation regime (R2, p. 15) or design thinking (BYM3, p. 6; SVO, p. 2) are often used to gain insight. To qualify that the methods are correctly used, external consultants are sometimes employed e.g. as BYM3. The differences in the subsystems' existing knowledge base in terms of citizen involvement is hence argued to set the basis for what value the citizens eventually can provide. The experience with citizen involvement may vary, so stakeholders that are possessing extensive knowledge about how to include citizens are thus of key importance for how much value the ULL can gain from the citizens.

Findings from the organizing theme *Time and prioritizing*, further show that the separate structures that STOR operates by at times lead to difficulties such as prioritization dilemmas and time management issues (BYM1, p. 4; BYM3, p. 13; R2, p.7), making it necessary to do a “*small juggling job and clarification of expectations between the organizations*” (BYM2, p. 4). The time problematics further lead to a continuous challenge of figuring out the best balance between sharing information and working efficiently (SVO, p. 6). Additional challenges are also found through the organizing theme *No common platform*, where it becomes clear that STOR currently does not possess a shared communication and documentation platform (BYM1-BYM3, p. 4). Extra efforts to make sure that everyone is “*on the same page*” (SVO, p. 1) are thus necessary to make sure that everyone is contributing to reaching the ULL’s full potential. Not being able to find this balance can limit the potential knowledge transfers between the subsystems. Further, through the organizing theme, *Economics sets frame*, it becomes clear that public budgets are considered essential for development, shaping the collaboration’s potential (BYM1; p. 5; R1, p. 6; R2, p. 11). Factors such as legal concerns are additionally argued through the organizing theme *External factors*, to create challenges due to unpredicted delays (R1, p. 7; R2, p. 1). Based on these findings, it may thus be argued that the public sector, both in terms of legal restrictions and economical limitations, has the power to influence the direction and development of the ULL. The political subsystem can hence be seen as an impactful subsystem framing the knowledge creating potential.

What role do citizens have in STOR?

The main focus of STOR is through the global theme **Citizen needs in focus**, argued to lie on citizen needs since these are seen as essential for developing solutions within the mobility sector (BYM3, p. 11; R1, p. 10; R2, p. 10; SVO, p. 7). Further supported by the findings from the underlying organizing theme *Citizens as creators*, it becomes apparent that both citizens’ knowledge and needs are forming the services:

“I think that the essence of it [citizen involvement] is that the services are built and based on what citizens and users need [...] And then it is important that the citizens or those living in Oslo, those who use these services, have the opportunity to participate in sharing their needs and sharing their knowledge and local knowledge to make the services the best possible” (R2, p. 10)

The statement “*built and based on what citizens and users need*” implies that the development is based on the needs of the citizens, and the aim of the innovation is, as a result, to develop mobility solutions based on these identified needs. Citizens’ role is hence considered to be an active partner

that, through their needs and knowledge, helps to “*make the services the best possible*”. Citizens are consequently participating in making the service, stimulating a relationship where the citizens are perceived to be co-creators. It can thus be argued that the role of citizens is contributors, in the way that citizens' needs are seen as setting the starting point for further development, and the development takes place with the users. The case of citizens playing the role of co-creator is therefore not apparent, as this is first perceived to be apparent when “*opportunities created by user-driven innovations are exploited primarily by users*” (Nyström et al., 2014, p. 487).

5.2.2.3 STB

Why do they collaborate in STB?

Through the global theme **Area as a resource**, findings show that Bodø municipality can gain experience of how to sufficiently reach and communicate with citizens in pilots by providing Bodø city as a test arena (BK, p. 8-9). Hence, as confirmed by findings from the organizing theme *More experience with citizen involvement*, the collaborators can also attain new knowledge of how to work with citizens (BK, p. 9; NFK1, p. 5). Findings additionally show that the motivation to gain such skills is specially raised by political stakeholders. Expressed through the organizing theme *Culture*, it shows that conducting a pilot that enhance a test and fail-approach is currently not common practice in the public sector:

“It is clear that it [piloting] challenges us both as an organization, but also the people who work with these concepts. And with pilots and this kind of thing, it also becomes very visible because before it was really quite simple” (NFK2, p.9)

The statement “*before it was really quite simple*” is furthermore related to the past governmental practices that are now being challenged with new ways of operating, ultimately affecting both the governmental organization and its employees as human beings. Supported by the motivation to gain such a new mindset, the collaboration aims to challenge existing roles in the public sector, drawing lines to the goal of achieving social innovation.

Reason for more specifically collaborating with the company Kobla can, however, be expressed through the organizing theme *Common goals*. Here it becomes clear that Kobla's business idea is almost perfectly aligned with the overall purpose of the STB-consultation (BK, p. 8; NFK1, p. 5). By partnering up with Kobla, STB can, together through their juxtaposed visions, challenge the existing structures of political-private relationships. Through their participation in the partnership, Kobla also

gets the opportunity to test the application on the citizens of Bodø and hence work with their mission of making citizens' travel habits more sustainable (Kobla, p. 7). Consequently, Kobla work towards achieving value by altering their application to meet social challenges within the mobility sector.

With that said, it further becomes evident through findings from the global theme **Ownership to citizens** that the overarching, but also distant goal for STB, is to provide power to citizens. Supported by the organizing theme with the same name, this gets backed up by the municipally stating that the citizens need to feel that they are heard:

“I think the ByLab is rather meant for the municipality part, so on the social level with... how do you create this by putting people at the center? Engagement. [...] Of course, you give input when someone is asking if they can demolish your house, right, so: How about this distinguishing between what are direct influencing factors and what is this participation in the bigger picture, where you see your imprint?”
(BK, p. 14)

“*Imprint*” can, in this case, be seen as a way to describe the outcome of citizen involvement, in a way that citizens ultimately feel that their opinions matter and their inputs are of real value. By having open workshops, empowerment seems to occur when the Kobla Pilot allows citizens to exert influence. The excitement for contributing is moreover confirmed by the organizing theme *Motivated citizens*, showing that citizens were happy to participate in the workshop, since they felt that their inputs were useful (C3, p. 1; C4, p. 1). Through constructing a belief that their opinions were taken seriously; trust is consequently argued to develop. By acting together, Kobla Pilot also builds on enhancing social relations and collective competences as social capital to achieve agreed outcomes. This way of seeing citizens' role in the development can hence be linked to elements of empowerment, trust, social capital, and sequentially to democratic value.

How do stakeholders of STB collaborate?

Expressed through the global theme **Flat structure**, the form of the collaboration can be characterized by a horizontal structure that enhances the philosophy of learning by doing (NFK1, p. 1). With each stakeholder having an area of responsibility that is not restricted by a hierarchical placement, the flat structure can consequently provide a framework that makes the collaboration easy to deal with and act from (BK, p. 11). With their focus on testing and learning, the flat structure is suitable for knowledge sharing. To successfully maintain this collaborative approach, findings from the organizing theme *Trust* show that trust is seen as the cornerstone of the collaboration. The concept of trust is

in this case represented as the guarantee that the partner members will, when necessary, be informed and invited into discussions concerning their areas of responsibility. This means that the stakeholders do not have to involve everyone for every collective decision, which as a result, can make them work more efficiently (BK, p. 12). With that being said since not everyone is represented at every decision, the knowledge creation across helices may as a consequence be bound. This subsequently means that not all subsystems will be able to exploit all of the potentials that the ULL currently possesses.

