Experimentation for sustainable transport?

Risks, strengths, and governance implications

EDITED BY

Kelsey Oldbury,
Karolina Isaksson,
Greg Marsden

LINNEFORS FÖRLAG

K2 is Sweden's national center for research and education on public transport. K2 is where academia, the public sector and industry meet to discuss and develop the role of public transport in Sweden. K2 is operated and funded by Lund University, Malmö University and VTI in cooperation with Region Stockholm, Region Västra Götaland and Region Skåne. K2 is supported by Vinnova, Formas and the Swedish Transport Administration.

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Any conclusions and recommendations expressed are the author's own and do not necessarily reflect the views of K2.

ISBN 978-91-88651-14-3

Linnefors förlag, Boxholm, Sweden
www.linneforsforlag.se

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CONTENTS

– Chapter 1 –

Experimental spaces for sustainable transport - the critical role of public actors

Kelsey Oldbury, Karolina Isaksson, Greg Marsden

We are living in a time where the climate crisis, together with other urgent sustainability questions, emphasise the need for a fast, radical and pervasive change within the transport sector. This need has been apparent for many years, but work to realise it has continued to progress at a slower pace than required if we are to bring about sustainable transport systems. Over the past decade, research on climate transitions has established that neither 'top-down' governance nor incremental efforts have managed to create the kind of structural and more sweeping transformation seen as necessary to break unsustainable patterns (O'Brien, 2012; Bulkeley & Castán Broto, 2013). The transport sector specifically is characterised by noticeable inertia, lock-ins and path dependencies which affect vehicle technologies, infrastructure, social practices as well as planning and decision-making.

Against this background, research and policy development in the transport domain have developed a noticeable interest in different kinds of *experimental* governance efforts and the possible role these can play in climate and sustainability transformation. Discussions taking place in research on climate governance and sustainability transitions have increasingly directed attention to the need for and potential of experimental approaches as a way to challenge and change established structures, organisational practices and ways of working.

At the same time, developments in the transport sector during the past decade have been characterised by a recurring focus on new technology as a key possibility to meet the challenges of the climate and sustainability crisis. Digitalisation and other examples of 'smart mobility' – such as automation, new concepts for shared and combined mobility etc. – have been central to the transport sector's interest in the potential of new technologies and concepts, and have fed the interest in experimentation and a belief (often optimistic) in innovation (Lyons, 2018). Overall, we have seen the growth of different kinds of pilots and demonstration projects, organisational innovation platforms, testbeds and other experimental techniques (or what we describe as experimental spaces). These have different implications for governance, policy and planning in the transport sector.

We recognise and acknowledge that experimenting and testing can be important and necessary in processes of change. However, the long-term implications and effects of current pilots and demonstrations for new mobility concepts are still unclear, and questions remain, such as how they ultimately contribute to sustainability and social responsibility, who gets to experiment, and how these spaces of experimentation connect to, and are able to shape, reshape or challenge established planning processes and power relations. Previous research has already looked at broader themes of the governance of smart mobility (Marsden & Reardon, 2018; Paulsson & Hedegaard Sørensen, 2020). Urban experiments have also been a major theme of urban planning literature in recent years (see Karvonen et al., 2014) and in literature on the governance of climate change (Bulkeley & Castán Broto, 2013). While transport and infrastructure questions are included in this literature (Berglund-Snodgrass &

Mukhtar-Landgren, 2020; Oldbury & Isaksson, 2021), a clearer discussion about the specific implications of experimental practices for transport and mobility planning deserves more attention. One theme which has emerged as central in the research literature is the role of public actors (i.e. municipal, regional and state/national levels) in these changes, especially when it comes to their existing and potential role for securing a sustainable development path and public good.

Questions around the roles, opportunities and responsibilities of public actors in experiments and innovation initiatives for sustainable transport are thus receiving attention in contemporary research. However, it is not clear how the emerging academic discussion has landed among actors in the public sector. There is a need for more dialogue and interaction among research and practice around these themes, and this is one of the motivations behind this anthology.

AIM OF THE BOOK

The overarching ambition of this book is to generate dialogue between research and practice around the phenomenon of experimentation, its prospects, and limitations in terms of sustainable transport transformations. It seeks to communicate key insights, themes, and questions from current research for public actors with key roles in governing the transport system to reach goals of sustainable transport and mobility.

The book seeks to highlight and discuss the following questions:

- *What are the strengths of experimentation? What prospects can it bring for sustainable transport and mobility?*
- *What are the limits of experimentation? What can it not bring, and what are the risks involved?*
- *What are the governance implications, in light of the need for a rapid transformation to sustainable transport and mobility systems?*

To realise this aim we include chapters from researchers from Sweden and the UK researching various aspects of experimentation as well as key take aways from current research to practitioners. We have aimed for a style of text which is grounded, accessible and less academic, and have therefore aimed to keep references within the texts to a minimum. We also intersperse the chapters with shorter, stand-alone quotes from practitioners and experts from the Swedish and Danish contexts to include some direct reflections and experiences with experimentation within the transport sector. These quotes come from discussions at a workshop held in April 2022 by the two K2[1] research projects 'New Mobilities in the Making' and 'Organizing innovation: learning from pilots and testlabs'.

TRANSPORT PLANNING UNDER PRESSURE: THE EMERGENCY TO TRANSFORM

The transport sector is facing a massive need for change. At present, it accounts for more than a quarter of domestic green-

1 K2 is Sweden's national centre for research and education on public transport. www.k2centrum.se/en

house gas emissions in Europe (air travel not included) (EEA, 2021). Needless to say, transport provides important benefits to society by establishing connections and flows of people and goods, thus providing opportunities related to work, housing, education, business, getting to know new people and places etc. At the same time, there are a range of negative impacts (for example, air quality, noise, safety, health, biodiversity and use of land) which have been known for many decades but have prompted only limited change in our mobility systems. The climate emergency presents a critical and time-bound challenge that demands a different response.

During the last decade, many policy initiatives have been formed aimed at creating pathways for reducing greenhouse gas emissions, for instance measures for enhanced energy efficiency of vehicles, and a shift to fossil-free fuels. However, the emission-reducing impacts of these types of measures have typically been eroded by an increase in private vehicle kilometers travelled (Marsden & Rye, 2010), and altogether, current efforts to reform the transport sector have so far had limited impact on total climate emissions, at best holding them steady. There is now hope that rapid electrification will be a solution to this problem, but research on sustainable travel shows that electrification needs to be combined with a modal shift and reduced travel if we are to achieve climate and sustainability goals (Banister, 2008; Brand et al., 2020). It is also important that measures to reduce climate emissions do not conflict other critical sustainable development goals related to, for instance, biodiversity, sustainable living environments and social inclusion. Hence, a sustainable transformation of transport can not only rely on technical developments but must include changed mobility practices and changed assumptions of what is seen as

standard modes of travelling, reasonable travel times, and a sustainable extent of travelling.

So far, it has proved difficult to establish and successfully implement effective policy and planning measures for sustainable transport. Some of the specific challenges related to this sector of society involve the ways in which transport and mobility are deeply intertwined with economic structures, culture and social life (Urry, 2007). The current transport system is also embedded in ideas about progress and welfare at both collective and individual levels and continues to have a massive impact on the shaping of cities and regions (Lundin, 2008). It has proved to be politically risky to suggest and implement measures that explicitly challenge a highly mobile lifestyle based upon the car as the norm for everyday travel. It is within this policy context that we have recently seen an increased focus on experimentation. However, it should be noted that experimentation and testing in the field of transport is not in itself new. As shown by historical research, intensive testing and experimentation also went on in the early days of motoring, with different types of cars and methods of propulsion (Geels, 2005). Also, when it comes to the design of road space, initiatives for traffic safety, etc., much experimenting, testing and learning has taken place over time (with centre railings, speed cameras, systems for driving support etc.). In the Swedish context, the introduction of congestion charging was carried out after a city-wide experiment with a six-month long trial period before the final decision on realisation was taken (Isaksson & Richardson, 2009). What is new is thus not experimental initiatives as such, but rather how experimentation is today highlighted as a way of solving major societal challenges related to transport and mobility.

A RICH FLORA OF EXPERIMENTATION CONCEPTS AND ACTIVITIES

(Urban) living labs, pilot projects, demonstration projects, tests, test beds, trials, innovation platforms - these are all terms which are commonly used to discuss different types of interventions used to test new technologies and concepts in the transport sector. The range of terms listed above has been described as a "palette of partially overlapping terms and approaches" (Evans et al., 2021, p. 172). Overall, these have all been described as different forms of experimentation. In this chapter we do not aim to present a full overview of the different concepts. Instead, we are interested in what we see as commonalities between the different terms. We understand the range of concepts used as representative of the different ways of organising experimentation and understand them all as concepts which highlight that there is a diverse repertoire of experimental practices which all generate specific contexts, or spaces, of experimentation.

In this book, we have found inspiration in Bulkeley and Castán Broto (2013, p. 363) who defined experimental activities as "interventions in which there is a more or less explicit attempt to innovate, learn or gain experience". Urban experimentation differs from experimentation "in the formal scientific sense" (ibid), as urban experiments are often rolled out in real-life settings, offer no or minimal control over different variables, and are challenging to recreate exactly (Scholl & de Kraker, 2021a). In line with Ryghaug and Skjølsvold (2021, p.4), we use the terms pilot projects, demonstrations, and experiments interchangeably to describe "smaller projects, as well as larger, targeted sets of projects and policies that set out to explicitly create new socio-technical realities within a demarcated site". Other concepts such as Urban Living Labs (ULL) have been

used to refer to a broad range of (relatively simple or more complex) interventions in urban settings, where multiple actors are brought together in interventions that are purposively developed "to address contemporary urban challenges and foster learning through forms of open and engaged experimentation" (Bulkeley et al, 2016, p. 13). However, the ULL concept has been described as a 'wet bar of soap' (Hakkarainen, 2017).

Overall, we suggest six main similarities between different types of experimental spaces and practices:

1) Experiments are often a distinct organisational form, something which has been described by Mukhtar-Landgren (2021) as 'temporary organisations'. These often take the form of new kinds of collaborative partnerships between different public, private, academic, and civil society sector actors.
2) Experiments are commonly implemented in a specific geographic area or local context usually at a delimited scale (Sharp & Raven, 2021).
3) They are commonly also 'real-world interventions' (Torrens & von Wirth, 2021).
4) Experiments often have a technical orientation, meaning that the pilot, or project, is a setting in which a novel technology is tested (Bulkeley & Castán Broto, 2013; Späth & Knieling, 2020).
5) Experiments have commonly been discussed as setting out to test alternative futures, learn, and navigate the complexities of climate change and the need for transformation (Torrens & von Wirth, 2021).
6) Despite being characterised by transformative ambitions,

> Hodson et al (2017) note that experimental activities often have an ambiguous relationship with sustainability. Sustainability itself is a 'wicked' problem, and even within experimentation there are multiple understandings of (and perspectives on) sustainability that shape experimental processes.

