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# RETAINING WAYS OF CO-CREATION

*Research Paper*

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## Abstract

*The design space of future mobility services is considered a wicked problem, as many stakeholders from the public and private sectors need to collaborate to create sustainable future services. Recent years have shown a growing interest in utilizing urban living labs (ULL) and similar quadruple helix approaches toward addressing wicked design challenges. However, when engaging in co-creation through living labs, many actors also see potential in adapting methodology and new ways-of-doing, to appropriate it and improve readiness for tackling other wicked challenges. The article draws upon a ULL initiative in the mobility service context to explore the main challenges for ULL partners to retain the ways-of-doing that develops in co-creation activities. Through our study, we identified that co-creation needs to be grounded in the known, to facilitate search and co-appropriation of the unknown as key for retaining ways-of-doing in ULL initiatives.*

*Keywords: Co-Creation, Future Mobility, Multistakeholder, Futurizing*

## 1 Introduction

The automotive industry is said to be in flux due to the digital transformation of mobility through mainly four developments; autonomous driving, connectivity, electrification, and shared mobility promoted by digital mobility services (so-called Mobility-as-a-Service, MaaS) (see, for example, McKinsey Quarterly, 2019). The levels of disruption these developments will bring with them are yet to be seen. However, the complexity of the design space in which these digital modes of future mobility will take form has increased in relation to the rising number of stakeholders needed for co-creating successful and responsible development and implementation (Chronéer et al., 2018; Löfgren, 2020). Using Urban Living Labs (ULL) methodologies to tackle these new and complex design challenges in the context of smart cities or smart mobilities has been popularized in recent years (Steen & van Bueren, 2017; Marvin et al., 2018). ULL acts as a site for collaboration and co-creation between diverse groups of stakeholders (e.g., public and private sector, citizens and NGOs), and has proven useful in supporting co-creation in these settings since they emphasize urban localized sustainability (Puerari et al., 2018; Chronéer et al., 2018) and rest on principles grounded in pluralism, openness, influence, value, and realism (Bergvall-Kåreborn et al., 2009).

However, since the ULL aims to address design challenges involving complex sustainability challenges, the objective of the design process is often dual. In parallel with the technological output of the design or co-creation process, the “ways-of-doing” of this process becomes a critical objective (EnoLL, 2022; Nesterova et al., 2021). On the one hand, the involved stakeholders aim to design a solution to a wicked design challenge. On the other hand, the stakeholders also aim to understand how the practice of solving the wicked design challenge can be retained and incorporated into their already established ways of working within their organization, to prepare them for new and complex challenges in new design contexts. While research and development have gone into explaining and promoting ULL models on a

macro level for innovation, researched knowledge on a real-world functioning level is relatively scarce (Ngyuen & Marques, 2021; Puerari et al., 2018). Indeed, the presence of a ULL is not enough to create a local innovation system (Paskaleva & Cooper, 2021), instead ‘the collaborative relationships required for transformational interventions in the future of cities need to be actively constructed by diverse actors and supported by intermediary vehicles’ (Vallance et al., 2020, pp 325). In addition, the ability to get partnering stakeholders to adopt or retain ways of working beyond the life of the project, remains a core challenge (Pirinen, 2016).

This paper will contribute to this void by reporting on findings concerning the co-creation of Mobility-as-a-Service (MaaS) concepts through ULL methodologies in two different cities in Sweden. The ULL was built on a collaboration between vehicle manufacturers, representatives from the cities, public transport, and citizens. During the lifespan of the ULL, we orchestrated co-creation on all levels, both between citizens and project stakeholders, to make sense of citizens' everyday life and between project stakeholders (Ebbesson, 2022, Smith et al., forthcoming). We analyzed our work through the prism of the following research question: *What are the main challenges for ULL partners to retain the ways-of-doing that develops in co-creation activities, and what can be done to enable this retaining process?*

To understand the real-world functioning level of the ULL, that is, the process of solving complex design challenges together across different sectors as well as retaining these ways-of-doing beyond the project, we adopted a participatory infrastructuring perspective (Bødker et al., 2017). Infrastructuring has garnered a lot of interest within the Participatory Design (PD) community in recent years due to the ability of the concept to aid in explaining how participatory invitations can be retained over time (Iversen & Dindler, 2014). In the context of this study, infrastructuring will aid in understanding the transformation aspects that take place in a ULL, thereby aiding us in addressing a persistent challenge for ULL methodology to deliver long-term change. The paper is laid out in the following fashion: First, we review related literature concerning challenges and enablers for co-creation from a MaaS, ULL, and infrastructuring perspective. Second, we describe our research approach, detailing both the setup of the ULL and methodological considerations. Third, we provide a brief description of the work we did in the ULL and reflections on these activities from stakeholders in the project. Finally, we analyze these reflections and discuss the implications for the co-creation of MaaS and ULL methodology.