Another risk with the collaboration is expressed through the organizing theme *Only a part of daily assignments*, where it becomes evident that both STB and the Kobla Pilot are only a part of the stakeholders' daily duties (Kobla, p. 3, NFK1, p. 13, NFK2, p. 13). This affects tasks, such as involving citizens, which can be viewed as an unclear responsibility area (BK, p. 13). This may also lead to finalizing at the last minute (Kobla, p. 7). It additionally appears that lack of time is generally a problem for the stakeholders involved:

“In a hectic everyday life, then there is this to plan... to get good enough plans and get participants. That is arguably one of the most difficult parts. Getting people to set aside time for this” (NFK1, p. 5)

Involving stakeholders can consequently be the most challenging part of the collaboration. The statement *“Getting people to set aside time for this”* further implies that stakeholders must somehow be convinced by the value that they will gain by participating in such initiatives. This is additionally supported by the organizing theme *Citizens need to learn how to participate*, which shows that citizens often lack experience with seeing how their role benefits urban development projects (BK, p. 16, Nord, p. 4). As a result, the representation of the community will not be representative, which limits the democratizing outcome (BK, p. 5). As the citizens might not be aware of how much power, and thus also responsibility they have in developing products (NFK1, p. 9), it is emphasized that they need to learn how to participate. The current knowledge base in each of these subsystems can consistently be argued to be limited because they do not see the value of such initiatives or because they have other matters to do that they value more. These findings, therefore, shows that both citizens as participants and other stakeholders in the remaining subsystems, may not value ULL initiatives to the necessary extent. This ultimately constitutes a barrier to the opportunities inherent in the cooperation.

The governmental structure is considered to be an influential factor impacting STB's knowledge creating potential. This is confirmed through the organizing theme *Framing collaboration*, where findings reveal that both legal restrictions and public budgets appear to influence the development of the pilot and ULL (Kobla, p. 3; NFK2, p. 12; Nord, p. 4). Supported by the organizing theme *Financing*, it becomes apparent that if it was not for the competition and the fact that STB won 50 million, the current mobility projects within STB would not have taken place (NFK1, p. 2-3). The scope of the collaboration is hence shown to be shaped by economic and juridical factors. As such, the political subsystem can conclusively be seen to possess the power to influence the other subsystems, leading to an asymmetrical collaboration where certain stakeholders need to be considered more than others. The collaboration between subsystems can, as a result, seem colored by the political subsystem's economy and jurisdictions. This ultimately sets the framework for how much knowledge can be gained in the collaboration. Expressed by the organizing theme *Economy vs citizens*, represented as the dilemma between economy and involvement, this seems to influence to what degree the public subsystem can get involved in the collaboration. Finding a balance between saving money and providing extra value to the citizens seems thus to be a solution:

“Has it created a bigger problem, this new solution, or has it obtained that we have now a better service? We may also save some money. It is an important element here ... and that the customer finally gets a better product” (NFK1, p.10)

Gaining an economically and socially beneficial outcome thus appears to shape the direction of the development, where the optimal goal is at the same time to save money.

What role do citizens have in STB?

Findings from the organizing theme *Testers and feedback for innovation* show that citizens are encouraged through the workshop to share their thoughts on technical features and problems they experience throughout the testing period (Kobla, p. 7). Although emphasized that such feedback often can be challenging to handle, it becomes clear that citizens will eventually contribute to the better outcome:

“It [the feedback] might mean that we are drowning and being beaten down, but it can also mean that we make something really good. It can mean that we create something that is bad-bad-bad, and in the end just: aha! So, it was very good because the sum of all the tough feedback eventually turns into something really good” (Kobla, p. 7)

By the use of the argument “*the sum of the tough feedback eventually turns into something good*”, it is claimed that the citizens are not only perceived as passive testers of the technology but rather as active participants that contribute to the creation of the application. This is further supported through the organizing theme *Motivated citizens*, where citizens express excitement towards their feedback being taken into consideration:

“Afterward, we had a good session at the workshop, where we could report back. I see they have done a lot of good, or a lot of what we came up with that they have changed. So that is really good” (C3, p. 1)

This excitement is reinforced by another citizen, stating that: “*it actually becomes very fun to participate when everything is registered*” (C4, p. 1). The statement “*when everything is registered*” additionally indicates that the citizens acknowledge that the application is not a finished product and that it might take time for the modifications to be made. Citizens can consequently, both by themselves and with Kobla, be seen as contributors in the way that they provide valuable feedback to a developing service, which ultimately gives enhanced mobility solutions.

5.2.2.4 Summary of the why, how, what for the ULLs and their pilots

In the analysis, it becomes clear that most ULLs have a willingness to challenge social frameworks by focusing on new ways to collaborate. The emphasis on where to start tends, however, to be divided into the focus on changing the collaboration models between academic, private, and political stakeholders (TKC&L) and the role of citizens (STOR, STB). What they have in common is that they want to challenge existing forms of cooperation in the public sector by strengthening a collaboration consisting of a diverse range of stakeholders. Achieving social innovation can thus be the overriding goal of the ULLs. Through enhancing social innovation, this may also eventually lead to an increase in democratic value (STB). All pilots also appear to be focusing on product or service innovation, where the overall goal of the Autonomous Bus and Combined Mobility seems to be getting ‘more for less’ by increasing efficiency and reducing costs. For Kobla Pilot and its mission to make citizens’ travel habits more sustainable, the intention of the innovation is rather to modify their application to meet social challenges in the mobility sector.

Since all ULLs operate under a board and a mandate (BST, STOR, TKC&L), the structure of the pilots is characterized by common traits. It becomes clear that this is where they meet to discuss the status of the pilots, while the primary idea generation is manifested in the operational aspect of the

pilots, where smaller teams work closely together. Consequently, ULLs operates as a connecting force across subsystems, which get their input of knowledge based on what the operational teams report. Building competence by focusing on empowering each other's strengths is further seen as necessary for achieving the set of objectives for the collaboration. Understanding each other's competence is hence key to a better understanding of how they can contribute to each other. Sharing knowledge that others can benefit from is therefore considered as an important aspect of the collaboration. Establishing a collaboration based on seeing each subsystem's unique competence also facilitates the transfer of unique knowledge from subsystem to subsystem. Accordingly, this can be argued to set the framework for the ULLs' potential for establishing a knowledge capital that, combined, promotes sustainable development in society. Trust is subsequently important, either to ensure that the stakeholders are included when needed (STB) or to create a "*sharing culture*" that enhances knowledge sharing (TKC&L). Additional factors that influence the ULLs' ability to succeed are time management and communication, creating restrictions for the potential knowledge flow across the subsystems.

With regards to the responsibility of involving citizens, this appears however unclear. For TKC&L, the responsible stakeholders turn out to be the governmental stakeholders and the operational team that runs the pilots. For the other ULLs, the lack of having a clear responsibility role can be caused by a shortage of knowledge about how to involve the citizens and what methods they should use. Gaining the right experience thus appears to be the solution (STOR), together with convincing citizens of the value of participating in such initiatives (STB). Others again seem rather focused on the importance of inclusion of the other subsystems, than the citizens in particular (STOR). However, a common feature includes the current risk that the citizens may not be represented to the same extent as the other subsystems. This leads to a possible misalignment in the representation of the stakeholders participating in the ULLs. Factors that additionally foster this skew relationship are arguably public finances and legal jurisdictions. Claimed to set the overall framework for development, the public sector is ultimately considered to be the one that creates both the opportunities and limitations of potential knowledge creation across the subsystems.

When it comes to the value that citizens provide for the ULLs and their underlying pilots, the most evident role can be seen as the contributor role. This is achieved by actively contributing with feedback on their preferences, motivations, and concerns, which shape the development of the products

or services. Citizens are consequently working together with the other stakeholders of the ULLs, cooperating to develop the products. One pilot, however, stands out from the rest. This is the Autonomous Bus pilot that sees the citizens' role migrating from a passive to an active tester. Citizens are therefore not considered as contributors, since they rather have a more experimenting role, testing the bus when it continuously gets adjusted by the other stakeholders involved.

Findings hence show that there are some clear similarities as to why and how stakeholders collaborate, and what value citizens provide to ULLs. These findings will be further explored in Sec. [5.4](#), where they are compared with findings from the subsystems, explored below.