While experiments may begin in connection to specific, predominantly urban, geographic contexts at a limited scale, they are often expected to have broader, system-wide effects (often discussed in terms of 'scaling-up' or more recently as processes of 'embedding'). Bulkeley and Castán Broto also describe experiments as "interventions within wider socio-technical systems" (2013, p. 366). Experiments taking place within the transport system face the challenge of balancing the systematic, networked nature of transport systems (which often stretch over urban, semi-urban and rural geographies and jurisdictions) with the specific contexts in which experimentation unfolds. How can the limited scale of an experiment match-up to the scales and sites of transport governance? Can the special conditions which facilitate the demonstration be replicated at a larger scale and for wider populations? Does the small example implemented provide a meaningful impression of the implications of a scaled-up version? In the concluding chapter we discuss the specific insights this selection of chapters can bring to these challenges.

THE CRITICAL ROLE OF PUBLIC SECTOR ACTORS

The use of experiments has been described as a response to path dependencies and fragmented governance and planning landscapes, and a way to approach and address the complexity

of problems (Scholl & de Kraker, 2012b). However, Torrens and von Wirth (2021, p. 3) emphasise that although experimentation has been met with enthusiasm, it is in essence a multifaceted phenomenon "with both positive and negative implications". How to govern a transition to a sustainable future – i.e., *how* to actually implement changes needed for the sustainability transition and not just identify the need for change (Isaksson & Hagbert, 2020) – is something which "remains a key challenge for urban policy-makers, planners and practitioners" (Marvin et al., 2018, p.3).

In this anthology we are specifically interested in the role of public sector actors in experiments, and the influence of experiments on public sector roles. As mentioned above, experimental spaces create organisational contexts where various actors work together as part of a temporary organisation. As Eneqvist and Karvonen (2021) note, the collaborative nature of experimental settings constitutes a different logic than the usual hierarchical structure or bureaucratic logic which usually orders the work in public institutions. The term 'experimental governance' has been introduced to highlight living labs, pilots, demonstrations and trials, as specific governance contexts where different actors work in collaboration to test and implement solutions and possible futures (Kronsell & Mukhtar-Landgren, 2018). This has also been referred to as 'governing through experimentation' (Torrens & von Wirth, 2021). In relation to this, experiments such as pilots and test-beds have also been discussed as policy instruments (Paulsson & Hedegaard Sørensen, 2020) and as new forms of planning (Berglund-Snodgrass & Mukhtar-Landgren, 2020).

One of the main questions currently being discussed in relation to experiments and the role of public actors are the ways

in which experimental processes influence, integrate with, or change existing institutions and planning processes. Evans et al (2021) highlight that there is currently a tension between the types of innovations often tested in experiments, and the changes these innovations are supposed to stimulate, and the lack of attention to how innovations may also change the organisations which ultimately have the responsibility for governing them. Drawing on previous research, Torrens and von Wirth (2021, p. 3) emphasise that experimentation is "by design" temporary, situated and organised in specific ways which demarcate experimental projects from established governance processes. However, the gap between experimental spaces and conventional planning practices is being questioned.

Experiments have been described as states of exception (Torrens & von Wirth, 2021), temporary organisations (Mukhtar-Landgren, 2021), and as tools to circumvent traditional planning processes and provide more open-ended, creative spaces for learning and innovation. In relation to this, previous research has stated that there is a need for clearer strategies and processes to ensure that the learning which happens through experiments and pilots is also linked back to, and integrated in, the regular processes of public policy and planning (Eneqvist, 2022). Eneqvist has also explored issues related to the way in which experimentation is organised and conducted, and who gets to participate in project groups, innovation labs etc. She concludes that there is a need for public actors who are engaging in experiments to "develop internal processes and procedures to be democratic stakeholders that take responsibility for the public good" (Eneqvist, 2022, p. 77).

Given the implicit and explicit assumptions in policy and literature that experimentation can lead to more sustainable

outcomes for society, we see a need to understand more about the politics of experimentation, not least when juxtaposed with the perceived resistance to changing mainstream policies which characterises contemporary transport governance. To what extent are experimental spaces becoming sites of learning, sites of exception and parallel silos, or even sites for distraction?

EIGHT CHAPTERS ON EXPERIMENTATION

Altogether, the motivations behind experimentation as an emerging phenomenon in transport planning and governance are complex. Sustainability is one of the most commonly stated motivations, together with ambitions to test and develop new technologies and concepts. Trying out and developing new organisational ways of working and collaborating is another recurring dimension of experimentation, and we note that experimentation has become a central means used by networks of actors to deal with the challenges of exploring change, learning, and developing knowledge at the same time.

As stated above, the ambition of this book is to communicate key insights, themes, or questions from current research on experimentation for sustainable transport and mobility, its conditions and possible implications for (existing) transport planning and governance. It will do so by means of eight chapters written by researchers based in the UK and Sweden, who are conducting research on various aspects of experimentation in the transport sector. Altogether six of the chapters build on research on experimental governance in the Swedish and Nordic transport planning context, and two chapters build on research from the UK context.

Swedish transport planning

Planning in Sweden is often referred to as an example of a decentralized planning system. Local municipalities control land use and water management, and regional or national authorities have only limited formal power over local development decisions, as long as these do not violate national regulations. At the same time, the Swedish planning context is characterised by organisational interdependence and a pronounced need for collaboration among different administrative levels. While the local municipalities control land use and local transport infrastructure, many transport decisions are dependent upon national funding and regulation. When it comes to public transport, it is the regional administrative level (more specifically, regional public transport authorities) that makes strategic plans and carries out procurement of public transport. In the end however, the public transport system and its functioning is highly dependent upon local land use planning. In many ways, Swedish transport planning is a collaborative endeavour, and this also characterises the emerging experimental spaces which today form a distinct part of transport governance. Experimental initiatives are often initiated and partly funded by the national policy level, but in practice, the activities in contemporary innovation platforms, pilots and demonstration projects are carried out collaboratively by local, regional and national public actors, researchers and industrial partners.

UK transport planning

The UK is often described as a highly centralised bureaucracy, despite many different devolution initiatives, most recently to elected mayors in the major cities. Regulation around the introduction of innovative transport systems requires national action and there are regular competitions run by the Department for Transport to stimulate experimentation such as the Future Mobility Zones and e-scooter trials. There is a Future of Urban Mobility Strategy and funding is directly channelled to support this through an innovation agency. Within this, however, there remains a significant degree of autonomy for local authorities, who can decide whether to participate or not. Local government acts as the highway authority for the area and is responsible for setting any amendments to rules which allow access within the national framework. Buses are run by private sector companies and, with the exception of London (and soon Greater Manchester) this is both de-regulated and privatised, meaning limited scope for direct state steering of service provision and integration.

The first of the individual chapters in the anthology (chapter 2) is authored by Lina Berglund-Snodgrass. Her chapter *Taking (any) risks in urban experiments with mobility?* builds on empirical research on risks and risk-taking in testbed planning in Swedish local authorities. Berglund-Snodgrass discusses risk-taking as an integral component of urban experiments, and an inevitable part of innovation and learning. However, she also notes that public actors are reluctant to take risks and tend to engage in the processes based on risk-minimising approaches, which means that risk is shuffled to other parties. Berglund-Snodgrass concludes that if urban experiments are to be a mode of governing for developing future mobility services, it is necessary for public actors to develop strategies and a willingness to engage with risk and risk-taking.

The next chapter (chapter 3) is called *Why getting people in the same room isn't enough. Organisational proximity and learning in public transport innovation*. The chapter, which is written by Mats Fred, Dalia Mukhtar-Landgren, Lina Berglund-Snodgrass and Alexander Paulsson, focuses on the governance and management of innovation processes. The authors note that innovation processes are often collaborative endeavours with a multitude of actors, expertise, ideas, and wills involved, and they discuss different types of proximities that are understood to support learning and innovation. As Fred et al note, there is a common tendency to emphasise physical proximity in processes of innovation, but other types of proximities such as cognitive, institutional, or social proximity (or distances) are also important. A key conclusion from their chapter is the need for public actors to focus more on the *why* of innovation.

In chapter 4: *Experimentation and platformisation - insights from a Mobility as a Service pilot*, Kelsey Oldbury discusses Mobility

as a Service (MaaS) through a platformisation lens. The chapter focuses on the way in which the key actors in a MaaS pilot navigate their roles in relation to a new digital platform. Many analyses of pilot projects for MaaS focus on the successful realisation of the concept. This chapter is interested instead on what a focus on the digital platform which supports the concept can contribute to how we can understand the governance capacities of different actors in relation to platformisation. The chapter highlights the boundaries of public actor roles, and illustrates that public and regional actors currently have a fragmented approach to platformisation. The chapter also discusses whether experiments are the right context for public actors to work with digital platforms, or whether a more co-ordinated strategic approach is needed if platforms are here for the long term.

Chapter 5: *Shaping the role of drones in UK logistics* is written by Angela Smith, Greg Marsden and Janet Dickinson. This chapter is focused on stakeholder perspectives and the regulatory and governance needs associated with the deployment of drones for logistics. The authors identify deficiencies in how public involvement so far has taken place in debates around the use of drones within logistics. They discuss how the results of trials originally intended for learning about the technical performance of drones for medical purposes are currently used for building a wider acceptance in society. Smith et al. note that the limited scope of the trials means that they cannot possibly perform this essential democratic function, and emphasises the need to provide space for broader debates which are not shaped by actors with vested interests, and where the potential use of drones for logistics are explored in a more relevant context and with a focus on potential benefits and risks for society.

Issues of democracy and public involvement are central also

in chapter 6: *Whose witnesses: An examination of the potential pitfalls of producing electric vehicles futures through experimentation*. The chapter, which is written by Chima Michael Anyadike-Danes, draws attention to issues related to the involvement of groups and individuals with physical disabilities in a charging project innovation project in Durham, UK. Anyadike-Danes shows the necessity to ensure that the conditions and experiences of different groups are included in the early, formative stages of innovation projects and pilots. His chapter is concluded with recommendations to always reflect critically on who is/was involved in the design of an experiment, who is/was interpreting the findings, the limitations of an experiment, key stakeholders and how to engage with dissenting or critical voices.

Questions regarding how different perspectives and experiences are included in different types of experimental initiatives are also key for chapter 7: *Designerly Living Labs: Design-driven experimentation*. In this chapter, Martin Sjöman and Mia Hesselgren argue that experiments driven by 'design-thinking' are significantly different from experiments driven by a more pronounced technology and innovation agenda with a focus on testing and evaluation. Based upon their experiences from interactive and experimental research, they emphasise that the design-based approach is challenging, but that it can also have major effects, for example by helping to open up the questioning of established norms and practices and by exploring and defining other possible futures.

The next chapter (chapter 8) is called *What happens beyond the experiment? Reflections on a collaborative partnership in Stockholm*. In this chapter, Kelsey Oldbury and Karolina Isaksson highlight insights from empirical research into a collaborative partnership that was developed to introduce various smart mobility servic-

es in public transport in the Stockholm region, Sweden. The chapter illustrates how experimental processes sometimes have wider impacts than originally intended. In this case, the collaborative partnership has led to more long-term impacts on the roles and relations among private and public actors involved, which in the end might affect the capacity of public actors to steer the developments of public transport and smart mobility.