## **2 Related literature**

### **2.1 Future mobility as a context for co-creation**

The context of designing future mobility services can be described as rife with wicked problems. Wicked problems can be described as ill-formulated problems where information is confusing, there are many decision-makers with conflicting values, and the ramifications of the whole system are confusing (Rittel & Webber, 1973). The reason why wicked problems are so challenging to design for is that there tends to be no clear stopping rule and no easy way to test the validity of a solution. Furthermore, as these solutions are implemented, they are not easily undone. These characteristics are mirrored in current research on Mobility-as-a-Service (MaaS) platforms since MaaS is a service that is often envisioned as a single application that can integrate all aspects of a travel experience, including trip planning and booking, payment, real-time updates, customization, and various information that is relevant to the traveler before and after the journey. In order to cover the entire journey of taking the traveler from point A to point B, the service also has to cover different modes of transport and be able to calculate ideal routes for the traveler in a setting where congestion, weather, parking space, and other factors may be relevant (Jittrapirom et al., 2017). Furthermore, in terms of gaining widespread user adoption, MaaS also have to accommodate varying user needs and profiles, such as creating a good fit for travelers that already undertake weekly multimodal journeys, as well as making the service appealing for travelers that today might rely on unimodal car use of a vehicle they own, or user groups with low overall technology adoption (Alonso-González et al., 2020). In addition, the service also needs to be balanced towards planet-centered and people-centered values (Zhao et al., 2020). Needless to say, MaaS has a lot of moving parts and involves a multitude of stakeholders in order to be developed, leading to a multitude

of challenges, drivers, and barriers when it comes to co-creating said service. The features of a MaaS platform create a design space where actors ranging from, but not limited to, vehicle manufacturers, fleet managers, city planners, traffic planners, public transport, payment providers, and policymakers need to come together to design a set of services that should fulfill the need of travelers, both today and in the future. These challenges are not uncommon or unique. Industries or practices such as mobility undergoing digital transformation through digitalization are often faced with unintended consequences which have a great impact on society (Tilson, Sørensen & Lyytinen, 2013; Vial, 2019). However, exploring the dynamics and balancing act of co-creating value for multiple parties is important, as an understanding of the frames of reference that guide the perception of how to balance the demand between different stakeholders becomes an important aspect of understanding the transformation which happens during co-creation of new services and platforms (Vial, 2019).

The interest in co-creating or co-designing services in the public and private sectors has grown in recent years, leading to increased collaboration between cross-disciplinary networks of actors (Pirinen, 2016). In order to facilitate collaboration, extant research has identified the building of trust, reconciliation of divergent goals, and search for mutual value as key challenges to overcome (Pirinen, 2016). MaaS platforms are a prime example of multi-disciplinary collaborations that face significant challenges and barriers. Identifying and addressing these issues is crucial for promoting integration between public and private transport services, facilitating accessible and efficient travel for citizens, developing sustainable business models for providers and operators, and aiding policymaking efforts related to MaaS (Zhao et al., 2020).

In order to support the development of MaaS, it is, therefore, key to identify challenges for development and implementation and find ways to address them. Extant research identifies challenges to implementing Mobility as a Service (MaaS) on macro, meso, and micro levels, including legislative, financial, and collaboration barriers (Karlsson et al., 2020; Pirinen, 2016). Challenges on the meso level include rules, regulations, and perceived roles, while on the micro level, challenges include understanding user habits and matching service offers to the users' needs (Karlsson et al., 2020).

Studies by Zhao et al. (2020) support the findings that barriers to Mobility as a Service (MaaS) development on the organizational level include difficulty understanding the complexity of MaaS as a sociotechnical system, which limits value creation and understanding societal needs. It has been argued that collaboration on the meso level is crucial for addressing challenges on the macro and micro levels, including policy, regulation, and understanding users' habits and needs (Karlsson et al., 2020). In addition, enablers for co-creation on the individual level include the capacity to work collaboratively across disciplines, curiosity about others' perspectives, willingness to learn, and motivation to engage in multi-disciplinary design processes (Löfgren, 2020).

## **2.2 Infrastructuring Urban Living Labs**

The research described in this paper draws upon experiences from organizing the co-creation of future mobility services within a ULL. Living lab methodology has evolved from testing technology in "living laboratories" to facilitate the co-creation of products and services with diverse stakeholders over the past two decades (Ballon & Schuurman, 2014; Hossain et al., 2019; Eriksson et al., 2005). The concept, which originated in ideas concerning open innovation, lead users, and user involvement, has today evolved into a methodology grounded in principles such as openness, influence, realism, value, and sustainability (Bergvall-Kåreborn et al., 2009). ULL advances the living lab concept by centering on the urban context and a localized approach rather than a broad real-life context. This approach addresses mobility as a complex design issue, requiring a bottom-up solution that considers unique local practices as opposed to top-down solutions.

The ULL as a bottom-up methodology has therefore gained increased interest for solving smart mobility or smart city challenges (Ballon & Schuurman, 2015; ENoLL, 2022; Nesterova et al., 2021; Alonso Raposo et al., 2021). Common for these initiatives is the ambition to engage and mobilize stakeholders and citizens from different societal groups toward solving design challenges, developing sustainable services through co-creation, stimulating the dissemination of findings, and scaling localized solutions.

Research on university-led cross-sector collaborations has highlighted several challenges for co-creation; a) transfer of modes of working, b) low impact on design decisions or core activities in partnering stakeholders' organizations, as well as c) heavy reliance on individual, committed participants (Pirinen, 2016). Scaling, or the ability to get partnering stakeholders to adopt or retain ways of working, therefore, remains a core challenge (Pirinen, 2016). Other challenges commonly seen in collaborative living labs concerns both engagement and meeting expectations between stakeholders with different backgrounds, cultures, and terminology (Nguyen & Marques, 2021). This can lead to situations where it is hard for stakeholders in a living lab to find their role, communicate clearly with other stakeholders, and struggle with output from co-creation that, at a glance, doesn't seem to match or reflect the output that initially was expected. In order to aid in understanding these challenges in context, we have adopted a participatory infrastructuring perspective.