5.3 Analysis of subsystems including stakeholders

The TNs of the subsystems, including their underlying stakeholders, will be described in this next part of the analysis, before analyzing the empirical findings from the TNA using the analytical framework. It should also be noted that the environmental subsystem will, due to its natural passive role, not be analyzed as a separate subsystem but rather as an overarching and integrated element in the other subsystems. The citizens' thoughts on their motivations and role in the collaboration, is additionally primarily based on the findings from the Kobla Pilot, as these were the ones that were interviewed. The findings from the analytical work will finally be compared and summarized at the end of the analysis.

5.3.1 The thematic networks of subsystems including stakeholders

While creating the TNs for the subsystems, it became clear that the most common basic themes were either connected to 1) the collaboration, 2) citizen involvement, or 3) external factors influencing the collaboration. As illustrated in Figure 6, the global themes will consequently be **Collaboration**, **Citizen involvement**, and **External factors**. These will with supplementing organizing themes in *italics*, be explained below.

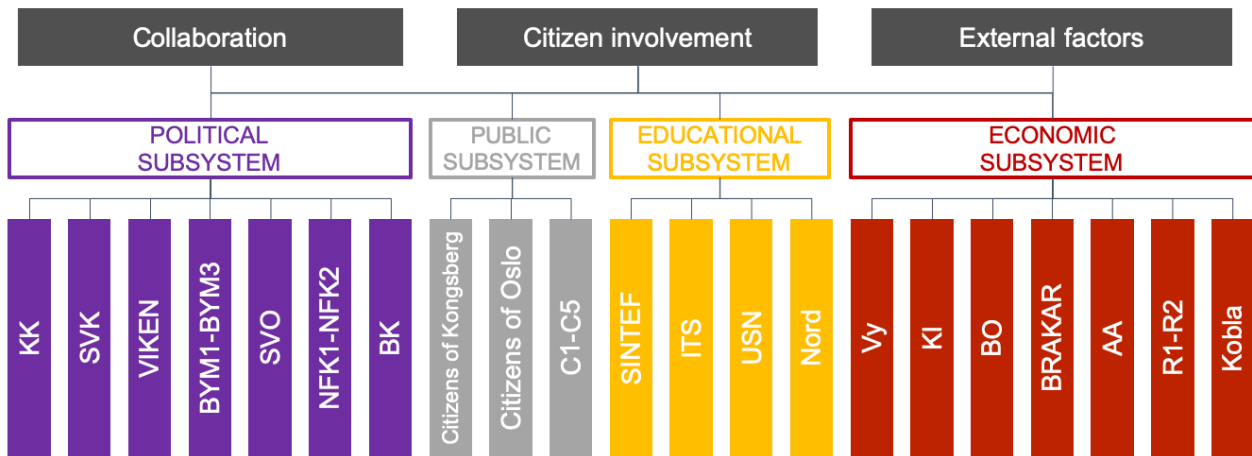


Figure 6: Relationship between global themes and the subsystems with their underlying stakeholders

5.3.1.1 The political subsystem

Collaboration is about the general motivation and reason for why political stakeholders want to participate in the ULLs. It consists of *Role as a connector*, *Spreading information*, and *Too complex to do alone*. Together they represent the roles and factors that influence the stakeholders' contribution to the collaborations. **Citizen involvement** concerns political stakeholders' thoughts on the topic. Being constructed of *Collective and individual responsibility*, *Citizen vs government relationship*, *Limited training*, and *Testers and verifiers*, it covers views on responsibility, experience, and citizens' role in the collaborations. **External factors** include outer factors that influence the collaboration and consists of *Financing in the public sector* and *Public sector influence innovation*. Together they cover the political stakeholders' perspectives on factors that impact the development of the ULLs.

5.3.1.2 The public subsystem

Collaboration involves the citizens' thoughts on factors that impact their role in the ULLs. It is built on *Positive with progression*, *Motivations*, *Must be easy to use*, and *Understanding of role*. Together they describe criteria and motivations that are influencing the public stakeholders' role in the collaborations. **Citizen involvement** concerns public stakeholders' perspectives on elements affecting their level of participation. This global theme consists of *Ways to involve* and *Do not see value*, which primarily comprises what the participants of the workshop in the Kobla Pilot think of aspects influ-

encing citizen involvement. **External factors** cover exterior factors influencing citizens' participation, expressed through the organizing theme *Material factors*. It represents elements that are not necessarily linked with human behavior during the workshop, but that yet appears to influence the overall experience.

5.3.1.3 The educational subsystem

Collaboration is about how the academic stakeholders are connected and what their aims are considered to be in the ULLs. The organizing themes *Grassroot movement*, *Knowledge connectors*, and *Technology as primarily topic* together constitute the roles and motivations that the stakeholders' have in the collaborations. **Citizen involvement** includes academics perspectives on citizen involvement and is constituted of *Citizens and pilots responsible for involvement* and *Citizens as customers*. Collectively they represent the overall argumentations for why the citizens need to be included and who is responsible for such inclusion. **External factors** cover factors influencing mobility solutions and consists of *Problems with the public transport sector*, which represents current dilemmas with today's business models and financing in the mobility sector.

5.3.1.4 The economic subsystem

Collaboration deals with the overall structure and focus of the ULLs, which is represented through *Role as facilitators*, *Bring out the best of each other*, and *Ecosystem*. Together they represent common features in terms of structure and contributions to the collaborations. **Citizen involvement** is about private stakeholders' thoughts on the matter. Founded upon *Ambiguous responsibility*, and *Split focus*, they cover the stakeholders' perspectives on the meaning of the concept, and who is responsible for the inclusion. **External factors** incorporate factors that influence the collaboration and are represented by *Depend on political contribution*, which covers the importance of political financing.

5.3.2 The why, how and what of subsystems including stakeholders

In the following section, the TNs will be analyzed using the analytical framework (cf. Sec 4.4). The analysis will first concentrate on each subsystem, before conducting a comparison between the respective subsystems.

5.3.2.1 The political subsystem

Why do political stakeholders collaborate?

Findings from the organizing theme *Spreading information* show that by engaging in ULLs, the political stakeholders first of all attempt to understand how to work with citizens in a pilot context:

“So, innovation for us is to get that mindset in place. That we can run this kind of workshop and that we actually are in the media and talk about that: “We are now running a workshop and a pilot”. I do not think that has, in any case, happened in a transport context before, so it ... there is a lot of innovation just in the cultural change and the mindset around it” (NFK1, p. 6-7)

By the statement “*get that mindset in place*”, or as described by other political stakeholders as “*get it permeated in the way we work*” (SVO, p. 4) and “*not only cognitively understand what it is, but actually understand what it means in practice*” (BYM2, p. 13), it is argued that the political stakeholders are trying, through gaining new experience and expertise, to better understand how they can work with piloting and citizen involvement. Additionally, by trying to disseminate the adopted knowledge gained from the pilots to the rest of the organization, social innovation is claimed to be the overall aim of participation.

This argumentation is further supported by findings from the organizing theme *Too complex to do alone*, where it becomes clear that the current mobility challenges are too complex to solve alone, consequently making the stakeholders have to work together as a collective force (Viken, p. 4). This can hence be argued to represent a supporting motivation for participating, where it becomes clear that they are required to collaborate to be able to find solutions for social challenges. As a result, findings show that the political stakeholders often seek to challenge existing relationships, in particular with the private stakeholders, where the change of collaboration structures can be seen to take different forms, e.g. as a test arena that accentuates a sustainable business model (KK, p. 6-7; SVK, p. 3; Viken, p. 4) or as a collaboration that enhances a test and fail-approach (BYM1, p. 2; NFK1, p. 1-2; SVO, p. 2). Common features of collaboration are, nonetheless, that they need to have a sustainable profile, often tailored to meet the UN’s Sustainable Development Goals (BYM3, p. 7; KK, p. 5; SVK, p. 3). In these terms, the aim of achieving social innovation can hence uplift a sustainable development, which in the long term can benefit society by improving the overall public value.

How do political stakeholders collaborate?