The final individual chapter (chapter 9) has the title *Smart Mobility Experimentation. Reflecting on a Public Transport Authority's Convoluted Journey with Mobility-as-a-Service*. In this chapter, Göran Smith discusses his experiences of experimenting with MaaS from his dual position as a researcher and an official at a regional public transport authority. The chapter highlights tensions between traditional public transport planning, on the one hand, and experimental spaces, on the other hand. According to Smith, a fruitful experimentation for smart mobility requires visionary long-term strategies, intermediate goals that are aligned with the maturity of the new mobility concepts and reflection and knowledge building regarding the issues that hinder further decision-making on new mobility concepts. The chapter also includes discussion regarding the role of leadership and determination at multiple organizational levels, and the need for institutional environments that favour experimentation – for instance by developing hybrid spaces to promote cross-experiment reflection and learning to increase the likelihood of transformational effects.

The results from the individual chapters in the anthology have formed the basis for dialogue and exchange of experience with actors active in policy, planning and development work for smart and sustainable mobility. Key insights from this dialogue and exchange of experience are included in the book in

the form of excerpts and reflections which in some cases reinforce, and in other cases contrast with or supplement what has emerged in the various research projects.

Altogether, the chapters and the reflections from actors working within policy, planning and other development work, has given a rich empirical picture of different dimensions of experimental spaces for sustainable and smart mobility, and of the critical role of public actors to ensure that public values and goals stay in focus in experimental processes and spaces. The work also provides pointers on how to develop strategies for learning and knowledge building beyond individual experiments, so that the knowledge developed through experiments will benefit the public. There are also issues concerning the design and outline of experiments that require more attention. These key insights are taken further in the concluding chapter of this anthology (chapter 10). In that chapter, we summarise and synthesise lessons learned for the coming decade which we envision will be characterised by a continued focus on experimental governance. Given the urgency of reducing greenhouse gas emissions, while maintaining a focus on accessibility and social justice, it is of great importance that experimental spaces are designed with an insight into the public values (such as accountability and transparency) at stake, and the opportunities and risks involved in experimental approaches.

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– Chapter 2 –

Taking (any) risks in urban experiments with mobility?

Lina Berglund-Snodgrass

It has been highlighted by scholars such as Andrew Karvonen, James Evans and Bas van Heur that, in their call to depart from the status quo and "business as usual", urban experiments constitute designated spaces of risk-taking. By this they suggest that urban experiments, as a mode of governing, ideally are configured to be open to surprises and the unexpected, and thus are seen as able to deliver new solutions to contemporary challenges. Urban experiments comprise of collaborations between public and private actors, and sometimes also with stakeholder groups and citizens — actors with potentially different agendas and stakes in risk-taking. Public actors are different from other actors in these collaborations in their democratic and moral responsibility for responsible public spending and providing just and well-functioning public services. Taking risks is challenging for public actors, who generally are tasked with minimising risk as far as possible. As risk-taking is brought forward as an integral component and prerequisite of urban experimentation, pressing questions to consider are what risks are at stake in these processes, and what public actor approaches to risk-taking prevail when these actors engage in such endeavours? Are they taking any risks? And if public actors are not taking any risks, who and what actors are instead bearing different notions of risk? Is the general public bearing what can be perceived as unacceptable

amounts of risk? And on a more overarching level, a perhaps more fundamental question to consider is whether public actors *should* engage in risk-taking, and if so, what risks do we find acceptable and tolerable? Risk and innovation researchers such as Stephen Osborne and colleagues suggest that if public actors fail to engage with risks, it *can only perpetuate a cycle of permanently failing innovation [and it is] a waste of public money down an innovation 'drain'*. One does not have to take the matter to such an extreme to realise that the preconditions for public actor risk-taking in urban experimentation is a matter that needs to be highlighted and resolved if public actors are serious about using urban experimentation as a means and method for developing solutions/processes/services for the future. Like other collaborative planning processes at large, urban experiments may open an opportunity to reorganise and shift responsibilities for risk-taking between actors. This chapter aims to illuminate these questions by summarising the empirical results from a recently carried out study of risk and risk-taking in testbed planning.[1] The purpose of the chapter is to introduce risk-taking as an integral component of urban experimentation and to provide empirical examples of public actor approaches to risk-taking with regard to different loci of risk in urban experiments with mobility in the Nordic context.

INTRODUCING RISK

What is risk? Risk is here referred to as a future event which may or may not occur and which may have positive or negative consequences.

1 Berglund-Snodgrass, L. (2022). Risk and approaches to risk-taking in testbed planning. Planning practice and research. 37(1), 79-94 DOI: https://doi.org/10.1080/02697459.2021.1992942. Reproduced in part in this anthology with permission from Taylor & Francis.

Considered in the context of urban experimentation, risking negative consequences is approached as a prerequisite for ensuring the *possibility* of positive consequences (e.g., sustainable mobility, healthy cities). Here, the idea of taking risks includes exposing individuals/society or organisations to the possibility of either positive or negative outcomes. What is in turn valued as 'positive' or 'negative' is connected to what society currently values and attributes importance. It may be the economy, climate or individual integrity that is attributed importance. Such a point of departure recognises risk as socially constructed and as existing within a knowledge relation, one in which society's understanding and valuing of reality plays a direct role in constructing and reproducing notions of risk. One key question to consider in this context is what negative consequences public actors are willing to accept in exchange for a *potential* positive consequence. Risk researchers such as Ortwin Renn point out that what is included and highlighted as a risk includes relevancy claims – what matters to society (people or organisations), and normative claims – what is acceptable or tolerable? What may be included as acceptable risk also concerns the fact that there is a perceived equality and justice in the distribution of possible benefits and risks, e.g., that particular groups are not only risk-bearers but also the groups that will receive the possible benefits or positive consequences.

Louise Brown and Stephen Osborne are researchers who have explored risk in public sector innovation processes. They highlight that risk in such processes concerns questions such as whether the new service, good or process that is tested will deliver its intended outcomes – and whether it will be accepted by users, the media, politicians and/or the public? They suggest

that there are different loci of risk in these experiments that engage the public actor in different ways. A new mobility ICT application that is tested may present risk to individual citizens and their security and integrity, if there is uncertainty in terms of division of responsibilities in providing data security protocols. Furthermore, should an ICT service that is tested as part of public transport authorities' service delivery not operate as intended, it may negatively impact the public perception of the public transport authority as a reliable organisation and service provider. The public perception of these new services that are tested may also risk bad press coverage which may negatively affect the reputation of the organisation and ultimately risk the re-election of responsible politicians. These examples highlight that there are different loci of risks in these endeavours that in turn are actualised in different ways. In the following section, examples of risk and public actor approaches to risk-taking with regard to three different loci of risk — individual, organisational, and political loci of risks in urban experiments — will be provided and discussed. This section draws primarily from interviews with municipal planners and project leaders from the Nordic countries that each are engaged in different types of urban experiments with mobility, ranging from intelligent infrastructures, autonomous buses and combined mobility services to new regulatory practices such as deviation from existing municipal parking regulations in new housing developments. The section is organised in accordance with the three loci of risk.

MINIMISING AND SHIFTING INDIVIDUAL LOCI OF RISKS

These loci of risk constitute risks that in various ways are perceived to impact adversely upon individuals in society. Smart city researchers such as Robert Kitchin and Martin Dodge

highlight that experiments with new, so-called, smart networked digital technologies for delivering new forms of mobility services may comprise to a high degree *technological* risks coupled to security vulnerabilities such as weak software security, data encryption or maintenance protocols, which in turn may present direct risks to the *personal integrity and privacy* of individuals by revealing, appropriating and aggregating sensitive data. The ways in which such technological risks are approached among public actors appear to be dependent on the ways in which individuals are considered in the process, as *citizens* or as *users*. In situations where individuals are approached as citizens, civil servants appear to adopt a strategy of minimising the risk through means of communication or restrictions. One smart city coordinator stresses the importance of communicating the technological risk to the citizens, since individuals subjected to such a risk are generally unaware of it:

> *because when you work with technology you just see how it goes very fast, and you see how people don't know what they are saying yes to [...] if we put sensors up in the whole city, I would like our citizens to know that we are doing that, and to maybe have a sticker that says this is a sensor, maybe it's a camera but it can't show your face, these basic communications about these things. Because people don't have a clue about them.*
> (Civil servant)

Here the coordinator suggests that citizens to a large extent are risk-bearers when experimenting with smart technologies, and that it is the municipality's responsibility to inform the citizens so that they can make an informed decision on whether they are willing to take the risk and participate in the experiments, e.g., by using particular streets or residing in testbed and demonstration districts. Another approach to these loci of risk

is expressed by one respondent who highlights that the municipality restricts what type of data can be collected in mobility experiments. This respondent suggests that data on individuals' or groups of individuals' movements and undertakings can by no means be collected as "it's very important that we don't know what one individual or group of people are doing"' (civil servant).

If instead individuals are considered as *users and testers* in the experiments, the technological risk appears to be shifted to the individuals themselves to consider and take responsibility for. One civil servant claims that the people who are interested in being users in the experiments generally do not care about data protection protocols or what type of data is collected:

> *Well, the people who are really interested in trying new things are usually not going to be too critical about "OK, does this actually use the GPS on my phone"?*
> (Civil servant)

Here, it appears that the issue at stake concerns getting access to individuals who are willing to participate as users in the experiments —rather than being about protecting their integrity as citizens— as the civil servants see themselves dependent upon them for successfully testing and demonstrating new services or techniques within the city. If this risk is not considered by the individuals themselves as a risk, the civil servant does not recognise that he/she should consider and care for. There also appears to be a perceived difference between urban experiments with new ICT services which rely upon active users that the civil servants need to recruit (e.g., testing an app or a mobility service) and urban experiments with data collection which rely upon passive users (e.g., smart traffic monitoring systems). Urban experiments which relies upon passive users is consid-

ered by civil servants to best remain invisible to the users, so "they won't annoy residents" (civil servant). Having a good relationship with potential "active users" appears to be of strategic importance in processes of experimentation.

MINIMISING AND SHIFTING ORGANISATIONAL LOCI OF RISKS

These loci of risk constitute risk to organisations and/or risks to the legitimacy of their associated methods and practices, comprising both reputational risks and risks of failing to meet political goals or performance targets. Louise Brown and Stephen Osborne highlight that urban experimentation may comprise the introduction of new approaches to addressing existing needs, e.g., new —perhaps unorthodox — planning approaches to addressing sustainability challenges. These potential unorthodox approaches open up the possibility for several organisational risks coupled to liability and trust in democratic institutions such as municipal planning, but also linked to the maintenance of the institution itself. Processes of urban experimentation risk undermining the normative values of conventional planning or the rationality of public interest as a basis for intervening in the built environment. In addition, the short-term objectives of urban experiments may risk increased pressure on public actor budgets to cope with unexpected future costs. And as we have learned from the literature on projectification, temporary project organisations – which in many ways comprise the organisational structure for urban experiments – require energy and resources from both professionals and civil society if not mainstreamed, which in turn may not only risk public finances but risk strain the patience of civil servants and citizens, and citizens' *trust* in civil servants and public institutions.

When it comes to the organisational locus of risk in the empirical material, predominantly two types of risk prevail, and they concern risking predictability and (financial) stability in urban developments, and societal trust in the municipality and its undertakings. Here the material demonstrates two different approaches to such risk-taking: organising urban experiments outside the hierarchical structure of local government or minimising risk by providing back-up plans.