The concept of infrastructuring has been used to problematize and understand the design of IT within the PD community for close to three decades, ranging from information technology as infrastructure to co-creation as a participatory infrastructure (Karasti, 2014). In order to continue to build upon this work, we will therefore characterize the ULL as a participatory infrastructure in order to both help in problematizing the dynamics in co-creation in a ULL and how potential impact can be perceived in a ULL. From a participatory infrastructure perspective, the co-creation between actors in the lab can be described as an emerging knotwork (Bødker et al., 2017) where actors form temporary and fluid connections to new actors. The emerging knotwork can also transform into a more stable network, which is crucial to sustaining and finalizing the design (Dindler & Iversen, 2014). Facilitating the creation of knotworks through careful design of interventions, methods, and tools often falls upon the participatory designer (Iversen & Dindler, 2012). It is, however, important to note that the agency to decide how the knotwork evolves does not belong to the designer; the agency is distributed over the group of actors (Dindler & Iversen, 2014).

As living labs and ULL have gained popularity over the years, the challenge of measuring impact has become a persistent challenge within the field (Paskaleva & Cooper, 2021). However, the impact has primarily been focused on the adoption of products and services, whereas the literature on infrastructure instead has focused on the ability to sustain outcomes (Iversen & Dindler 2014; Smith & Iversen 2018) and how participation can challenge the status quo (Huybrechts et al., 2017; Hillgren et al., 2011; Matthews et al., 2022). The implications this have for ULL are many, one being that impact of co-creation in a ULL should not solely be focused on the impact of isolated co-creation activities but instead, as the potential of the impact of co-creation as a catalyst to both inform design and challenge, shape or reshape institutional thinking. Iversen & Dindler (2014) has described four ideal types of sustaining dynamics related to participatory infrastructures: maintaining, replicating, scaling, and evolving. These dynamics also go further than measuring the impact of products or services generated from a ULL to describe instead how a participatory initiative can be sustained over time (maintaining), how the methodology can be used in different contexts (replicating), how findings and outcomes can be scaled in other settings, and finally how findings can be used as a catalyst (evolving).

### **3 Research context**

The research objective of this paper was to investigate and explore the main challenges for ULL partners to retain the ways-of-doing that develops in co-creation activities and what can be done to enable the retainment process. In order to achieve that objective, we drew upon qualitative data gathered during a close to 3-year long research project and ULL initiative. The ULL focused on co-creating future mobility services in two different neighborhoods in Sweden through co-creation between representatives from two different cities (CityAlpha & CityBeta), a car manufacturer (CarCompany), representatives from public transport (PublicAlpha & PublicBeta) and citizens in two different neighborhoods.

The collaborative project was structured as a mix of living lab meetups and stakeholder workshops (see fig. 1). The meetups acted as a way to disseminate findings and open up for dialogue with people outside the core project group, the meetups were, therefore, open to external guests, and project stakeholders were encouraged to invite guests from their respective organizations. The stakeholder workshops acted

as a way to move the project forward through co-creation and collaboration on findings that were uncovered during the day-to-day design ethnographic activities within the ULL. In contrast to the meetups, the stakeholder workshops were primarily open to project participants. The aim of the ULL initiative was to explore future mobility and potential future mobility services through the involvement of citizens through co-design and design ethnography. The ULL did not have a set “physical lab” but instead moved between two different neighborhoods in two Swedish cities (an urban area in CityAlpha and a peri-urban area outside CityBeta) through the organization of workshops, pop-up events, and ethnographic fieldwork where citizens and project stakeholders were involved in co-design. The ULL can therefore be described as an entity that crossed demographic, geographic, and organizational borders throughout the duration of the project.

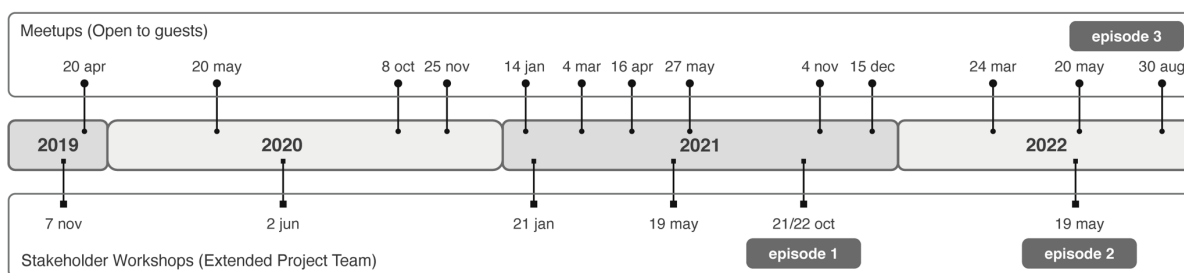


Figure 1. Project overview.

To make fieldwork and output from design ethnographic work with citizens more tangible and actionable for the project stakeholders, the research group spent a lot of time creating transferable materials that could be used in stakeholder workshops, where the direction of the project could be negotiated and co-created. This process involved taking empirical findings from fieldwork, co-design workshops with citizens, and producing narratives, illustrative models, citizen profiles based on ethnographic material, and different types of transformation games that could be brought into co-creation stakeholder workshops to make it easier to digest research findings in a playful way (Ebbesson, 2022). The stakeholder workshops acted as a neutral ground where stakeholders representing the cities, public transport, vehicle manufacturers, and citizens could co-create future mobility service scenarios and discuss the visions of future mobility services created during design ethnographic work with citizens through workshops.