Through the organizing theme *Role as a connector*, the overarching role of the political stakeholders is seen to be operating as a gateway into their organization: “*What I do is make sure to be their guide in BYM and make sure the right people are in place*” (BYM2, p. 2-3). Supported by other political stakeholders, they hence see themselves as connectors or a “*guide*” into their governmental organization (BK, p. 12; BYM1, p. 5; SVK; p. 1; Viken, p. 1). As such, they play an important role in enabling the knowledge creating possibilities that lie in such collaborations. Depending on how good they are with connecting people, the political subsystem can thus be argued to form and influencing the direction of the knowledge flow that circulates across the subsystems.

In terms of connecting with citizens, who together form the public subsystem, it is argued through the organizing theme *Collective and individual responsibility* to be of operational (SVK, p. 6; Viken, p. 5) and at time collective responsibility (SVK, p. 5). These findings hence show that the subsystems work both separately and together with connecting the ULLs with the public sphere. Some political stakeholders, however, emphasize that they should be the ones with the overall responsibility (BK, p. 13), as the municipality is having the overall legitimacy to qualify the inclusion of citizens in the public space (KK, p. 7). The findings from the organizing theme *Citizen vs government relationship* can be argued to draw lines to the traditional relationship between the citizens and the government, where the government has the role to inform and receive feedback about concerns surfacing the public area.

The organizing theme *Limited training* nevertheless shows that the public sector often lacks this practical experience of how to involve individual citizens in initiatives such as ULLs (BYM2, p. 13). Issues that appear important but challenging include gaining a diverse citizen pool (BK, p. 5; KK, p. 11; NFK2, p. 10; SVK, p. 8; SVO, p. 6), early involvement (BK, p. 13; NFK1, p. 17; SVO, p. 2, 7), asking the right questions (SVO, p. 8; Viken, p. 6), or having the right competence or processes available:

“I wish we had more...I think more knowledge is actually missing. It is a work in process, but we need the knowledge to understand that citizen involvement requires a lot ... It will require more money. It will take more time. It will require much larger processes” (BK, p. 5)

These findings thus imply a dilemma between the public stakeholders being the ones with legitimacy to include citizens, and at the same time having problems with knowing how to practically achieve the involvement. The political stakeholders' lack of experience and knowledge is hence argued to influence citizens' ability to participate in the ULLs. The public subsystem's contribution can as a consequence be bounded by the political stakeholders' existing knowledge base. To solve this, BK emphasizes that citizen involvement in the public sector requires more money, time, and bigger processes. Further, supported by organizing themes *Financing in the public sector* and *Public sector influence innovation*, factors such as political budgets (BYM1, p. 5) or prioritization by political leaders (Viken, p. 5) seem to influence what ideas or suggestions to concepts that go through. Due to their money limitations, and overall structure, these findings thus show that the governmental sphere may limit the potential knowledge creation that lies in multi-stakeholder collaborations such as ULLs.

What role do political stakeholders see citizens have in the collaboration?

Expressed through the organizing theme *Testers and verifiers*, political stakeholders seem to have a diverse view on what role the citizens have in the collaboration. They all seem to agree, however, that testing and receiving feedback is essential for developing mobility solutions and that by involving citizens, can get value propositions confirmed or denied:

“It [user insight] is used for further development and further innovation. It is also used to confirm different truths about what is actually of value to our customers” (NFK1, p. 11)

“The main purpose of it [the ULL] is that we test early on those who actually are going to use it and get early feedback on whether we are on the right path. We have hypotheses and ideas. Verify if they are life made or provide some value” (SVO, p. 2)

At first glance, the statement *“for further development and further innovation”* implies that the citizens work as testers by providing feedback on existing products that will be used after the production as input for new processes. The citizens can hence, through being *“customers”*, contribute to the development by being testers of existing products. This perception nevertheless gets challenged when these insights are additionally used for *“confirming different truths”*, indicating a more active role during the product development. Supported by the statement of getting *“early feedback on whether we are on the right path”*, citizens are providing more value than just feedback on a product. The citizens can thus be seen as contributors in a way that they can clarify in the development process if it is of any value to them by *“verify if they are life made”*. By doing so, they are ultimately forming the solution steering the developers away from the *“wrong”* direction. As such, they contribute to

development together with the other stakeholders before the product is complete, and they can consequently be seen as contributors to the product.

5.3.2.2 The public subsystem

Why do public stakeholders collaborate?

Expressed through the organizing theme *Motivations*, it becomes clear that some public stakeholders participated in the Kobla Pilot due to their interest in transportation (C1, p. 2), while others did it because of external and social reasons (C2, p. 2). The majority, however, participated mostly because of their work within the municipality:

“I am the section manager for urban development, project, and mobility in Bodø municipality, so ... this is something I have as my work to do” (C3 p. 1)

Consequently, their motivation for participating fluctuates between external, social, and professional motivations. The reasons for participating can, therefore, be seen as diverse. Through the organizing theme *Positive with progression*, it becomes clear, however, that the public stakeholders were all eager to provide feedback and happy to be heard (C3, p. 1; C4, p. 1). Based on this excitement, it can be argued that the citizens’ underlying motivations are to enhance a democratic value in terms of getting the opportunity to influence decisions through empowerment. By participating in ULL initiatives, they can conclusively improve social capital by acting together to build a better outcome.

How do public stakeholders collaborate?

Through the organizing theme *Must be easy to use*, it becomes evident that one essential criterion for citizens to be willing to participate, is that the application must be easy to use and take up little time (C1, p. 1; C2, p. 1; C3, p. 2). Not fulfilling these criteria can, in this case, possibly limit the public presence and consequently its representation in the helix. Findings further show through the organizing theme *Do not see value* that citizens, in general, do not see the value in participating in such initiatives as the workshop and consecutively chooses not to come (C3, p. 2). From the interviews, it also becomes clear that early invitation and prioritizing time become the primary factors influencing their participation:

“I think it is about not knowing exactly what it concerns and why they [the citizens] should be involved. That they do not prioritize it. [...] People who have kids. They have to pick up the kids, so they have no time. There is a lot to manage in a busy everyday life, so I think it is a bit like that ... Plus, you have to reach people and it is not always that you manage to do so. It was such short notice. I think I got the

notice ... what was it ... yesterday or the other day? By then people may already have plans.” (C4, p. 2)

As the citizens “do not prioritize it”, it can be argued that the citizens' existing knowledge in terms of values, culture, and traditions, does not include seeing citizen participation as a common practice in the public sphere. Means for challenging these set cultures or habits can consequently be expressed through the organizing theme *Ways to involve*, where stakeholders of STB try to challenge these set habits by triggering participation through using external motivation such as pizza (C4, p. 2). Supported by the organizing theme *Material factors*, findings suggest that when creating a welcoming atmosphere, the Kobla pilot also uses round tables and an atrium for gathering (Appendix D, p. 313). Finding ways to engage participants, however, seem to be challenging (C3, p. 2; C4, p. 2) and the existing culture within the public sphere can, as a consequence, be argued to limit the potential knowledge creation across the subsystems.

What role do public stakeholders see citizens have in the collaboration?

The organizing theme *Understanding of role* relates to findings showing that citizens in the Kobla Pilot seem to understand that they are contributing to the workshop by being “test rabbits” (C5, p. 1). The role of being a “test rabbit” seems at first glance to refer to the role of a tester. Thereafter, findings from the organizing theme *Positive with progression* further show that citizens were highly motivated for taking part in the development as they saw how their feedback was transformed into a real product: “I think I definitely contributed because when he talked about the change, he looked at me (!). So... yes. I think I was heard“ (C4, p. 1). This excitement is further supported by several participants (C3, p. 1; C5, p. 1), implying that the citizens felt they contributed to a change and took an active part in the development. This ultimately leads to the argumentation that citizens do not perceive themselves as only testers of a product but rather contributors in the way that they actively form the application together with the other stakeholders of the pilot.

5.3.2.3 The educational subsystem

Why do academic stakeholders collaborate?