> *One mayor before our current one said to us that [the intermediary organisation] has the licence to fail. So, it is [risk-taking as an integral part of urban experiments] also the reasoning behind why we are a separate limited company and not just a city division. [...] a city division needs to stay in the budget, and they need to do the things which are valuable to the city at the moment. But our values are in our projects, which may fail in a way if a solution or method that we try and perceive is not fitting. That is not a failure for us. For the city division it would be a failure.*
> (Intermediary actor)

What is highlighted in the quotation is that failure is socially acceptable within the intermediary organisation, and that this is different from what is perceived as acceptable in the municipal hierarchical organisation. An intermediary is "[a]n organization or body [or an individual] that acts as an agent or broker in any aspect of the innovation process between two or more parties" (Howell, 2006 as cited in Hakkarainen & Hyysalo, 2016, p. 46). By organising the experiments outside the hierarchical organisation in intermediary organisations, municipalities are considered able to carry out their everyday operations and not to be negatively affected by experiments that fail or do not perform as intended. In the intermediary organisation, risk-taking is part of its everyday operations. However, as one transport planner

suggests, too many failed urban experiments may still reflect poorly on the municipality and its undertakings. In this regard they claim that they have to be careful about what pilot projects they accept and prioritise in the testbed so that citizens' trust in the municipality remains intact.

The approach of organising risk-taking outside the local government stands in contrast with the examples where the municipalities try to minimise the organisational risks by providing back-up plans or communication campaigns. In urban experiments with municipal parking norms, developers were granted exclusive permission to deviate from the existing parking regulations and build so-called 'car-free housing'. These processes did not include any intermediary organisation and were joint ventures between the developer and the municipality – and in one case also a mobility service provider. Here, the planners were presented with the risk that the future residents would not be as car-free as intended. By formally having accepted a deviation from the car-parking norm under the logic of testing and experimenting, the car-parking infrastructure in the urban district would risk being insufficient for future needs. What organisation should have the financial responsibility to provide additional car-parking spaces, if post-occupancy evaluations show that residents, contrary to the predicted positive consequences of the experiment, own cars? This was a central and much debated matter between the actors in these processes. In one example, the developer pointed out that the experiment might bring about positive outcomes for all actors and society at large and, hence, all involved actors should share the financial risk-taking:

> *As we see it, a pilot project includes a certain risk-taking for all parties involved (the municipality, the developers, the mobility service*

> *provider and perhaps mainly the residents). It is also reasonable that all parties take their share of the risk in a pilot project like this, based on the potential that everyone will share the benefits (reduced car traffic and more efficient land use, more attractive housing, new market for mobility services, better personal finances, etc.).*
> (Developer's statement in municipal official communication)

In the quotation above, which is taken from a formal communication concerning the municipal decision to deviate from the car-parking regulation, the developer wishes to share the risk-taking between the parties and is not ready to assume sole responsibility for possible future costs connected to possible negative outcomes. However, the municipality made the developer responsible for providing additional car-parking spaces if evaluations of the experiment indicated that residents owned cars, i.e. shifting the risk. In another example, the urban planner instead made the housing association responsible for ring fencing a fund that would be used to arrange alternative mobility solutions if the future residents found their mobility situation insufficient. In the detailed development plan, the municipality highlighted locations where car-parking could be provided if necessary after the experiment. In yet another example, the municipality instead demanded that the developer would invest the money they 'saved' from not building parking in other forms of infrastructure that would support sustainable transport such as biking. This demand also operated to counteract unfair competitive advantage for the specific developer. The developer invested money in, for example, elevators that could accommodate cargo bikes, food delivery cool boxes in entrance hallways and free rain jackets to all residents. Municipalities further demanded that developers carry out communication campaigns, making sure that no-one moved into the housing without knowledge

of the restricted parking context. In all these examples, risking stability in urban development appeared challenging to urban planners and was not something that they were ready to immediately compromise upon.

REFUSING POLITICAL LOCI OF RISKS

Political loci of risk concern risks to politicians and local democracy, and/or their legitimacy. Such risks may concern risking political stability, their reputation and legitimacy, but also risking democratic anchoring and accountability. In terms of the political loci of risk, one type of risk prevails in the material, and it concerns the ability to maintain political stability and the possibility to be re-elected. Although politicians are in many ways perceived to be supporting urban experimentation at large, they are not ready to engage in urban experimentation that may jeopardise their political position or that results in angering members of the public. Different types of mobility experiments appear in turn to different degrees to be politically sensitive matters and to present different degrees of political risk. Experimenting with parking norms appears generally as a contested, perhaps even controversial, political question that upsets some members of the public, making politicians ambiguous and conflicted in pursuing experiments that may make it difficult to own and use cars in urban areas. According to civil servants, the politicians engage with this risk by requesting knowledge or investigations of the possible effects and consequences of experiments – to a much greater extent than in conventional planning processes. The politicians are perceived as being conflicted between wanting to accommodate the citizens who are motorists and wanting to explore urban experimentation as a method for reducing the number of cars in the city and

achieving sustainability. One civil servant states:

> *The second was that they were afraid of making a decision that would affect them negatively in future elections. [This is] because of the car, those who use cars really like their cars. One can feel it oneself when one drives a car, it is very nice. So, one was really afraid that people in this housing would actually buy a car and then it would spill out onto the street and steal parking places from others.*

In the quotation above, the planner recognises that the politicians were concerned about not being re-elected due to a possibly messy traffic situation, if the experiment did not turn out as intended. Since messy traffic situations undoubtedly will return to their desk post experimentation, this makes urban experiments a possibly high political cost to elected politicians. Consequently, what is politically possible to experiment with becomes a new guiding question for civil servants to navigate.

Experimenting with smart mobility services, such as autonomous buses, appears in contrast to experiments with parking norms not to be as politically sensitive and thus is more acceptable. Such activities are widely considered as contributing to branding the city as 'innovative' and 'forward thinking', making the politicians appear progressive. Civil servants also suggest that smart mobility experiments entail comparatively small monetary investments for the municipality, and consequently do not interest and engage the politicians and members of the public to the same degree as perhaps new infrastructure developments, such as building new bridges, parking garages or railways, and hence can exist in the shadows and away from public scrutiny. Urban experiments with smart mobility services are instead perceived as being aligned with the political objectives of showcasing and demonstrating new technology for branding the municipality on the global arena.

CONCLUDING REMARKS

This chapter aims to introduce risk-taking as an integral dimension of urban experimentation and has shown examples of public actor approaches to risk-taking in different examples of urban experiments with mobility. The chapter has demonstrated that public actors appear reluctant to take any risks – either individual, organisational, or political – which makes sense from a public sector perspective whose objective is to govern risk on behalf of citizens, but less so from the perspective of urban experimentation, with its focus on being open to surprises and the unexpected. What is striking is that civil servants appear not to have thought or reflected to any significant extent about engaging with risk and risk-taking as part of urban experimentation; instead they appear to incorporate urban experiments into what can be described as conventional planning and its risk-minimising approaches, and are busy distributing responsibilities for risk to other parties.

As urban experiments seemingly depend on attracting individuals who are willing to participate as users in the experiments, civil servants appear conflicted between protecting individuals' integrity as citizens by means of communication and information, and carrying out 'successful' experimentation by recruiting a high number of users. One pivotal question that is worth pursuing is how experiments can become better anchored with the general public about what risks are reasonable and feasible, while also ensuring that the individuals are not only risk-bearers but also potential risk beneficiaries in these processes. Furthermore, certain types of experiments appear politically less risky than others, such as experimenting with smart services and solutions. Quite naturally this will have an impact on what experiments are invested in and carried out. Here, one can reflect

on which actors mainly benefit from such experiments but also which experiments are not carried out or even thought of as a consequence, and how this impacts the ways in which public actors think about possible future travel. If urban experimentation is to be a mode of governing for the development of future mobility solutions, it becomes necessary for public actors to engage with risk and risk-taking. But to make sure that this is carried out fairly and transparently, public actors should set out an explicit and inclusive risk-taking strategy when they engage in these types of activities, and decide what comprises acceptable or tolerable public actor risk vis á vis other actors. Developing a risk-taking strategy includes deliberations between all parties that are affected by the experiments, and in which the conclusions in turn are communicated fairly to all parties, including the potential users. This could involve drafting a statement which includes the intentions of the experiment but also the settled agreement concerning what actor should bear what potential negative risk but also benefit from potential positive outcomes. Such a statement would open up the possibility for democratic discussions on the political intentions of the urban experiment but also on whether the different loci of risks vs benefits were found acceptable.

Risk-taking is an integral component of urban experiments, and concerns individual, and organisational as well as political loci of risk. Public actors are in general reluctant to take risks in these processes and tend to engage in the processes based on conventional risk- minimising approaches, and shuffle the risk to other parties. If urban experiments are to be a mode of governing for the development of future mobility solutions /processes or services, it becomes necessary for public actors to engage with risk and risk-taking. This requires that public actors start developing an explicit and inclusive risk-taking strategy when they engage in these types of activities, in which they decide what comprises acceptable or tolerable public actor risk vis á vis other actors.

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Practitioner reflections on collaboration and risk

"It is an interaction among actors with different timelines, needs, and conditions - this is a risk when you carry out a project /... / On the other hand, it is possible to share the risk. If you are to do something innovative, no one knows what the answer is and what you will learn along the way. So you share the risk and you support each other when you meet difficulties. /... / If you would take control yourself and run it on your own, there would not be much innovation in it."

(Strategist, Innovation platform)

"...we have learned a lot about the importance of talking to each other and working together. And I have noticed that /... / thanks to these projects /... / it has become much easier for us to talk to each other because we have understood that we are dependent on each other for delivering a successful and value-creating product."

(Official 1, Public Transport Authority)

– Chapter 3 –

Why getting people in the same room isn't enough

- Organisational proximity and learning in public transport innovation

Mats Fred, Dalia Mukhtar-Landgren,
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INTRODUCTION

In just a few years, the public transport sector has undergone a series of relatively disruptive transformations. We have seen public transport authorities pilot autonomous buses, develop different kinds of apps, and collaborate in testing new combined and shared mobility services. We have also witnessed the introduction of new (private and public) actors in the field of public transport, including everything from e-scooter companies to large innovation platforms and networks. Public transport innovation can, as such, be described as a field, or a market, where different actors, as well as different expertise and knowledge, meet to construct and promote novelty or handle complex challenges.

Innovation researchers and policymakers often highlight the importance of collaboration, organisational diversity and the integration of heterogeneous knowledge in innovation processes. The co-location of different organisational actors and a diverse set of resources are regarded as pivotal for the formation of a creative environment. However, the governance and management of such collaborative endeavours within the context of public transport can be a tricky business - there are a multitude of actors involved, different kinds of expertise and (political,

professional and technological) ideas and wills to consider when venturing into innovations aimed at organisational learning and transformational change in public transport. The mere presence in space (and time) of a group of actors does not necessarily imply learning between them or an inflow of new ideas. Co-location is not enough - closely located actors might still struggle to collaborate and to innovate and learn from each other due to their differences in terms of knowledge, background and organisational culture. In this chapter, we explore the dynamics of proximity for learning in public transport innovation. Yet we move away from the one-dimensional understanding of proximity as physical closeness alone and instead build on studies that talk about a multiplicity of proximities and distances.