### 3.1 Data Gathering & Analysis

The primary empirical findings used for the study consist of reflections gathered in conjunction with co-creation workshops and project events, where the primary stakeholders reflected on both the outcome and collaboration during the co-creation workshop they just finished and experiences from co-creation in the project. The empirical data was gathered during three events (see fig. 1) towards the end of the project. The reason for selecting these three events is based on 1) the workshops were situated at a time in the project where we had gathered enough fieldwork to open up for creative sessions between stakeholders, and 2) they constitute workshops where a large pool of stakeholders with diverse backgrounds and expertise (city planners, traffic control, local and public transit, service developers, car manufacturers and others) was invited to collaborate. During the workshops there was a mix of both genders and levels expertise, with the majority of the stakeholder representatives having senior positions within their organization. The workshops therefore represent a heterogenous mix of relevant mobility stakeholders, often found in smart city, or smart mobility initiatives, which makes it possible to generalize the findings to similar contexts:

- The 5<sup>th</sup> (2-day event) and 6<sup>th</sup> stakeholder workshop (1-day event), where 30 participants from CityAlpha & Beta, CarCompany, and PublicAlpha & Beta ideated and developed future mobility service concepts together, including a 45-minute-long reflection phase where

representatives from each stakeholder wrote reflections in smaller groups on co-creation during the workshop, and the project as a whole. The reflections were aggregated into a shared digital document to which all participants had access. The reflection document from the 5th stakeholder workshop comprised 106 written reflections concerning the benefits of co-creation and learning and takeaways from the event. The reflection document from the 6th stakeholder workshop consisted of 31 written reflections addressing co-creation and challenges for incorporating co-creation within their own organization.

- Final meetup: Co-creation workshop between stakeholders and guests, with reflections gathered on post-it notes (59 in total). The event also covered a panel where key stakeholders had prepared reflections on co-creating together throughout the project. The panel discussions comprised 2 x 30 min sessions (8 panel speakers). The audio of the panels was recorded and transcribed for analysis.

The data gathered during these events were appropriate to address the research question, as the reflections were gathered in conjunction with co-creation between key stakeholders in the ULL, when the stakeholder had the co-creation session fresh in mind. The empirical episodes were transcribed and then analyzed through thematic analysis (Braun & Clarke, 2006). The material was analyzed by both authors of the paper, and the findings were then discussed and compared. The analysis process started with a thorough read-through of all the empirical material by both authors, which led to an initial discussion of potential findings. The next step concerned coding the material, followed by creating representative themes, which were then discussed and reviewed by both authors. The final step was writing up the material. During the analysis, we noticed that each of the selected three events represented a mode of thinking in relation to the co-creation activities. The analysis, therefore, led us to divide the result chapter and analysis into three different episodes that represent three distinctly different takes on co-creation from the participants' perspectives.

## **4 Empirical findings**

In order to aid in addressing the research question, the chapter will draw upon findings from three different episodes of the ULL initiative. These three episodes demonstrate different aspects of retaining ways-of-doing in a ULL and range from the stakeholders' first steps of familiarization with co-creation to reflection on the impact it can have on their own practice. Throughout the episodes, we zoom in specifically on how stakeholders in the project grounded perspectives in the everyday life of citizens, dealt with the unknown and uncertainty, and based on their experiences in the project, perceived moving forward with co-creation beyond the ULL.

### **4.1 Episode 1: Workshop (October 2021) – Grounding Perspectives**

During the first episode, stakeholders from the public and private sectors met during a co-creation workshop organized to have key stakeholders in the ULL engage with ethnographic findings from fieldwork in the ULL concerning citizens' everyday mobility. During the workshop, the stakeholders engaged with the ethnographic findings, and some initial future mobility services concepts developed around these findings. An important outcome from the workshop that participants expressed was that it was enriching to meet different stakeholders, develop a common language and learn about different practices. One participant expressed it as:

*“Wonderful to see how easily we find different ways to collaborate. However, we still have a long way to go. There are still blockers to making collaboration more tangible and leading to actions in the cities and the industry. Joint development of guidelines/standards/legal requirements may help.”*

It was noted how the workshop led to fruitful discussions where it was clear that the different competencies of the different stakeholders were informing the work. The workshop also contributed to

gaining a clear picture of the role other stakeholders held and how they positioned themselves, a participant expressed it as follows:

*“It was good to see the benefit of making the tensions of different positions and stakeholders explicit. Expressing where people have different interests, different rationales, languages, and values can create the basis for a more open and honest discussion - and also for finding common ground.”*

It was also appreciated to try out new methods for collaborating together concerning service concepts, as the ways-of-doing in the ULL were quite different from how many of the representatives from the city were used to working, both concerning what type of data they worked with, the ethnographic fieldwork that had informed it, and the style of designing service concepts together:

*“What we have worked with in the workshop is quite far from what and how I generally work in my role. Life is a constant learning curve, and this workshop and the project, in general, open up new things in my portfolio.”*

The workshop also provided a way to ground the mobility service concepts in citizens' everyday life instead of assuming them. Which, according to one of the participants, was the best part of the workshop:

*“Getting different perspectives instead of assuming them, getting insights from the research that has been conducted with real people, and getting a better and more concrete understanding of the opportunities we have to collaborate and to create solutions that address real problems”*