Findings from the organizing theme *Technology as primarily focus* show that the motivation for academic stakeholders can all somehow be linked to finding new ways in the society to utilize different forms of technology. ITS does this by “promoting the use of ICT in the transport sector [...]” (ITS, p. 1), and focuses, through using ICT as a tool, on the product innovation side of the mobility sector.

Nord and SINTEF are not that interested in the technology itself, and they rather focus on the legal and economic models and conditions, and what it takes to implement these types of solutions in the society (Nord, p. 1; SINTEF, p. 2). Followed by USN's (p. 5) focus on community development through technology acceptance and development, the latter seems to have a more societal focus on how these solutions may impact the overall society. It can thus be argued that SINTEF, Nord, and USN all maintain a social innovation aspect of it, whereas ITS focuses primarily on the product side of it. Thereby, all academic stakeholders focus on how these new solutions may impact society.

How do academic stakeholders collaborate?

Through the organizing theme *Grassroot movement*, findings show that the academic stakeholders create networks by bundling partnerships from former initiatives (ITS, p. 2). By creating so-called “waterholes” (USN, p. 1), the academic stakeholders create connections and share information, promoting cross-sectoral knowledge creation. USN illustrates that TKC&L can, for example, work as such a waterhole, operating as an opportunity generator that promotes knowledge sharing across the spheres (USN, p. 3). Findings from the organizing theme *Knowledge connectors* show that the roles of academics, can however in these multi-stakeholder collaborations get split between two interlinked roles: knowledge generators and connectors. By being knowledge generators, academics can, using their know-how gained from interactions with e.g. firms, transform this knowledge into outputs such as research reports and education programs. When later transferred to students of the university, this can additionally be returned to the business world when the students are graduating (USN, p. 2-3). Through this circular process, academia can connect both private, public, and also political stakeholders (SINTEF, p. 2), ultimately playing the role of connectors by uniting a wide range of subsystems. This is further exemplified by ITS, which emphasizes that its role is to create meeting places between a wide range of stakeholders:

“So ... it is our job to create meeting areas or contribute to meeting areas, where we get the industry, academia, i.e. researchers, and the customer segment that is often public, gathered and work out ideas for projects or implement new ideas and pilot ideas [...]” (ITS, p. 1)

Academia can, therefore, be seen as active contributors to doing things together across the organizational borders and can, by working as both knowledge generators and connectors, enhance interdisciplinary knowledge creation across all subsystems.

Findings from the organizing theme *Citizens and pilots responsible for involvement* show that in terms of the responsibility of inclusion of the public society, most academic stakeholders state that this lies on the pilots (SINTEF, p. 4; USN, p. 4), or the ones owning the pilot (Nord, p. 4). It is further stated that the involvement should be taken more seriously by the citizens:

“I think the initiative may be from the owner, but again... when citizens come along, and perhaps after two or three generations, when we have learned to participate and come aboard, then maybe they will attain too.” (Nord, p. 4)

Citizens should consequently be seen as responsible for participating in initiatives. However, as this potentially will first happen after “*two or three generations*”, it requires both a cultural and habitual change in the public subsystem. A consequence of having a lack of culture for public participation may henceforth lead to citizens missing the opportunity to influence the mobility outcomes and thereby the knowledge flow that circulates across the subsystems. This may lead to the public subsystem being misrepresented in the helix, making them less accounted for in the social knowledge creation. Other concerns influencing the potential of the collaboration are further found through the organizing theme *Challenges with the public transport sector*, where topics such as business models (Nord, p. 4; USN, p. 5) and dilemmas with current mobility systems (ITS, p. 6) are presented. These elements can be argued to create the overall framework for how many multi-stakeholder collaborations can take form, where especially economic means seem to control both the ULLs’ possibilities and barriers of the potential knowledge creation in the mobility sector.

What role do academic stakeholders see citizens have in the collaboration?

Through the organizing theme *Citizens as customers*, findings show that citizens should be involved to make sure that the ULLs develop usable products (Nord, p. 3) and that citizens are eventually willing to buy:

“I think it is absolutely crucial that they participate. It is just like selling a new taste of ice cream, right. You have no idea if it will sell or what song among the ten new ones will be a hit. You have no idea until you release it. You cannot afford to wait and see. You have to test it to find the solution.” (ITS, p. 10)

The statement “*You have no idea until you release it*” implies a test and fail approach, where the citizens can test an already produced product. The citizens can hence be seen as active testers meaning that the citizens can contribute by choosing to buy the product or not. This can henceforth work in contrast to when citizens are actively co-creating the product while it is made. The innovation can,

therefore, be made *for* the citizens, and not *with* the citizens. The citizens are, in other words, considered as testers in the form of buyers and not co-producers.

5.3.2.4 The economic subsystem

Why do private stakeholders collaborate?

Findings through the organizing theme *Ecosystem*, show that the private stakeholders see themselves taking part in some sort of ecosystem, where the stakeholders through their underlying motivations and interests, get connected by overarching, collective goals (KI p. 1; R2, p. 5; Vy, p. 10). By joining forces, they arguably want to impact the mobility development by “*pulling it in the direction that we see in the community is sustainable and good*” (AA, p. 1). By aiming at “*pulling*” the development into the direction the “*community*” wants to achieve, it is argued that they consequently seek to set the overall agenda of the mobility sector. Collectively challenging the existing sector by enhancing a diverse multi-stakeholder collaboration, the goal can ultimately be to achieve social innovation.

Underlying motivations for participating seem, nonetheless, to be present. Some stakeholders acknowledge that they want to become a “*showcase*” for local initiatives and autonomous vehicles (Vy, p. 2), by aiming at achieving scalability (AA, p. 8; Vy, p. 9) or building up their social responsibility by proving the citizens with “*low average travel times*” (R1, p. 4). Recognized as motivations for achieving status, upscaling, and efficiency, common features are hence that the underlying motivations can all somehow be connected to the aim of enhancing economic growth. The statement “*sustainable and good*” may, therefore, be indicating a development that is economically durable in terms of being economically beneficial for all parties involved. Consecutively, this implies that achieving economic growth in terms of efficiency and new, economically beneficial solutions can be seen to represent the underlying motivation for participation.

How do private stakeholders collaborate?

As an argument used by several private stakeholders (AA, p. 2, 6; KI, p. 7; R2, p. 13; Vy, p. 2), findings from the organizing theme *Bring out the best of each other* show that important aspects of the collaboration are to build on each other’s strengths and gain an understanding of each other’s roles. By learning how they collectively can work together (R2, p. 13), the participating stakeholders need to get the “*national team thinking*” (AA, p. 8) in place. Followed by Vy, they must “*work agile*

together and use resources efficiently and make the most of what we have available” (Vy, p. 10). To do so, findings suggest that they must build competence together:

“It is also important that you build competence together. That you share updates. Establish a sharing culture ... it is obvious that it requires a sense of confidence and trust between the parties. I think that are important prerequisites for success” (KI, p. 7-8)

Creating a “*sharing culture*” can thus be seen as an essential element for strengthening knowledge-creation, and an “*important prerequisites for success*”. Trust can as a result be argued to create the foundation that both enables and gains insight into other's subsystems knowledge base. This is especially important for private stakeholders since findings through the organizing theme *Role as facilitators* show that they are usually the ones inviting to workshops (R2, p. 5), or serving as “*network operator*”:

“We facilitate projects between the big companies in the [Kongsberg] cluster, between the companies and other actors and the municipality, the university ... So, we are a network operator and have in a way established an ecosystem and collaborate with many people and draws different resources into projects.” (KI, p. 1)

Seen as inviters and network operators, the private stakeholders can all somehow be linked to the role of facilitators by creating connections between the helices, ultimately working as bridge builders for enhancing knowledge transfers between subsystems. Findings also suggest that the private stakeholders often have the roles of leaders and managers, being responsible for either design (R1, p. 1), deciding the next step for the pilot (R2, p. 1), strategic decisions (AA, p. 1), or business development (Brakar, p. 1; Kobla, p. 1; Vy, p. 1). In other words, they all have some sort of leadership responsibility, meaning that they can, through their position as leaders, influence the other subsystems. It can consequently be argued that the private stakeholders may in the collaboration have more power to execute certain activities within their fields of interest, which can in the end impact the overall direction of the collaboration.