Aim and outline

Authors such as Ron Boschma (2005), Satu Parjanen and Mirva Hyypiä (2018) have explored the importance of thinking about proximity in the plural, as *several different* proximities in order to understand processes of innovation and organisational learning. These forms of proximities includes organisational culture, knowledge or expertise but also proximities in terms of norms, values or beliefs. Based on these debates, we argue that public transport innovations are produced, or constructed, through purposive arrangements configured through (at least) four types of organisational proximities: cognitive, physical, institutional and social. We understand these proximities to be analytically separate but closely related in practice. Each form of proximity consists of a tension between more or less proximity, or put differently, between proximity and distance. This tension can also be expected to fluctuate over time and as such can affect the actors involved as well as the innovation at hand.

Below, we describe these proximities and discuss them using examples from three empirical studies; one where we investigate the development of mobile apps for travelling and ticketing in two Swedish regions - Skåne and Västra Götaland; one on a pilot with autonomous vehicles in Norway and one focusing on intermediary innovation platforms in the Nordic countries. As the analysis shows, the four proximities configure processes of public transport innovation and unfold in different organisational arrangements.

PROXIMITY AND INNOVATION - EXAMPLES FROM PUBLIC TRANSPORT AND SMART MOBILITY

Even though physical, cognitive, institutional and social proximities and distances co-exist in practice, in various forms of arrangements, here we separate them analytically to more clearly describe how they operate and function. In all our cases we found evidence of the four proximities but in some of the cases, one or two proximities were more prominent.

Physical proximity

Physical (or geographical) proximity refers to the spatial distance between organisations, organisational units or individuals. This is perhaps what first comes to mind when one thinks of proximity. In the Swedish public transport context, there is a strong belief in physical proximity and "getting people in the same room". One example of this is the development of travelling and ticketing apps in two Swedish regions, where we observed a great belief in the idea of physical proximity. Instead of procuring an off-the-shelf solution, the Public Transport

Authorities (PTA) responsible gathered different actors and resources under the same roof to develop their own apps. In one of the cases, the PTA installed a specific organisational unit, or 'development lab' as they called it. When staffing this lab, they cherry-picked what was perceived as necessary in terms of resources and skills to assemble a project team, a person responsible told us. One of the consultants involved in the lab said:

> *"we were about 30-40 in total, hired from various consulting companies through various forms of procurements… and [when developing the app,] all these developers shared the same office space and that was very important for us… even though we were from different companies, it worked really well" (interview, 2021).*

The idea of the development lab can be said to rest upon physical proximity - to get different actors in the same room, and the strategy appears to have been successful. One of the consultants, a system architect, described how the close proximity between the different actors made decisions and discussions between involved actors easier: "...by being there, then you could just grab someone at the coffee machine and sort of discuss this and that", and he continued to describe as an example how, due to the short distance between actors, he managed to "sort things out" with the transport director - the highest ranking chief at the PTA - at a Christmas party. He described how he, as a consultant, did not always have the opportunity to share office space with the people he was working for and how that had made discussions and/or decisions more difficult. However, there appears to have been more than just physical proximity at play here as several of the people we talked to described the necessity to understand each other and/or to speak the same language (what we refer to as cognitive and social proximity).

Physical proximity was also described as an important feature in the intermediary innovation platforms we studied. These platforms are gaining in popularity and their very foundation is based on the idea of physical proximity - where actors and resources are assembled under the same organisational roof to mobilise support for a specific issue. One example is *ElectriCity*, a collaboration bringing together 16 different actors representing public (e.g. Gothenburg City, VGR, Västtrafik , the local energy company) and private actors (e.g. Volvo, Ericsson, property owners) as well as research organisations in the Gothenburg region. These actors are brought together to test, develop and demonstrate new products and services within the broader area of electrification of transport in Gothenburg. The idea behind *ElectriCity*, and similar platforms, is to expect great ideas and innovations to result from getting different actors in the same room.

However, physical proximity in the platform examples is temporary and builds on annual meetings, conferences or sometimes specific projects through which the partners meet up physically for a short period of time and then return to their home organisations. The reason for this temporality is that the different actors may have different interests, mandates or simply different degrees of engagement in the key issues at hand. Hence the platforms, just like the app development cases, need to be built upon more than just physical proximity. Co-location, temporary or not, does not appear to be enough to stimulate common knowledge production or learning. Yet it can be a prerequisite for, or an enabler of, other proximities (related to organisational culture, resources, knowledge or values and beliefs for instance). One illustrative example to this end is STOR (Smart Transport in the Oslo Region), a Norwegian plat-

form that tests new mobility services. STOR is a collaboration between the PTA in Oslo (Ruter), the Oslo municipality and the Norwegian public road administration. Similar to the other platforms, STOR's main activities were centred around physical proximity through a string of meetings in the same group, working on delimited and pre-defined projects. Yet physical proximity was not enough to get this platform going. The members involved described how their close collaboration was built upon concrete challenges and active participation with clear roles and mandates, where the importance of a "common language" was emphasised. With the notion of a common language, physical proximity was combined with *cognitive* proximity - the topic of our next section.

Cognitive proximity

Cognitive proximity can be defined as the degree to which two or more persons share the same knowledge base. In essence, cognitive proximity might be about a common language, jargon or different standards. Professions like doctors, architects or engineers often have close cognitive proximity in that they share a certain way of communicating with each other. However, one might also talk about cognitive proximity at an organisational level, referring to how organisations belong to the same organisational field or how they share the same kind of knowledge or expertise.

In our empirical material, questions and challenges related to cognitive proximity arise in different ways. Returning to the platform *ElectriCity*, the actors involved represent very different knowledge bases, such as engineers, ICT developers and planners, constituting an arrangement of cognitive distance between actors. Combining dissimilar and complementary knowledge

foundations is a challenge that demands that the different actors have an absorptive capacity to identify and exploit new knowledge. Many platforms rely on (temporary) physical proximity including a range of meet-ups and network opportunities, but the objectives of these platforms are often vague, all-encompassing and sometimes even conflictual (e.g. "smart and sustainable mobility"). Contrary to that, *ElectriCity* facilitates collaboration around a very specific objective and vision – the electrification of transport – which delimits the platform to a pool of diverse but complementary knowledge and capabilities necessary for such specific undertakings. In the app development cases, the PTAs hired external consultants (UX designers, IT architects etc.) from several different firms and placed them all in an office together with staff from the PTA (civil servants and managers). Here was a mixture of cognitive differences placed in close physical proximity. Both *ElectriCity* and the app development cases illustrate the combination of, and tension between, physical distance and cognitive proximity in two different processes of innovation.

Close cognitive proximity presumably ensures efficient communication within and/or between organisations, but on the other hand, it might be obstructive for processes of innovation. The rationale behind this idea is that knowledge production demands access to different and complementary knowledge bases. New sources of expertise might trigger creativity, and excessively close cognitive proximity, with everyone being from within the same field, might hamper or prevent the acquisition of new knowledge, or lead to what Levitt and March (1996) call knowledge lock-in.

Institutional proximity

Institutional proximity is about overarching norms and values and the practices produced through them. Here institutions are understood as a glue for collective action as they reduce uncertainty and reduce transaction costs. Formal institutions (laws and regulations) and informal institutions (cultural norms and habits) will influence the degree and manner in which individuals and organisations coordinate their actions.

In Sweden, the PTAs are politically governed bureaucratic organisations, while at the same time they are market actors in a heavily marketised sector. This creates a potential institutional as well as cognitive distance and dissonance between different roles and expectations. In our studies, people working with innovation, both within and outside the PTA, often describe perceived tensions between everyday procedures and innovation processes. In the app development cases, one manager argued that there is very little room for innovation within the PTA organisation: "as a public actor, we have a political assignment... if we are to do something else… it has to be covered by our assignment" (interview, manager, 2020). Another manager describes the tension between everyday procedures and innovation in terms of: "not a lot of people are allowed to think big". As such, there is a challenge within these organisations to balance between on the one hand "logics of production", following routines and optimising or streamlining current operations, and on the other hand "logics of innovation" - challenging existing practices, making room for reflection, risk and allowing creativity and innovation (also reflected in chapter 9). In the app development case, the solution was an arrangement with physical distance and cognitive proximity (a development lab located separately from PTA headquarters, staffed mostly with IT/ICT

consultants). This allowed the team to be creative and work differently compared to the ordinary operations of the PTA. Note however that this also created a distance between ordinary operations and the app development team, making implementation and/or organisational learning between the two more difficult.

Another way that the tensions between the two institutional "logics of production" and "logics of innovation" were handled was by placing innovation at arm's length from everyday procedures, thus creating physical distance. One example of this can be found in *ElectriCity*. Here the PTA made clear that tests and experiments must be carried out in a way that did not undermine the customers' trust in the reliability of their services - buses and trains had to be on time - thus prioritising a logic of production. Yet at the same time, the actors developing the new technology emphasised that they wanted long-term continuity to test the products in "real life environments" - as such, they were opposed to pursuing innovation through delimited and numerous fragmented projects. The solution to this dilemma was to introduce a testbed as extra services (extratrafik) operating in addition to, and outside the regular operations. One of the coordinators stated:

> *"if we do something that does not work, it should not be on a trip where a customer expects the bus to arrive [...] What Västtrafik refers to as the customer promise [kundlöftet] they want to keep at any price. Therefore, it is important to be able to do it on the side. It's one way of dealing with that".*

In interviews, this form of physical distance (i.e. placing the innovation processes in a smart mobility pilot instead of within the organisation) was often described as a way to ensure innovation and risk-taking (see also chapter 2 in this volume). Yet institutional tensions may persist, regardless of the physical distance

created, thus indicating a necessity to understand proximities as going beyond their spatial or physical dimensions.

Social proximity

Social proximity is defined by Boschma as "socially embedded relations between agents at the micro-level" (2005, p. 66). Relationships involving trust based on friendship, kinship and experience facilitate the exchange of tacit knowledge, something that might be difficult through other channels. In our empirical material, it is clear that there are long-lasting relations between actors working with public transport innovation. This is sometimes manifested in organisational forms such as networks, but more often they are more informal connections. This was evident in the example from STOR, as mentioned above, where the actors involved had built a trust-based relationship over time, including clear notions of roles, mandates and competencies. In terms of institutional proximity, it is interesting to note that they were all public sector actors, and thus had in common that they worked in political organisations geared towards the public interest. In this case, they had also chosen an external project leader to facilitate the meetings and communicate results; as such, equality and engagement between the partners was enhanced. The project leader coordinated the partners through the development of common language and common problem formulations - cognitive proximity.

As such, the example of STOR illustrates how this particular arrangement was created and configured through an interplay of different forms of proximities. Yet the success of STOR perhaps also lies in it being a new cooperation and a collaborative venture. Boschma also notes that long-term relationships within organisations may lead to path dependencies triggering

repetition in the established ways of doing things. This may sometimes be at the expense of members' creativity and innovation capacity. As a result, actors outside the social network, with new ideas, might even be denied entry.