The grounding was also appreciated by participants from the industry who described how it was easy to get satisfied with solving an issue for a user without fully understanding the implications for the city or infrastructure. Co-creating through the workshop aided in building an understanding of mobility challenges that were both practical and down to earth, where you could understand the challenge from additional perspectives. However, even if it was seen as rewarding to meet, discuss, learn about other professionals' perspectives, and learn about the findings from the two ULL sites, it was evident that there remained challenges to adopting these findings into some of the participant's everyday work practice. A city planner expressed it as:

*“In my role, I normally work with rather concrete stuff - planning the city, now lots of questions remain unanswered, and the possibilities are endless, which makes it difficult to apply all the findings to my field of work directly.”*

However, even if there still were a lot of unanswered questions and challenges, that was perceived to be a part of the process and seen as a natural part of trying to predict the future. These questions concerned not only what the future would look like for citizens in relation to mobility but also what roles, for example, the municipality would have in the future.

Another issue seen as both important and challenging was how social value could be incorporated into everyday work routines, a city representative elaborated.

*“Social values play an important role, but it is hard to “decide on” what values are worth underpinning.” Could some kind of checklist be useful? Then you also document what you reject. However, I am not very fond of checklists since they are hard to spread and implement”*

## **4.2 Episode 2: Workshop (May 2022) – The Unknown & Uncertainty**

From the CityBetas stakeholder participants' side, it was evident that they were concerned with finding ways-of-working that could aid in understanding citizens' everyday mobility needs in a better way. The key, according to the participants, was to establish stronger relationships and dialogue with citizens and connections with other actors. A key ingredient missing in the methods that had been developed and used during the time in the ULL was ways to involve politicians and state-governed organizations such as the traffic authority and similar organizations. The goal going forward for the cities was also to align themselves better towards the United Nations sustainability goals of Agenda 2030. This meant, among other things viewing mobility as part of a lifestyle and understanding how behavior concerning mobility can be changed. Changing how mobility is perceived was also on the agenda for CityAlpha, where participants stressed the need for reframing how mobility was perceived within the organization, from



purely viewing mobility from an efficiency point of view towards more focused on the social context of mobility and value it provides from a social perspective.

*“We have to think differently about mobility. The first and last mile is about social values, not efficiency. It is about human interaction and trust, not about a specific means of transportation - this can vary according to seasons, person, and need.”*

Working with these issues was perceived to be challenging, and the participants from the city expressed a need for an external party like a university to help implement methods they had used in the ULL in their respective organizations to help manage these challenges. The reasoning was rooted in the realization that the city needs to make better pre-studies to understand sustainability mobility before procuring new mobility services to match current and future citizen demands. The findings concerning the need for competence that can aid in facilitating or mediating between parties were also mirrored by CarCompany, who expressed the need for boosting their competence concerning the facilitation and mediation between partners concerning technology, business, infrastructure, and policy. Furthermore, the need to shift towards understanding mobility from a social or ecological sustainability point of view was also mirrored by CarCompany, a participant from CarCompany expressed that they need to:

*“Meet user needs, community needs, and planetary needs in balance, based on local values and principles.”*

The main barrier or challenge of getting there through applying ways-of-working used in the ULL, according to CarCompany, was primarily management and being comfortable with uncertainty. A tool that had been helpful to manage uncertainty and to help the stakeholders position themselves during the workshop was the transformation game developed within the ULL. The transformation game brought design ethnographic findings concerning social value in the two neighborhoods into the workshop in a playful manner, by guiding the discussions towards social value.

### **4.3 Episode 3: Workshop and Panel (August 2022) - Winds of Change**

During the panel discussion, the representative from CityBeta expressed how working with ethnographic data through co-creation is time-consuming but rewarding and that initiatives like the ULL should be a place where the city continues to be involved. However, the representative also remarked how the city also needs to reframe how the city thinks about all the interfaces they have with citizens through their city servants, interfaces such as schools, social care, and healthcare, to name a few. These city servants can be part of the solution of grounding new mobility services in people's everyday life, as they collectively know a lot about the city and people's everyday needs and wants.

A key challenge, according to the representative from CityBeta, is to develop more knowledge about social and equity aspects of transportation and bring more of the Agenda 2020 goals into it. One way forward, according to CityBeta, is to bring in more approaches that focus on human experiences, like the ones used within the ULL. Furthermore, it was also noted that additional stakeholders need to be engaged through innovative methods to bring policymakers and public agencies to the table.

The representative from CityAlpha shared much of the sentiment of CityAlpha but went into detail concerning the need for striking a balance between citizen need and societal need and finding a way forward by blending the processes that the city currently works with, and the methods introduced through the ULL to solve challenges together.

*“We must work together, that is very obvious, and it is important to work together, to get all different perspectives from the city, us, and companies, so I think that is the key here. [...] and I think we can use the methods from the project and use the transformation games and user stories as a platform for all these discussions.”*

The representative explained how the city, as a public organization, also has to take both politicians and long traffic agreements and traffic procurement processes into account and put that in relation to findings from living lab activities. A way forward could also be to not just look at the output from the ULL in terms of concept for services but also look at the findings concerning citizens' wants and needs and use

these to reflect on services that are already running to investigate if they really fulfill the need they set out to meet.