With that being said, findings from the organizing theme *Depend on political contribution*, indicate that as the financing primarily comes from political means and budgets, current and future developments will therefore heavily depend on whether political leaders see the value in it or not (AA, p. 7, 8). As political financing is also considered to be essential for starting the initiative (KI, p. 2) and keeping the pilot going (R1, p. 11), private stakeholders do not necessarily have real decision-making

power, although they are titled as project leaders. Hence, as political decisions seem to color the overall direction of the pilots, misalignment between the economic and the political subsystem and also the remaining helices might occur. The fluctuating balance between the economic and political subsystem appears at the same time to be present in terms of responsibility for citizen involvement. Findings from the organizing theme *Ambiguous responsibility* show that the responsibility often shifts between belonging to the ones having the end-contact with the citizens (Vy, p. 8), the municipality (KI, p. 5), the pilots (AA, p. 4), and at times the collaborating stakeholders (Brakar, p. 3; BO, p. 2; Vy, p. 7). The majority seem, however, to believe that it is the private stakeholders' role and that the political stakeholders are more responsible for covering in the democracy aspect of it (Kobla, p. 7). As the responsibility of bringing the public subsystem into the collaboration is currently not clearly stated, this may lead to implications that the citizens are not being represented to the same degree as e.g. the private and political stakeholders.

What role do private stakeholders see citizens have in the collaboration?

Through the organizing theme *Split focus*, findings suggest that there is a split understanding of why citizen involvement is important and what value citizens ultimately seem to provide. The split views can be separated between seeing citizens as testers of technology and active contributors to the development. Testers of technology include involving citizens to figure out what they think about the pilot (Brakar, p. 4-5; Vy, p. 1), what their fears are for the existing technology (AA, p. 4, 6), and what their thoughts are concerning the usability of the product (Vy, p. 3-4). By providing feedback which the pilots can later take into consideration, modification of the products based on these inputs can consequently make citizens more satisfied. Citizens that are involved during the development of the products but are not an active part of the actual development process are considered testers. I.e. they test intermediate development products in order to give feedback to the stakeholders developing the products. The other perspective, in contrast, focuses on the citizens' needs while including the citizens in developing solutions that consider these needs. This is done by working closely together *with* citizens to understand their requirements, underlying motivations, and barriers (Kobla, p. 8; R1, p. 1; R2, p. 13). This way, the citizens actively contribute to the creation of the product, and their role can be considered as contributors. The difference is thus between whether citizens are involved as testers of intermediate products or as active developers of the products or services.

5.3.2.5 Summary of the why, how and what of subsystems including stakeholders

The reason why the stakeholders collaborate seems overall to be challenging existing frames and structures, either within their organization or across subsystems. Political stakeholders plan to do so by getting a new mindset in place, private stakeholders by enhancing economically sustainable development, and academic stakeholders by finding new ways to utilize technology. For public stakeholders, this is about gaining empowerment and building social capital. The overall motivation of the collaborations is hence challenging existing roles and ways of collaborating by enhancing social innovation. The stakeholders seem additional to have underlying motivations for their participation in the collaboration. For the political stakeholders, this is to achieve sustainable development, which in the long run can improve the overall public value. For the academic actors, whose focus lies on either product development or societal perspective, this is about finding how new, technological solutions may impact society. The focus of the private stakeholders appears to be achieving economically beneficial solutions, whereas for the citizens their motivation for participation seems to be influenced by external or personal factors.

The overall focus of how to collaborate can be expressed through the statement brought forth by the private stakeholders with "*bring out the best of each other*", meaning that the collaborating stakeholders cooperate by building on each other's unique competencies. This is seen to be done by creating a sharing culture that emphasizes knowledge sharing across the subsystems. As a consequence, the role of the connector is most commonly seen in collaboration. It becomes apparent, however, that there are different meanings of the role. For the political stakeholders, this means connecting other stakeholders to their organization. For the academic stakeholders, this is about connecting across organizational boundaries. Some private stakeholders support and build on this understanding, considering themselves invitees, facilitators, and "*network operators*".

The overall role of the private stakeholders appears, nonetheless, to be project leaders, gaining a managerial responsibility for either the pilot or the ULL. Supported by private, academic, and political actors, it becomes apparent, that the political subsystem is however the one that creates the opportunities and constraints in the collaborations. Responsibility for the development of the ULLs and the pilots hence seems to be fluctuating between the economic and political subsystem, leading to possible confusion about the overall decision-making power of the ULLs. The political subsystem

appears on the other hand to be the one making the final call. The fluctuating balance between economic and political subsystem further seems to be present in terms of responsibility for citizen involvement. It also becomes evident that experience with citizen involvement is not currently always present. This leads to the risk of citizens not being represented to the same degree as the other subsystems, creating a possible misalignment in the labs. It also surfaces that the skewed relationship can be somewhat blamed on the citizens since they currently do not embrace a culture that heightens public participation. This is further supported by academic stakeholders, stating that citizens will hopefully take more responsibility for their development. Besides, the citizens stress that they do not always see value in participating in such initiatives, and that time problematic is often the blame. This ultimately leads to a poor representation of the public subsystem, which risks losing the opportunity to influence the knowledge flows circulating across the subsystems and hence the development of the mobility sector.

The role of citizens in the collaborations appears to be either testers of technology or contributors to the development of new solutions. Academics consider them as active testers and see them as customers of services that provide value by deciding to purchase the product or not. Some private stakeholders see citizens as active testers that, at the same time, test the technology and provide feedback. They are, however, regarded as testers since they are experimenting with the solution, where their feedback will in a later stage be considered for modifications. The rest of the private stakeholders see the citizens as contributors. Through their needs and feedback, citizens contribute to the creation and development of products and services. This is further supported by political stakeholders, in the sense that citizens are perceived as contributors i.e. they can verify if there is any value with the solutions made and steer the other stakeholders in the ULLs in the right direction. Citizens also appear to agree that their contributions matter, consequently seeing themselves contributing to the production process. The general differences between the citizens' role in the cooperation hence lie between being testers of a service or product under modifications and contributors forming the production process.

5.4 Overall findings

As mentioned in the introduction of this analysis, a final comparison between the ULLs with their respective pilots and stakeholders placed in underlying subsystems will now be conducted.

Why do they collaborate?

In the analysis, it becomes clear that ULLs, through their pilots and supporting stakeholders, tend to participate because of the willingness to challenge existing social frameworks. The emphasis on where to begin tends to be either transforming the citizens into active participants (political stakeholders, public stakeholders, STB, STOR) or establishing multi-stakeholder collaborations (academic stakeholders, private stakeholders, TKC&L). Ways to achieve these new forms of cooperation appear to be through increasing citizens' decision-making power (public stakeholders, STB), challenging existing cultural frameworks by gaining new expertise with citizen participation (political stakeholders, STB, STOR) or finding new ways to use technology (academic stakeholders) often by strengthening financially sustainable development (private stakeholders, TKC&L). By challenging existing social frames, this may lead to an increase in the democratic (public stakeholders, STB) and public value (political stakeholders) in society. The overall motivation is thus to challenge existing roles and ways of collaborating by achieving social innovation.

It also becomes clear that Autonomous Bus and Combined Mobility, through their focus on technological improvements, aim at innovating products and solutions for achieving cheaper and better mobility solutions. This motivation seems to correlate with the focus of the private stakeholders, who aim at innovating economically favorable solutions. For the Kobla Pilot, supported by academic stakeholders, the goal is nevertheless to figure out how new technology solutions may impact society. Hence, they strive to find innovations that can solve current social challenges such as CO₂ emission within the mobility sector. Consequently, there appear to exist underlying motivations for participation in the collaboration and they are, all connected to how the use of product and service innovations can help to find economic and sustainable solutions in the mobility sector.