CONCLUDING DISCUSSION

The public transport sector has undergone a number of changes in the last couple of years. New actors, such as Uber, Voi and Lyft have entered the market of shared transportation, and new services such as Mobility as a Service (MaaS) and other combined or shared solutions relate to the traditional public transport in different ways. In addition, many cities are engaged in efforts to reach the global sustainability goals, where public transport plays an important part. Adding to that is also the rapid technological advancement and digitalisation of the last decade. This pressure, combined with the investments channelled through the EU and national innovation funding bodies, has led to the development of new ways of organising innovation processes, including externally funded testbeds, pilots and platforms. Yet, as we have shown, public transport innovation constitutes various configurations of different proximities - not only physical but also cognitive, institutional and social. To conceptualise these configurations, one can talk about innovation-producing arrangements (see Lavén, 2008) where proximities, in different ways, are arranged: a smart mobility testbed may have close physical proximity, but low cognitive proximity and a network of old PTA colleagues will have high social proximity even though the partners are located in different Nordic countries (low physical proximity). As such, *innovation-producing* arrangements configure actors - and functions - in different ways.

There is a tendency to emphasise the importance of physical proximity in processes of innovation: as long as we get different (public and private) actors in the same room, creativity and innovation will happen! Actors, including innovation funding agencies, often promote a combination of collaboration and physical distance from ordinary procedures, which often results in externally (funded and organised) smart mobility pilots and projects. These temporary organisations safeguard space for physical proximity between actors involved, yet *cognitive, institutional, or social* distance may still prevail. For example, actors may have different goals and even different cognitive frames, including different conceptualisations of what constitutes a 'smart', or sustainable service or solution. Relatedly, in light of the strong pressure on PTAs to innovate, we noted that the *why* of innovation was sometimes obscured and the continuation of some of these arrangements appeared to depend solely on the fact that the actors involved knew each other well.

Is there a catch-all or magic recipe for how to combine proximities in order to foster innovation and/or organisational learning? We think not, but what we do observe in our studies is an (almost) reflexive use of temporary projects and pilots, organised at a distance from ordinary operations of the PTAs, when engaging in processes of innovation. This is a result of a perceived pressure on PTA to renew their operations and attract more customers/travellers at the same time as a large portion of of the PTAs' energy and resources, by necessity, are devoted to keeping the "production line" in good shape, that is, making sure that buses and trains remain on schedule, that tickets are available and support is provided where needed. In terms of proximity, this conundrum encourages organisational strategies where activities that indicate novelty, risk-taking or

organisational insecurity - i.e. innovation - are kept at a distance. Innovation often becomes a value in itself, instead of a means to an end (whether that end is sustainability, efficiency or attractivity). As a reaction to that, one possible strategy could be to more clearly point out why we innovate - and what objectives we are aiming for - as a way to integrate innovation into everyday procedures.

There is a tendency to emphasize the importance of physical proximity in processes of innovation- as long as we get people in the same room, creativity and innovation will happen! However, 'innovation producing arrangements' often entail a mixture of different (cultural, social, institutional and physical) proximities and distances.

In processes of innovation, the question of *why* is sometimes forgotten and initiatives are built upon things like long lasting relationships (social proximity) or the availability of funding (institutional proximity) instead of a clearly stated objective or reason for why the project is initiated. To paraphrase Nietzsche, one might argue that as long as you have a clear cut *why* you may endure or figure out every *how*.

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Practitioner reflections on bridging and learning

"It is essential to include those who work with the day-to-day operations in pilot projects. /... / You should not treat it as a separate activity, but make sure to create connections with regular activities [of the organization]. /... / So that those [who work with the day-to-day operations] can influence the pilot project, but also to make sure that it becomes their pilot project"

(Senior consultant at a Think tank)

"A pilot project might not have a large impact in terms of 'volume', but it can have a large impact in terms of learning. /... / However, learning needs to be consolidated. /... / It is therefore important to have a specific task in a project to gather insights and to spread insights to more people"

(Strategist, Innovation platform)

– Chapter 4 –

Experimentation and platformisation - insights from a Mobility as a Service pilot

Kelsey Oldbury

One relatively new concept within the transport sector is the much-discussed notion of Mobility as a Service (MaaS). Variations on its definition exist, but generally the concept represents an ambition to integrate existing transport infrastructures, such as public transport, with other forms of mobility services, such as car-sharing, taxi, bike-sharing, and e-scooter services, often through one digital platform interface or application. Various services which commonly operate through separate digital platforms are therefore combined in a MaaS service. The concept has also been promoted and framed as a tool to potentially reshape existing systems of mobility provision and use and support a shift away from the private car. Although some MaaS services have been fully launched (e.g., Jelbi in Berlin) much of the development related to the concept is currently being navigated in the form of pilot projects, as well as strategy documents and press releases.

In pilot projects, a dominant theme is often the successful realisation of the MaaS concept. *How*, exactly, to realise MaaS is also a dominant strand of academic literature on MaaS. In parallel, research from digital culture and media studies has taken a broader view on the role of digital platforms in society and the increasing prevalence of platforms across many sectors. This process has been called *platformisation*. Within platformisation

discussions, MaaS has been used as an example of how digital platforms are re-shaping the transport sector. Inspired by this broader approach to MaaS, this chapter discusses a pilot to introduce MaaS as an example of the platformisation in the transport sector.

The case explored offers an opportunity to understand more about the different roles actors take in relation to platformisation, as well as the use of experimental spaces - such as pilot projects - to introduce digital platforms. The aim of the chapter is therefore to discuss the ways in which key actors involved in the pilot for MaaS in the Stockholm region navigate their roles in relation to the platform. On a broader level, the chapter also aims to generate insights into the relationship between platformisation and experimentation.

PLATFORMS AND PLATFORMISATION

Researchers Poell, Nieborg and van Dijck define platforms as "(re-) programmable digital infrastructures that facilitate and shape interactions among end users…and the other main stakeholders or "sides" in platform markets" (2019, p. 3). The same authors define platformisation as the spread of "infrastructures, economic processes and governmental frameworks of digital platforms in different economic sectors and spheres of life" and the way in which social practices are reorganised around platforms (2019, p. 5-6). The piloting of MaaS can consequently be understood as a process where various actors involved in the transport sector – public and private – are developing their roles in relation to the concept, and subsequently to the platformisation of mobility.

Digital platforms are a challenging and abstract object of governance for public actors. Researchers van Dijck and others

have argued that public actors "have yet to recapture their role vis a vis the platform system" (2019, p. 11). They state that it is misleading to think of platforms as a single object, as they act as a digital infrastructure which connects various things. Without the things it connects, the platform itself is often redundant. It is also hard to pinpoint where digital platforms start or end because they are commonly accessed through other objects (such as smart phones or computers). Their existence is also made possible through systems which support the exchange of data (servers, wireless technology, the internet of things, and open data etc.). In the transport sector, platform-based mobility services are thus connected to, and reliant upon, a multitude of physical and digital infrastructural entities. Stehlin and his co-authors point out that this includes infrastructures which are commonly funded by public actors, such as "road networks, sidewalks and other public spaces, existing mass transport systems, telecommunications, and GPS" (2020, p. 1254). Platform-based mobility services are therefore a new territory for market actors and public actors working with various aspects of transport planning and provision.

KEY CONCEPTS: NAVIGATION AND NAVIGATIONAL ACTIVITIES

This chapter draws on research from urban studies into processes of urban change and transitions, and specifically the concept of navigation developed by Stissing Jensen and his co-researchers in 2015. These researchers introduce the concept of navigation to discuss how urban actors respond to situations where existing boundaries or junctions between the different systems which make up the urban fabric are challenged. Jensen and his co-authors describe these as "ill-defined places". They

use the term "ill-defined" to highlight sites where "conventional boundaries and interdependencies" in mobility systems are called into question (2015, p. 557). Navigation, or what the researchers also refer to as "navigational activities", takes place in relation to these boundaries or junctions. The term "navigation" is used together with the terms "boundaries" or "junctions", to conceptualise the dynamics between the different practices, infrastructures and sub-systems which comprise urban mobility systems, how these systems overlap, and the efforts of governance and planning actors to align and co-ordinate them.

In this chapter, the concept of navigation is used to explore processes of navigation and junctions in a pilot to test MaaS, a concept which sets out to inspire and initiate new interconnections and interdependencies between mobility infrastructures, services and practices. The central aspect of the realisation of the MaaS concept is the re-shaping of boundaries and connections between different aspects of the mobility system. The integration of public transport, car-sharing, bike-sharing etc. is all about changing existing boundaries between these services. The processes of navigation, or navigational activities, taking place in connection to MaaS can be understood as the ways in which various actors working with the transport sector are working to (re)orientate themselves in response to MaaS and platformisation.

Three different aspects of navigation are discussed:

1) the platform itself as a new boundary emerging in the transport sector,
2) the sale of public transport tickets,
3) the use of public space for mobility services connected to the platform.

The pilot for MaaS discussed in this chapter is part of the same project discussed in chapter 8 in this volume on the Modern Mobility in Barkarby project. The MaaS pilot launched within this project developed from the Stockholm region public transport authority's (RPTA) approach to the MaaS concept. In 2016/2017 the Stockholm RPTA produced its own strategy for MaaS, or combined mobility (kombinerad mobilitet in Swedish) as it is often called in the Swedish context. In a strategic document from January 2017 the RPTA outlined its stance on MaaS, explaining that it would continue to act as a 'producer' of public transport, which meant that it would continue in its existing role. The RPTA also decided that it would engage in pilot projects to explore and learn more about the MaaS concept. This stance meant that the RPTA became the de facto initiator of the process to establish four initial pilot projects for MaaS across the Stockholm region. One of the pilots that the RPTA selected to work with was initiated by Nobina Technology, the innovation company of the bus operator Nobina. This pilot focused on integrating public transport ticketing in the platform 'Travis', together with a range of other mobility services, such as bike-sharing, taxi, car-sharing, and e-scooter services. The implementation of the pilot in Barkarby was also facilitated by the municipal innovation company, Barkarby Science.

The MaaS platform

Platforms are developing in the spaces between existing infrastructures and ways of moving. They can therefore be seen as new boundaries which challenge conventional boundaries and interdependencies, in this case in the transport sector. Howev-

er, they of course do not emerge by themselves. An important question is therefore which actor ultimately owns and is responsible for a platform and how their navigational activities influence the changes which a platform can potentially bring. In this case, the bus operator is the actor who has taken the decision to own and develop the MaaS platform service.

In 2016, the bus operator involved in the pilot for MaaS created its own innovation company, Nobina Technology. This allowed the company to create an organisation connected to, but still autonomous from the main Nobina concern, where it could work on questions connected to the future of public transport. It was this branch of the bus company that started to work with the MaaS concept in 2016-17. After a period of research about the role it could take in a MaaS system, Nobina decided it would position itself as a 'mobility broker'. Around this time, the idea of subscribing to a package of mobility services was dominant in MaaS discussions in Sweden and internationally. Deciding to take a different tack, Nobina Technology opted to take more of a 'pay as you go' approach, similar to a multimodal journey planner, where public transport would be presented alongside a range of other mobility services in the Travis application. It was this suggestion for a MaaS pilot which Nobina Technology submitted to the Stockholm RPTA's call for pilots in 2017.

In taking a broker position, Nobina Technology moved to develop and take responsibility for the platform which would integrate public transport and other types of private mobility services (taxi, bike-sharing, car-sharing services, etc). Nobina Technology was responsible for designing the platform, as well as the negotiations and agreements with other mobility service providers to get them to commit to integrating their services within the platform. Nobina Technology were therefore in

charge of managing the platform and the multiple new connections with other services needed to realise the MaaS concept.