The CarCompany representative described how the primary challenge for them as an organization concern reframing how companies and society think about mobility. As a global company, it is sometimes challenging to work with “local values” since you need to produce global products. However, according to the representatives from CarCompany, that doesn’t mean you shouldn’t focus on social value. A way forward towards reframing mobility can, therefore, according to the CarCompany representative, be to tell strong narratives about real value for people. The representative continued and explained that a challenge to bringing methods and ways-of-doing in the ULL into the automotive industry right now is that they are in the middle of transforming from old business models towards new models, a shift that also society needs to make concerning for example, the willingness to share:

*“We can see in the ULL results that people that don’t own a car, are very interested in cars that you share. But if you ask someone that already owns a car, they are not interested in sharing, because personal freedom, freedom to move in a personal and sustainable and safe way”*

An important challenge is, therefore, to find ways to explore other business models that reflect what people want, and that go beyond sharing.

## **5 Analysis**

The following chapter will provide a brief review of the empirical findings from the thematic analysis of the three episodes sampled from the ULL. The three main themes found concerning the retainment of co-creation during these episodes were *grounding in the known*, *searching for the unknown*, and *co-appropriating the unknown*. During the analysis, it became evident that the process of grounding in the known created buy-in and familiarization with the idea and utility of co-creation, which was necessary for moving forward. As the participants saw the utility of co-creation as a method for solving problems, they moved forward in the process by attempting to find additional actors and pieces of information that seemed vital for co-creating together through a search for the unknown. These two steps lead them to the final step, co-appropriation of the unknown, where they could manage the uncertainties of the co-creation process and retain it as a way-of-doing.

### **5.1 Grounding in the known**

During the first episode (Workshop 1), it was evident that a lot of focus from a stakeholder perspective was spent on figuring the other stakeholders out. There was a need to position yourself in relation to others and identify how the different stakeholders in the ULL contributed to the work. This was expressed by both city representatives and industry representatives. The role of the workshop as a way to help participants identify different interests, rationales, values, and terminology, therefore, became evident. It was also seen as an important activity in order to learn about new ways of working that could help improve the participants' skillsets in relation to both collaborating with other stakeholders and to learn how to ground development and procurement of mobility services in citizens' everyday context. The workshop, therefore, contributed to helping the participants of the workshop to both ground their everyday work in relation to other stakeholders and in relation to citizens' needs and wants and to expand their palette of tools and methods that they were familiar with. The workshop was also quite frictionless in terms of interaction or co-creation between public and private partners; the city representatives and the industry representatives seemed to share both agenda and objectives by being curious about each other's roles in the ULL. Instead, the challenge seemed to revolve around reframing mobility and expanding the concept of mobility to something that goes beyond efficiency also to include social value. Based on the findings, grounding also appeared to be an important part of the retaining ways-of-doing, as the grounding allowed for making impressions, and the perceived value of co-creation created an understanding of co-creation practice and ethos.

## 5.2 Searching for the unknown

During the second episode (Workshop 2), the participants primarily worked collaboratively on designing future mobility service concepts in smaller groups using design techniques and methods developed within the ULL. The techniques helped the participant to ground the services in citizens' everyday life to provide social value.

However, through the participants' post-workshop reflections, it became evident that they had realized that there was a piece of the puzzle that was missing for them to tackle future mobility concerning methodology, stakeholder setup, and perspectives on mobility. The barrier or challenge they saw going forward was not a mismatch between how industry and the public viewed future mobility but rather how participants from both sides viewed mobility from similar quantifiable perspectives. The challenge instead seemed to lie in finding tools for how to work with reframing or rethinking mobility as a concept. Immersing themselves into co-creation and appropriating co-creation methods into their toolbox, therefore, seemed to have kickstarted a process of trying to find the missing puzzle pieces that could help the participants get a fuller picture of the challenge they were trying to address. This was expressed as the need to enroll and engage additional actors in the project. Examples of these actors were decision-makers such as local politicians. The stakeholders from the city saw potential in using transformation games in co-creation activities with politicians to help convey what social value a future mobility service could have for citizens. Other actors that were identified as important to enroll were representatives from state-governed organizations like the traffic authority.

The value of the ULL as a methodology and milieu was also highlighted through the expressed interest in having an external party help organize workshops between themselves and additional partners such as policymakers and other actors, as the participants had realized that this was challenging to do on their own.

## 5.3 Co-appropriating the unknown

During the second and third episodes (Workshop 2 & panels), it became evident that the city and industry representatives were quite aligned concerning what was needed to tackle future mobility challenges.

A key enabler during the process of both searching for and appropriating the unknown seemed to be, as a CarCompany representative expressed it, being comfortable with uncertainty, which also resonated with how, during episode 1, city representatives had expressed how the ways-of-doing created results that weren't as concrete and tangible as they were used to. The research team tried to accommodate this need by transforming "intangible" findings into workshop material that was more tangible, and thereby through "transformation games," tried to help or guide the participants through uncertainty.

Throughout episodes 2 and 3, we experienced how the transformation games helped the participating stakeholders to start co-appropriating unfamiliar themes together. It also became apparent that the methods and transformation games helped the participating stakeholders to move one step forward in the process, as they started suggesting how the transformation game could help them both engage with new stakeholders and to engage with new themes and concepts such as social value, or social sustainability, themes the participants agreed was important to work with, but previously have found it challenging to approach due to not feeling familiar with them, or used to working them, as the dominant perspective in their everyday work-life often concerned efficiency in relation to mobility, and not social aspect to a large degree.