How do they collaborate?

Findings show that ULLs can be perceived to work as a connecting force between the subsystems, where the operational teams, seen as pilots, act as knowledge and idea promoters. Creating competence and knowledge together by building on each stakeholders' strengths are additionally seen to be a necessary move for standing against current mobility challenges. The overall focus on how the stakeholders should collaborate is, therefore, expressed through the statement “*bring out the best of each other*”. Illustrated by TKC&L, with support from political and private stakeholders, this ultimately creates a sharing culture that accentuates knowledge flow across the subsystems, aiming at

optimizing the knowledge creating potential of the ULLs. Trusting that associated stakeholders will be included in this knowledge circulation, is accordingly seen as important (TKC&L, STB). A common remedy is enacting a connecting role that links the subsystems together. The role's meaning appears, however, to be divided between working with connecting stakeholders within or across own organizational boundaries.

In terms of managerial responsibility for pilots, the private stakeholders are seen to be the project leaders. Their decision-making authority is nonetheless perceived to be limited due to political constraints. Supported by academic and political stakeholders and findings from STB and STOR, it hence becomes clear that the political stakeholders are the ones making the final decision concerning finances, time horizons, and claims for outputs. The political subsystem can thus be argued to be the one that sets the framework for ULLs' potential to promote urban development in society. Other factors that influence the ULLs' and pilots' potentials are time management, legal jurisdictions, lack of trust, organizational structures, and communication. This eventually creates barriers to knowledge circulation across the subsystems.

When it comes to the responsibility of involving citizens, it seems somewhat unclear. However, the overall main stakeholders are claimed to be the political subsystem and the pilots' operating teams, which are mainly led by the private stakeholders in the economic subsystem. Furthermore, it becomes evident that experience with direct citizen involvement, especially in the public sector, is not currently present. Gaining the right experience is hence a necessity (STOR), along with convincing citizens of the value of participating in such initiatives (academic stakeholders, public stakeholders, STB). A lack of knowledge on how to involve citizens and why they should participate seems, therefore, to be an element of concern since this significantly affect the citizens' overall level of participation. The public stakeholders further emphasize that scarcity of time is often to blame for their missing participation. As a consequence, lack of participation of the public subsystem may lead to the risk of missing the opportunity to influence the knowledge flow that circulates between the subsystems, ultimately influencing the development of the mobility solutions.

What do citizens provide to the collaboration?

Citizens switch between being seen as testers and contributors, where the role of a contributor is most present. However, the meaning of these roles appears to be diverse. In TKC&L, the tester's role is seen as both passive, as road users, and as an active character, being customers of the service. This

way of looking at testers as customers is further found in the educational subsystem, where academics see citizens as testers in the form of customers. Some private stakeholders take the active role a step further, meaning that citizens also provide dynamic feedback on what they think of the pilot and the usability of the technology, which may, when appropriate, be included during modification of the product conducted by the other stakeholders of the ULLs. Nonetheless, the common feature of the citizens' role as testers is that they are in a real-life context experimenting with the solution.

The other proportion of private stakeholders rather sees citizens as contributors, as the citizens can provide feedback to their preferences, motivations, and concerns, and actively help to shape the products and services together with the stakeholders of the ULLs. This view is further supported by STOR and STB through their focus on building innovations based on citizens' needs and motivations. Political stakeholders also see them as contributors, as citizens can verify whether the concepts are of any value and hence steer the pilots in the right direction. Citizens additionally seem to agree that their contributions matter and confirm that they see themselves contributing to the production process. In other words, depending on whether the citizens are only experimenting, or are actively cooperating with the stakeholders of the ULLs, this will determine if the citizen's role will be perceived as testers or contributors.

Chapter 6 Discussion

In this chapter, the essence of the above findings will be discussed, also in the context of previously presented academic work.

The gap and overlap between New Public Management and New Public Governance

Through the thesis' findings, it becomes clear that the motivation for participating in ULLs can be divided into an overall motivation of achieving social innovation and an underlying motivation for achieving efficient and sustainable solutions. Accordantly, when being related to the previous literature, it is evident that these motivations may in a more holistic manner, be seen to originate from the two different governmental regimes; NPM and NPG.

With the underlying motivation of qualify public offerings through product and service innovations, the majority of pilots aim at creating solutions that increase efficiency and thereby reduce costs. Accordingly, in the spirit of NPM, where the public sector aims to develop better and cheaper services for gaining happier customers, these findings hence draw lines to previous literature, stressing an efficiency-understanding of co-creation (Agger & Tortzen, 2015; Agger et. al., 2018). The overall motivation for achieving social innovation lies in contrast to changing the social frames of society. As a result, this can be associated with the NPG approach of public governance, which focuses on enhancing cooperation between multiple stakeholders. Consequently, correlations with the empowerment-understanding of co-creation are evident (Agger & Tortzen, 2015; Agger et. al., 2018).

As the existence of the two motivations depend on each other in a way that the pilots operate in the ULL, these motivations are strongly interwoven, implying that an overlap between the governmental styles also exists. Interesting reflections hence include why these two styles both individually, and collectively co-exist. To investigate, this discussion will dig into the collaboration form of the ULLs, the lack of knowledge, and the roles of the citizens.

Collaboration form

Even though stakeholders stress that they must work together to find solutions in the mobility sector, it becomes apparent that there also exist challenges with collaborating in multi-stakeholder initiatives such as ULLs. One of the overall reasons for these challenges appears to be rooted in today's business

models, where present collaboration structures forming multi-stakeholder collaborations are perceived to be a disputed element affecting the cooperation. Since the participating stakeholders operate under the present collaboration structures, it is argued that they do not possess structures that fully enhance multi-stakeholder collaboration efforts. This consequently makes them limited by the “old” way of operating, where stakeholders are primarily perceived as individual contributors, leading us back to NPM. This further implies that while the overall motivation for challenging existing social roles is strong, the present collaboration structures and business models hinder the stakeholders from fully exploiting the potential that lies in such initiatives. This means that, while the overall motivation for participating is to challenge the old way of working, by enhancing social innovation to achieve new structures that are supported by an NPG regime, the underlying motivations gets bounded to NPM in the way that they must find economical favorable solutions that are accustomed to current business models.

The lack of knowledge

It also becomes apparent that there is a lack of knowledge concerning how citizens should be involved and why public stakeholders, in general, should participate in ULL initiatives. This implies that the existing knowledge base in society is not highly recognized in terms of understanding how and why the citizens should get involved. The culture that embraces public participation thus appears to be absent, which can lead back to the NPM way of seeing the public sector as providers of services and citizens as passive consumers. The reason for this situation can further be argued to lie in the existing knowledge base of the political stakeholders. Since the political stakeholders are both seen as initiators and as the “frame builders” of the ULLs, their existing knowledge base will consistently influence the focus and form of the collaboration structure. Political stakeholders are additionally among the ones that have the least experienced with direct citizen involvement, and therefore it entails the risk that citizens will not be properly included in the cooperation. Consequently, since the citizens are potentially not involved in the ULL initiatives, they will neither learn the value of participating in such collaborations. This creates the risk of citizens being placed in traditional frameworks, where, as in an NPM perspective, they are seen as customers of public services.

The role of citizens

Seeing citizens as customers and users of public services and products relates in this case to the role of testers, where citizens are involved as for testing and giving feedback on products. Citizen involvement is hence seen as something that is done to create good services or products for the citizens.

However, it becomes clear that the role of citizens is also perceived to be contributors, where citizens are actively participating during the development of the products. Supporting the NPG approach to public management, citizen involvement is hence when the solutions are created *with* the citizens.