Looking at this actor, the idea that navigational activities take place around new boundaries has two layers of meaning. Firstly, Nobina/Nobina Technology decided to take the role of the main actor responsible for creating and launching a new digital platform in the transport system. And secondly, as the owner of the platform, Nobina Technology took an overarching role in defining how other actors could connect to the platform and how they would be presented within the platform (i.e. the business model which structures the platform and steers how taxi services, e-scooters and bike services are also included in the platform alongside public transport). Nobina therefore had an influential role in setting up a structure affecting how other actors could navigate their position in relation to the platform.

This case is also an example of how a process of navigation led to a reorganisation of roles and new interdependencies between the RPTA and the bus operator. The RPTA's decision to participate in a MaaS pilot as one of a range of actors within Nobina Technology's platform switched the hierarchy of roles which ordinarily exist in public transport provision between the RPTA and public transport operators. Generally, an operator provides services via a procurement process on behalf of the RPTA. In the pilot for MaaS discussed in this chapter, public transport instead became a service within the bus operator's platform. This process is connected to how both actors navigated in this case, and while the RPTA could be said to more or less maintain its existing position, the bus operator took the opportunity to develop a broker role in MaaS developments alongside, or beyond, its more conventional business as a public transport operator.

The sale of public transport tickets

One of the often talked about aspects of MaaS is the role of public transport within a so-called MaaS ecosystem. As Smith discussed in chapter 9 in this volume (and as his work has highlighted more generally) RPTAs have often focused on the position they can or cannot take in MaaS developments. For the pilot discussed in this chapter, Stockholm's RPTA outlined its position on MaaS developments in a strategic document first published in 2017. In this document the sale of tickets can be identified as a boundary around which the RPTA navigated its role, and which signified how public transport would be involved with the development of the MaaS concept in the Stockholm region. This in turn influenced the navigational activities taking place in the pilot discussed in this chapter.

In the strategic document published in 2017, Stockholm's RPTA communicated its decision to act as a producer of public transport within a MaaS service, effectively reiterating its existing role, and stated that it would make public transport tickets available for re-sale within a third-party app. This decision was also announced with the caveat that the RPTA would participate in pilots led by other actors. More generally, this decision initiated and set in motion the piloting of MaaS in the Stockholm region, which can be seen as a way to navigate MaaS more generally. Ticketing became a boundary between public transport and the platform, which both made it possible for the RPTA to take part in MaaS developments while simultaneously making the distinction that the RPTA themselves would not be leading the development of a MaaS service.

When it comes to the pilot for MaaS in Barkarby, the realisation of the sale of public transport tickets through a third-party platform was a central element and aim of the pilot. In practice,

this involved work on the part of both Nobina Technology and the RPTA to each build a key part of the digital infrastructure necessary to make the sale of public transport tickets possible. This digital infrastructure is commonly known as an API (Application Programming Interface). An API allows for communication between two programs regarding, in this case, the authorisation of the sale of single public transport tickets. In the Swedish context, Nobina is the first organisation which has been able to resell the RPTA's tickets in its own platform. In this case the process of re-selling tickets was done on an ad-hoc basis for the pilot, but a more permanent internal system or interface for the re-sale of public transport tickets via external platforms (i.e., platforms not owned by the RPTA) is also under development. At the start of the pilot, the RPTA already had its own platform for the journey planning and ticket sales; however, there were then no stated plans to use the RPTA's own journey planning and ticketing platform as a core platform for the integration of various mobility services.

The sale of tickets has guided how the RPTA has navigated its role in this example of platformisation and is also likely to inform further developments in this area. Ticketing is used to demarcate the RPTA's role without closing off public transport to MaaS developments. This has led to new processes as during the pilot the RPTA has worked to establish new systems to allow the sale of tickets to third-party actors. The RPTA also currently has plans to continue to develop processes for the sale of tickets via third-party actors. It could be said that ticketing is a boundary which is used to simultaneously uphold conventional boundaries around public transport while establishing the opportunity for new interdependencies with platform-based services established by other actors.

A third boundary around which navigational activities occurred in the pilot is related to the implications that new mobility services have for land use and public space. This boundary has primarily highlighted the role and responsibilities of the municipality in the process of piloting MaaS and managing new platform-based mobility services. In comparison to the RPTA, the local municipality involved in the pilot did not have a specific service to be integrated into the platform. Instead, the questions which concerned the municipality in particular was the way in which the mobility services included in the platform were allowed access to public space. Land use requirements and regulations were therefore a key boundary which influenced the municipalities' navigational activities as part of this MaaS pilot.

The municipality of Järfälla, where Barkarby is located, is around a 10-15 minute journey by commuter train outside Stockholm's urban core. This suburb had not been an area of the Stockholm region where many (or any) new mobility companies – such as car-sharing and e-scooter businesses – had chosen to launch their services prior to the pilot for MaaS discussed here. The Barkarby area had instead been identified as an interesting area for piloting MaaS by the RPTA, due to the considerable urban development happening in Barkarby over the coming years. The pilot in Barkarby brought a number of private actors working with car-sharing, shared bikes and e-scooters to the municipality in connection with Nobina Technology's efforts to establish a pilot for MaaS there. Although Nobina Technology was the main actor responsible for recruiting these services, the municipality had to provide permission with regards to whether, and where, vehicles could be placed around Barkarby.

In the MaaS pilot, the way in which the use of public space

was handled varied depending on each mobility service. When it comes to car-sharing, the municipality decided that it could not provide on-street parking for the cars. This was instead solved by using parking spaces in the local supermarket garage, which were rented for the pilot by the bus operator. For the bikes, which were provided by the same company responsible for the car-sharing service, the municipality decided that within the framework of the pilot they could justify allowing these to make use of public space. The e-scooter company involved in the pilot was allowed to create a specific geo-fenced area (a type of virtual geographic zoning) for the pilot, as it would for its normal service in the inner-city in order to influence where users could use and park the e-scooters. Therefore, in practice, the municipality had to navigate how it could allow a number of different services to make use of public space, and what existing regulations could, or could not, allow in the context of a pilot project.

For the municipal actor involved in this case, the MaaS pilot thus became a fragmented question which it had to deal with via the different services to be placed in the urban area under development. The municipality therefore experienced the MaaS platform primarily through the new effects and planning questions other platform-based mobility services posed for land use planning regulations and the use of public space. This highlights how platform-based services are layered on top of each other in a MaaS, making it a challenging concept to handle for a municipal actor expected to deal with a variety of different services. An additional aspect influencing navigational activities relates to public space at the local level; however, local regulations applied at the municipal level are set at a national level, i.e. in parliament through the Planning and Building Act which is

facilitated by the Swedish National Board of Housing, Building and Planning. Therefore, although questions about how public space is used are often applied and negotiated at the local level, in Sweden the national regulating body also has a role in shaping what is included in the laws applied at local level.

The MaaS pilot in this case has also influenced the municipality's work to develop a strategy for transport planning for the whole municipality. A document was drafted by civil servants at the municipality during 2021, but still awaits political approval by the political council at the municipality. The development of a new strategy can be viewed as an effect of the navigational activities which took place in connection to the pilot for MaaS, where the municipality has sought to re-orientate its formal documents in relation to platformisation.

CONCLUDING DISCUSSION

Technical transformations in the transport sector are not new but ongoing. However, van der Graaf and Ballon (2019, p. 367) have noted that "transportation systems have tended to be planned, designed and managed as exclusively physical infrastructure systems". Platform-based mobility services are a hybrid combination of physical and digital systems, and consequently represent a new dimension of what is driving change in the transport sector.

As seen in this chapter, actors working in collaboration around the same platform application actually work with quite different aspects of the platform. It could be said that this is the point of collaborating – different organisations come together because of their different expertise and responsibilities. Yet it could also be argued that this case also illustrates the more un-

even and fragmented aspects of collaboration and the existing challenges for public actors in establishing a more overarching governance approach to platformisation. The RPTA and local municipality work with boundaries to the platform which overlap with their existing roles in ticketing and the use of space. For both actors, these junctions are sites where the two actors maintain their existing responsibilities. At the same time, they have also incrementally started to work with how platform mobility services influence their institutional settings more generally. Nobina however, work with navigating the MaaS platform as a whole, rather than in relation to different parts of the platform. This also connects to questions regarding how public actors engage in risk-taking, as discussed in chapter 2, and how risk is distributed amongst actors.

This chapter has explored a pilot for MaaS as an example of how public and private actors are responding to platformisation in the transport sector. This is an alternative approach to understanding, or evaluating, MaaS pilots in terms of how successful (or not) they are at realising the MaaS concept. Exploring a MaaS pilot through a platformisation lens emphasises the different capacities public actors have to influence the development of digital platforms. For example, this case highlights that the boundaries established between the platform for MaaS and the two public actors limit the capacity for these actors to influence the development beyond access to ticketing and use of public space. They are only able to influence different facets of the concept, which potentially limits how public actors can ensure MaaS contributes to public goals. More generally, this raises questions about how different public actors are limited to governing certain aspects of platforms and, if so, how this limits the future development of platforms, but also the future

development of public transport. The fragmented relationship to platformisation that local and regional actors have also raises the question of whether they could strengthen their capacities to govern platform-based mobility developments by working more closely together to develop knowledge and learning, and to have a more integrated public response to these developments. This kind of response is difficult to realise in the context of bounded experimental activities, and requires a different type of co-ordinated approach to platformisation which can combine and stretch across different types of experimental activities.

Digital platforms are a challenging and abstract object of governance for public actors. Public actors could strengthen their capacities to govern platform-based mobility developments by working more closely together to develop knowledge and learning, and to have a more integrated public response to these developments. Experimental spaces may not be the optimal context to develop this response. A different type of co-ordinated approach to platformisation is needed, one which can combine and gather experiences from different types of experimental activities and facilitate reflection from a broader perspective than, for example, applied pilot contexts.

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Practitioner reflections on the why and how of pilot projects

"For me, piloting is to test something. Where you should also have the choice to say 'no, this was not right'. In public transport environments, it often feels like pilots are used as the first step towards implementation. /... / but maybe you should run more pilots where you just test 'is this a good idea or not?' "

(Official 2, Public Transport Authority)

"If you look at the documents that are linked to the project /... / the ambition for [the project] to continue and be taken further afterwards is clear /... / The question [in these documents] is not whether we should continue to work with it, but how"

(Official 1, Public Transport Authority)

– Chapter 5 –

Shaping the role of drones in UK logistics

Angela Smith, Greg Marsden, Janet Dickinson

This chapter addresses the introduction of Unmanned Aerial Vehicles or drones, as part of innovation trials in the UK. Our experience relates, in particular, to research surrounding the demonstration of drones for the movement of medical goods in the Solent[1] region of England. This specific demonstration is of the movement of time-sensitive medical products (such as blood samples and chemotherapy drugs) between Portsmouth on the mainland and the Isle of Wight. The trial is funded by UK Research and Innovation (UKRI), a public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS) through the funding stream 'Drone Solutions for COVID-19', with further funding from the Department of Transport's Solent Future Transport Zone Programme within which a range of new approaches to transport are being tested. The Solent trials seek to develop a platform for integrating drones with the needs of the health service with a view to extending their use within this sector. The questions we explore relate to the extent to which the limited experimentation on medical logistics, which forms the core of the trial, relates to the wider visions for drone logistics and air taxis which underlie the commercial interests. We question the extent to which this kind of limited use case can be used to understand the 'new socio-tech-

1 The Solent region encompasses the Isle of Wight, the two cities of Portsmouth and Southampton, the New Forest, the M27 corridor and the Solent waterway.

nical realities' which experiments are supposed to address.