## 6 Discussion

The empirical findings and analysis illustrate how the participants during the three empirical episodes developed their ability to co-create and adopt ways-of-doing co-creation. In turn, this highlights the challenge of *searching for the unknown* as one of the primary challenges when supporting co-creation in a ULL and methods for *co-appropriating the unknown* between a flexible set of stakeholders as a key enabler to support retaining ways-of-doing.

## **6.1 Addressing challenges to co-creation**

Extant literature covers how challenges for the co-creation of MaaS platforms exist on the meso, macro, and micro levels (Karlsson et al., 2020), challenges driven by future mobility as a wicked problem to solve. Throughout the three episodes, we can follow how the participants use or see the potential of using the methodology they adopted during their time in the ULL as a tool for addressing some of these challenges. On the micro level, previous research has identified challenges concerning knowing the context you design for and its impact on society (Karlsson et al., 2020; Zhao et al., 2020). During the co-creation activities, it was clear that the participants experienced how grounding their future mobility service in the everyday life of citizens and social value sparked interest in adopting the methods into their own work practice. Similar notions were evident during the panel in episode 3, as it was detailed how the process had sparked ideas for how to reframe the way the city conceptualized dialogue with citizens as something that also could be used for input for design. These findings are not surprising as both Hillgren et al. (2011) and Matthews et al. (2022) have demonstrated previously how co-design can challenge the status quo and inform and reshape the conditions of design. However, we argue that activities that aid in grounding also create a space where the participants can perceive the value of co-creation and open up for buy-in and embrace the co-creation way-of-doing things. We perceive this as the first step towards being able to retain ways-of-doing co-creation, as it is not feasible to retain something which you do not believe will have an impact. Achieving this can, however, be challenging, as extant literature has identified a lack of collaboration culture (Pirinen, 2016) as a key challenge for co-creation, and more specifically, perceived roles and responsibilities as challenges for the co-creation of MaaS platforms (Karlsson et al., 2020). As illustrated by our findings, activities focused on grounding, through, for example, the use of transformation games (Ebbesson, 2022) as covered in our case, can aid in addressing some of these challenges, as transformation games have the potential to help stakeholders find new ways of positioning themselves around the design challenge they are trying to solve, and thereby breaking away from established norms.

We interpret the repositioning around the design challenge as a crucial component of supporting and retaining ways-of-doing co-creation in ULL as the repositioning opens for identifying gaps that need to be filled to address the mobility design challenge. In our ULL, this was illustrated by the search for new relevant actors and stakeholders (e.g., local politicians, policymakers, and representatives from state-governed organizations) to enroll in the project, a search that began after the participants had established a common ground. We interpret the search as a way to try to address challenges on the macro level (Karlsson et al., 2020), challenges such as legislation, deregulation, vision, and financial support, and in the long run, enable the participant group to shape, understand, and interpret future visions and policy to either align the service with current or future legislation and regulation or to align and ground ideas with local politicians by for example playing transformation games. Grounding, therefore, becomes a crucial first step towards setting out on a joint co-creation journey, where new actors can be invited, and the participants can appropriate both findings from the ULL and ways-of-doing co-creation.

## **6.2 Approaching new territory together**

Through our experiences in the ULL and the empirical episodes, we can trace how the participating stakeholders had to undergo a journey (see fig. 2). Where they first had to familiarize themselves with the logic of co-creation and “ways-of-doing” in a ULL. For some participants, this meant getting accustomed to working with data, findings, and methods they rarely meet in their everyday work. In short, we can sketch out a journey that starts with grounding and getting adjusted to what Pirinen (2016) refers to as a collaboration culture. We observed how the beginning of this journey could put the participants in a state of flux, where they needed to renegotiate and challenge current practices, an experience shared by both representatives from the public and private sectors. These findings resonate well with research on participatory infrastructures and the potential of co-creation to challenge institutional logics and schemas (Matthews et al., 2022) and partly explain why some partners who enter into living lab collaborations can experience this as a challenging and messy process where strategies, processes and expected outs change as the living lab process unfolds (Nguyen & Marques, 2021). In the

ULL covered in this paper, grounding activities acted as an important step to help stakeholders make sense of this messiness, but this might not be true for all cases, which echoes the need for additional research (Ngyuen & Marques, 2021; Puerari et al., 2018) that focus on the real-world function level of ULL activities, as it has the potential to explain why some living lab initiatives fail, where others succeed.

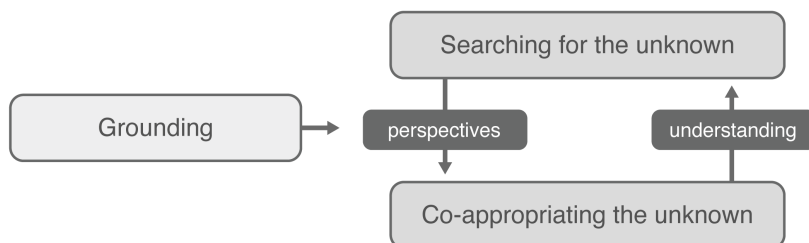


Figure 2. Co-appropriation during the journey of co-creation.