How the stakeholders of the ULLs make citizens become contributors in practice seems however challenging, with the reason being the lack of knowledge on how to involve citizens and make them into contributors or co-creators. Consequently, the lack of knowledge can be argued to lead to the risk of citizens being perceived as contributors, but in reality, treated as testers. This could eventually mean that e.g. the political stakeholders unwillingly, due to lack of experience in how to involve citizens, make them testers when they ideally want them to become active decision-makers. This, therefore, implies, that the existing knowledge base of the leading stakeholders, which in this case is perceived to be political stakeholders, will ultimately shape what role the citizens can have in the collaboration. As supported by academic work conducted by Leminen et al. (2015) and Menny et al. (2018), the findings hence confirm that citizen involvement, and the degree of citizen involvement highly dependent on the leading stakeholders in the collaboration. The existing knowledge base of the lead stakeholders hence influences citizens' role, as either passive role-takers (as testers) or active role-makers (as contributors). It is nevertheless noteworthy to mention that a lack of interest by the citizens in the collaboration, makes it harder for leading stakeholders to shape them into becoming more active participants. Both the public and the political stakeholders are hence to blame for the citizens absent role as co-creator.

Accordingly, the ULL can be seen as being affected by both NPM and NPG, shaping the motivations, forms of the collaboration, and roles of citizens. Missing structure, that otherwise enhance multi-stakeholder collaboration, appears to create a gap between being stuck in old ways of working (NPM), and at the same time being willing to get new collaborative roles (NPG). Elements such as trust, cross-sectoral understanding, and the creation of a sharing culture are hence mentioned in the overall findings as being factors for successfully reaching the potential of the multi-stakeholder collaborations and the transformation towards NPG. Acquiring knowledge about why citizens should participate in ULLs and how to involve them, is further argued to be necessary for making multi-stakeholder initiatives more normalized in society. If not accomplished, even though the intention of making the citizens co-creators are present, the role of citizens may eventually be buyers or experimenters in the form of testers. If accomplished, the findings can support the research of Baccarne et al. (2016),

stating that ULL can potentially increase the socio-ecological balance in urban areas. As a consequence, the ULL can be used as a tool to improve the quality of life in cities (McCormick & Hartmann, 2007) and for future generations (Baccarne et al., 2016), eventually resulting in a more collective form of urban governance (Voytenko et al., 2016).

Chapter 7 Conclusion

The main aim of this thesis was to examine why and how stakeholders in ULLs collaborate to co-create mobility solutions related to urbanization and climate challenges. To do so, three different ULL pilots were compared and investigated with respect to why and how the stakeholders in the ULLs cooperate, and what role the citizens were perceived to have in such collaborations.

The findings from the analysis showed that the main reason for why stakeholders collaborate in ULL initiatives is to achieve social innovation. The emphasis on where to begin to achieve such value tends however to be shared between challenging existing frameworks and structures, either by making citizens active contributors or through general multi-stakeholder collaboration. Additionally, by developing product and service innovations, an important underlying motivation is finding economic and sustainable solutions to the social challenges in the mobility sector.

The overall focus on how stakeholders should cooperate is displayed through the statement "*bring out the best of each other*". Creating a sharing culture that enhances knowledge flow across so-called subsystems (groups of stakeholders with common characteristics) is in other words common, working towards optimizing the knowledge creating potential of the ULLs. Trusting that affiliated stakeholders will be included in this knowledge circulation is hence considered as important. Additionally, it became clear that the ULLs act as linking forces between the various subsystems, where the operational teams in the pilots, act as knowledge and idea generators. As a consequence, a common role for the participating stakeholders is working as connectors, linking the subsystems together.

Findings also indicated that the responsibility for involving citizens is rather unclear, mainly fluctuating between political and private stakeholders. A lack of a clear responsibility role is perceived to be caused by a shortage of knowledge about how to involve the citizens. Additionally, as the citizens are not a part of a culture that embraces public participation, it causes a risk of citizens not being represented to the same degree as the other stakeholders. This leads to a possible misalignment of knowledge bases represented in society. Finally, it was found that public structure influences development in terms of money, laws, time, and organizational structure, ultimately affecting the collaboration potential of enhancing knowledge creation across the different subsystems.

The role citizens are perceived to have in the collaborations tends to vary between being testers of a service or product and being contributors to the development process. Ultimately, depending on whether the citizens are only experimenting, or actively cooperating with developing the service or product with the stakeholders of the ULLs, this will determine whether the citizens' role will be as testers or contributors.

Further reflections eventually showed that elements affecting the collaborations appear to originate from the public management paradigms NPM and NPG. The ULLs are hence colored by both management styles, leading to fluctuating motivations, collaboration forms, and citizen roles. Increased knowledge about why and how citizens should participate, how stakeholders should collaborate, and which ways to shape citizens' roles in ULL initiatives, are hence necessary in order to make multi-stakeholder initiatives more normalized in society.

Chapter 8 Future Work

The thesis will be rounded off with suggestions on implications for businesses in practice and future research.

8.1 Implications for Business in Practice

Acquiring knowledge about how to involve citizens are seen to be essential for being able to gain the most value from their participation and hence for forming the citizens' role as desired from the cooperation. In future collaborative work, the participating stakeholders should, therefore, find good ways of reaching citizens before the pilots are initiated, meaning that they get some practice before they start collaborating with citizens. Having a course with methods such as design thinking and test workshops with internal employees may be suggestions for ways to gain such knowledge. This is to some degree already conducted by STOR and STB. Involving external experts as consultants can, as a result, be beneficial. From findings it also appears that an unclear responsibility exists in where the inclusion responsibility lies, increasing the risk that this task may be vague. One way of reducing the risk of citizens not being included in the collaboration may hence be solved through having specific stakeholders being responsible for the involvement. An important prerequisite for the inauguration of the role is thus that the selected stakeholders have a proper knowledge base on how to involve citizens.

All stakeholders have additionally chosen to structure their ULLs by having underlying pilots consisting of individual operating teams. Even though this gives a lot of freedom to quickly test and try out new solutions, it also creates a risk in the sense that important knowledge is not spread throughout the subsystems, and thereby the knowledge sharing possibilities of the ULLs are not being optimized. Working on creating a culture that enhances sharing (cf. a sharing culture) is therefore essential to qualify that the knowledge gets transferred to other parts of the ULL. Trust, collectively accepted goals, and proper communication tools are here seen as important elements to consider and work with.

Finally, as it appears that citizens are also the ones that are difficult to reach, a focus area should be to strengthen citizen participation. Creating a “citizen base”, in the same way as a customer base, may

as a consequence be a potential way to gain a foundation consisting of citizens that have either participated or want to participate in ULL initiatives. Within the frames of the GDPR, sending updates through newsletters, or creating ULL-communities are just a few suggestions for potential ways to keep them involved and updated. By additionally aiming at creating a word-of-mouth strategy together with the community, through encouraging the citizens to spread the word to their peers, the pilot may as well, if successful, experience a broader group of citizens. Proper information on the purpose and following updates of the pilots are seen to be essential for achieving engagement and understanding.

8.2 Future Research

For future research, it would be interesting to compare the empirical findings from this study with other ULLs in different fields, e.g. health or housing, to see whether there are any differences across sectors. A discourse analysis could here be performed to better understand the social construction of the concept behind ULLs and multi-stakeholder collaboration. As one pilot only represents a small part of the ULL's portfolio, a detailed case study of a single ULL with several underlying pilots may also be interesting to investigate if there are further differences between the pilots as to why and how they participate, and if the intended role of the citizens within the collaboration. Since previous research indicates that the degree of citizen participation can change over time (Menny et al., 2018), it could in this regard be interesting to research over an extended period. Additionally, the question of contextuality is yet to be explored, i.e. explore if citizen involvement always should be the aim for achieving co-creation. Under the concept of democratic quality (Vanleene et al., 2015), it could be interesting to investigate whether ULLs contribute to strengthening or reducing democratic quality. It would hence be relevant to conduct a comprehensive study in the mobility sector, where a wider range of citizens are gathered, to better understand why they choose not to participate. Finally, it could be interesting to investigate the concept of ULL through using a leadership approach, by focusing on how e.g. the public stakeholders work under the Complexity Leadership Theory to create adaptive spaces between the subsystems (cf. Uhl-Bien et al., 2007).

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