When a collaboration culture (Pirinen, 2016) starts maturing and ways-of-doing co-creation become appropriated by participants, we see what we interpret as the second leg of the journey start for the participating stakeholders. As participants from both the public and private sectors started to build common ground, find their roles, and overcome challenges on the individual level (Löfgren, 2020), we saw how what we interpret as a search process began. We interpret the search process as a way to seek answers to questions the stakeholders did not have when the collaboration in the ULL was initiated. That is, the journey has taken them to a step where the actors realized that they could not solve the challenge of designing future mobility services alone, instead, they needed to expand the knotwork (Dindler & Ivernsen, 2014) of partners to gain a more extensive picture of the problem space. We interpret this step of the journey as a way of realizing and attempting to grapple with the challenge of understanding the complexities of the MaaS platforms as a sociotechnical system (Zhao et al., 2020; Karlsson et al., 2020; Zhao et al., 2020). The ability to extend the knotwork of actors in the ULL would enable the existing stakeholder group to align new actors (e.g., decision-makers) with their attempt to solve the design challenge while also gaining additional perspectives (e.g., domain experts), which could help tease out and understand the challenge better.

As the search process began, we can also trace how the participating stakeholders started to seek to explore unfamiliar contexts and concepts together. That is, rather than viewing the co-creation processes as an arena for finding your role and positioning yourself towards other stakeholders or the ethnographic findings, as we had experienced during episode 1, the participating stakeholders now started to try to co-appropriate unfamiliar concepts together through the transformation games. Instead of aligning themselves with other stakeholders at the workshop, they jointly attempted to align themselves with themes such as different social values derived from the ethnographic research. We interpret these changes in dynamics as a shift in agency away from each stakeholder to instead collectively shifting the agency to the cause, which is the wicked problem that needs to be solved. The participants, therefore, jointly make co-creation a vehicle for making what they perceive to be intangible challenges, such as Agenda 2030, more tangible through a process of co-appropriation. However, getting to this point required embracing co-creation as a practice and struggling with taming uncertainty until reaching a point where the mastery of the process leads to seeing the potential of applying the process in similar contexts. Based on our findings, we, therefore, define the process of co-appropriation (see fig. 2) as integral to co-creation through the way the participants not only learn to master uncertainty but also collectively form a common understanding of the uncertainties that they can apply in new situations.

### 6.3 Implications for ULL & retaining ways-of-doing

This study focuses on detailing findings from a ULL that goes beyond the macro level to focus on the real-world application level of living labs, a strand of research that is relatively scarce (Ngyuen & Marques, 2021; Puerari et al., 2018). Even though the findings in the study are limited to one ULL

initiative, it provides both explanations and suggestions for how persisting living lab challenges can be managed and should be considered as an additional piece of the puzzle of understanding living lab challenges on micro and meso level in the context of retaining ways-of-doing in a ULL.

Through the paper, we sketch an outline for viewing co-creation as a journey that takes its departure in grounding towards a process of search for the unknown and co-appropriation of the unknown. From the point of view of facilitating a ULL initiative or retaining ways-of-doing co-creation, we can draw a few conclusions. Firstly, grounding presents an opportunity to create buy-in and immersion in co-creation practice, which will open up a space for stakeholders to renegotiate their own practices and enable retaining ways-of-doing co-creation. In the case of our ULL, a strategy that worked was to make the intangible more tangible through transformation games (Ebbesson, 2022), where stakeholders can explore common themes together. However, this solution might not work in all contexts, exploring other ways to support grounding and possibly also as a way to address expectation gaps in living labs practice (Ngyuen & Marques, 2021) is therefore encouraged. This is an important step forward to retaining co-creation in ULL, as grounding through transformation games provides both a way to retain ways-of-doing, while also presenting a way to sustain co-creation methods, as the transformation game provides a scalable vehicle for co-appropriation that participants can bring home to their everyday work practice. Secondly, as illustrated by extant literature, it is crucial to help facilitate the creation of fluid knotworks in a participatory infrastructure (Dindler & Iversen, 2014). In the context of a ULL, you might therefore consider preparing for a flexible management structure where it is possible to involve or enroll additional stakeholders during the life of the ULL. Based on our findings, this is key to supporting the process of co-appropriation, as the process revolves around searching for and shaping the unknown, which in some instances means enrolling new actors to unlock new perspectives needed to solve the design challenge at hand. Secondly, there needs to be room to renegotiate goals and deliverables as the search and co-appropriation part of the journey begins.

## **7 Conclusion**

The article set out to address the question of *what are the main challenges for ULL partners to retain the ways-of-doing that develops in co-creation activities and what can be done to enable this retaining process?* Through the empirical findings and analysis, we identified the main challenge of supporting the co-creation journey of *grounding in the known, searching for the unknown, and co-appropriating the unknown* as key for ULL initiatives.

Grounding in the known concerns facilitating activities where participating stakeholders are aided in appropriating ways-of-doing co-creation through workshops and other activities. Immersing stakeholders in co-creation through grounding enables buy-in and adoption of the co-creation practice. Grounding, therefore, becomes a crucial first step towards setting out on a joint co-creation journey, where new actors can be invited, and the participants can appropriate both findings from the ULL and ways-of-doing co-creation.

After a co-creation practice has been established, the next challenge is to support the *process of searching for the unknown and co-appropriating the unknown*. This process is defined as a process of collective sensemaking of unknowns, wherein a common understanding of the unknown builds up. As the common understanding develops, the collective seeks to enroll additional perspectives to the co-appropriation process through the addition of new stakeholders. The process of co-appropriation can be supported through management structures in a ULL that allows for flexibility concerning the enrolment of new stakeholders, room for the renegotiation of goals and deliverables throughout the ULL initiative, and co-creation methods which aid in transforming findings to become more tangible for participants.

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