Our interest in drones is as researchers. We are working towards the development of new understandings of stakeholder perspectives and the regulatory and governance needs associated with the deployment of drones for logistics. Our work so far has identified deficiencies in how public involvement in debates around the use of drones within logistics has taken place. Input from the public has so far centred around identifying and understanding their concerns about drone technology through workshops, polls, surveys and focus groups undertaken by academics, government agencies and commercial organisations. These lean heavily towards the paradigm of seeking public acceptance of a seemingly inevitable transition in transport. This resonates with other envisioned transport transitions, and we draw upon Stilgoe and Cohen's (2021) paper which critiques how the public has been framed as a barrier to the inevitable technological progress that automated vehicles will provide, and how public acceptance has become the goal of many engagement activities. They conclude that there is a need to move on from seeking acceptance to a model where public dialogue can shape the governance of new transport technologies.

Reflecting this back to our case study of experimentation on medical logistics, we can see that experimenting on a specific route with a socially desirable use case provides a useful and legitimate technical demonstration. However, such an approach tells us almost nothing about what drones in unrestricted airspace would be like, or how the public would respond to any commercial firm being able to operate such drones for any type of logistical activity. Here, the concern is that the use case acts as a Trojan horse for notions of wider societal acceptance.

The chapter is organised as follows. First, we briefly intro-

duce drones to set the context for the interest in urban experimentation. Second, we describe the UK programmes which are funding the drone experimentation. We then turn to the gap between the experimentation and the longer-term goals for adoption. In particular we discuss the framing of acceptance and the challenge of interpreting the trials beyond their technical successes.

DRONES

Drones have an established role in the delivery of medical items in some developing countries, where they provide significant benefits in the context of less developed road infrastructure and difficult terrain. For example, Zipline have been delivering blood products by drone across rural Rwanda since 2016 and have since established services in Ghana and Cote d'Ivoire. In more developed countries, whilst drones are used for a range of non-transport purposes, such as in the UK where police forces use drones to locate criminals and missing persons, surveillance and the recording of crime scenes, the use of drones for deliveries remains largely aspirational, with a continued focus on trials of delivery services to develop the proof of concept.

For drones to be able to operate in logistics they will need to be flown beyond the pilot's visual line of sight (BVLOS). This is dependent upon the development and implementation of an Unmanned Traffic Management (UTM) system which would unlock the anticipated potential for drones both in logistics and for non-transport sectors where more routine BVLOS is also considered advantageous. At present, BVLOS drone flights require specific permissions from the Civil Aviation Authority, with the temporary closure of the section of airspace to other

users. Trials of drones aim to contribute to resolving some of the technical challenges of creating a UTM system whilst providing an understanding of practical challenges such as drone performance and reliability. At present the development of the UTM is largely the remit of technical specialists and those with a vested interest in how airspace is used including drone operators and more general airspace users. In the longer term, local authorities are expected to have a role in coordinating access to airspace, with geofencing providing the scope for defining future use boundaries alongside the planning of any required landing facilities. This role, once established, will need to be informed by wider understanding of the impacts and benefits of use cases and public dialogue around the desirability of the routine deployment of drones in local environments.

WHAT AND WHO IS DRIVING DRONE TRIALS?

In the UK, the push for the use of drones within logistics stems from the government's promotion of the expansion of the use of general drone technology and ambitions for 'Urban Air Mobility'[2] . This is bolstered by the private sector which contributes to forecasts of economic gain and extols the operational benefits to industry.

1) General expansion of the use of drone technology

The UK's Drone Pathfinder Catalyst Programme represents a partnership between the public and private sectors with the aim of accelerating progress in drone technology and regulation. It falls within the Catapult Network which has the ob-

2 Urban Air Mobility envisages the routine use of highly automated aircraft (drones and air taxis) at lower altitudes within urban and suburban areas to move people and goods.

jective of accelerating the application of new technologies and is ultimately funded by the BEIS. Here the use of drones for logistics sits alongside the desire to support greater deployment for infrastructure inspection and surveying with the remit of addressing challenges such as enabling routine BVLOS flights and changing public perceptions to achieve acceptance of the technology. Demonstrating drone technology is a key facet of this programme.

As transport researchers, we see the grouping of the use of drones for logistics with uses such as surveying, inspection, agriculture and search and rescue as problematic. Logistics uses imply deployment in everyday environments at so far undetermined frequencies as they become embedded into transport systems. By contrast, in surveying and inspection uses, deployment is irregular, infrequent and within distinct settings for example, along a railway corridor or within a closed power plant or for search and rescue. As such, *acceptance* is not so much of the technology but the benefits or impacts that may occur relative to their use case. The Drone Pathfinder Catalyst Programme was established to contribute to the delivery of the UK Government's 'Build Back Better: our plan for growth' and the 'Future of Mobility Grand Challenge', although the push for the use of drones in logistics from a transport perspective is more conspicuous within the UK's 'Future Flight Challenge' and the desire for 'Urban Air Mobility'.

2) Ambitions for Urban Air Mobility

UKRI, a public body sponsored by BEIS, oversees the Future Flight Challenge, which is a £300 million programme funded by government and Industry. The UKRI's 'Future Flight Vision and Road Map' envisages drones providing distribution

and delivery services alongside support for emergency services by 2030. Within this vision, drones are positioned alongside air taxis and regional air mobility, the former sharing urban landing infrastructure with drones such as that being demonstrated by Urban-Air Port Limited in Coventry. The UKRI forecasts that drone services will contribute £16 billion in net cost savings to the UK economy by 2030, although it needs to be acknowledged that drones used within transport represent approximately one quarter of this estimate, with the wider value coming from drone use within sectors such as agriculture, public defence, manufacturing and consulting, further reflecting how the use of drones within transport systems is conflated with wider adoption of this technology.

The Future Flight Vision and Road Map states that drone trials taking place in the present day will contribute to "unlocking a path to certification *and* social acceptance" (p12, emphasis added) thereby enabling subsequent steps towards full operations including general drone delivery use cases such as on demand last-mile delivery of cargo by retailers. Therefore, from the UKRI's perspective, the desired endgame of drone trials is their widespread deployment in everyday environments as part of the shift towards using the skies for local and regional transport of people and goods. The UKRI's Vision and Roadmap does not represent a policy position. UK national transport policy is more tentative, for instance the Future of Mobility: Urban Strategy (Department for Transport 2019) outlines that drones *could* (our emphasis) replace vans for some urban deliveries but warns that new modes could also have potentially disruptive impacts on urban environments. The language of inevitability is therefore less apparent.

As set out above, industry is partially funding the UK's Fu-

ture Flight Challenge, and organisations with an interest in drone technology and aerospace are significant contributors to the UKRI's vision. However, since the end of Amazon Prime Air in 2021, there are no wholly commercially funded trials of the use of drones for logistics taking place in the UK, and current trials are predominantly funded by government agencies (which includes the UKRI, the UK Space Agency and the Department for Transport) and delivered in partnership with the private sector.

In summary, UK drone trials are largely publicly funded and represent steps towards achieving increased adoption of drone technology in all settings with their deployment for logistics also forming part of a future vision for UK transport where airspace represents a potential new layer for mobility. Achieving social acceptance is a planned outcome of the active demonstration of the technology generally and its specific use within logistics.

HEALTHCARE DRONE TRIALS: CRITICAL INNOVATION OR TROJAN HORSE?

In the absence of commercial drone deliveries, trials of services funded through UK Government agencies provide examples of such operations. Recent and ongoing trials are focused on the transport of medical items to rural and island communities (further trials have taken place in remote areas of Scotland and from Cornwall to the Isles of Scilly). The medical focus may be inspired by established drone delivery services operating in Rwanda, Ghana and Cote d'Ivoire but also may represent a more surreptitious starting point for attaining public acceptance, with surveys and polls indicating how the public are inevitably more receptive to use cases which provide a social good. Moreover, it can be seen to have the effect of closing down

debate; the UK National Health Service (NHS) is subject to public and political reverence, heightened by the Covid-19 pandemic, and the deployment of technology to support services is unlikely to be contested.

Public engagement surrounding current drone trials does little to address this bias but rather hooks onto "helping the NHS" narratives with an absence of reference to the wider longer-term goals of the trials. Cohen et al. (2020) highlight how promotors of automated vehicles have made the potential safety benefits a central theme within their communications, although in reality these safety benefits are likely to be unevenly distributed across transport users. Similarly, the benefits of drone delivery services in terms of saving lives or even saving carbon are yet to be evidenced. This initial framing of drones as isolated medical delivery services is also misleading if the longer-term objective is in fact widespread drone deliveries for all purposes and further still represent one aspect of future plans for Urban Air Mobility.

Marres (2020) identifies how public trials of emerging transport technologies are "stage-managed", with limited opportunities for public interaction. For drone trials in the UK, visibility of the trials is limited by the focus on the movement of items to island communities and restricted use of airspace. Trials of more general delivery drones such as those taking place outside the UK (see for example Wing in Australia (Wing, 2021)), provide greater exposure and potentially a more realistic representation of how long-term drone deployment is envisaged by the UKRI, and the greater potential for controversy is in fact something to be embraced.

The E-Drone research project, which the authors are collaborating on, is connected to and helping facilitate the wider system design changes necessary to support the medical use

case. However, it is independently funded and has been exploring the value that drones may have in supporting NHS logistics needs. It is also developing new tools to enable stakeholders and citizens to experience more realistic future scenarios with open air space through virtual reality. The demonstration project would not be funded to look into these wider issues, focussing as it must on more 'project' level success criteria. However, the demonstration has, in part, shaped the thinking around this wider reflective research, and enabled it.

CONCLUSION: MOVING ON FROM ACCEPTANCE

The fundamental role of trials is in the testing of new transport technology in the real world, but this is situated within the longer-term desire to see the adoption of new modes of transport to meet wider policy goals which may be economic, environmental, and social to varying degrees. As seen in this case, the push for adoption is to some extent driven by innovators and industry before it is clear that the envisaged wider benefits can be realised without resolving downsides to deployment, although trials will contribute to this evidence base.

The UKRI's 'Future Flight Vision and Road Map' presents a future within which everyday transport takes to lower airspace with the deployment of drones and air taxis to transport people and goods across urban areas. This represents a very significant change to local environments which, according to the UKRI vision, would take place as early as 2030. The public's role in determining the shape of this potential transport future is critical. However, input so far has been through surveys and polls which we have found to conflate the use of drones within logistics with non-transport drone uses and to present them largely free

of context. The scope of these surveys has been further limited to identifying the public concerns which represent barriers to acceptance. This has the effect of distancing drones from the local environments in which people live, and is devoid of crucial context and has so far failed to generate a level of public debate congruent with a significant socio-technical shift. Meanwhile those with direct interests in the technology and how airspace is used are actively contributing to the debate. Moving on from the public acceptance model requires at the very least that the issues identified here are addressed. In basic terms that means communicating and co-developing the aspirations for the use of drones in transport and providing relevant context in terms of the potential impacts and benefits.

The drone trials in the UK reveal an important contradiction in experimentation. The trials are necessary as technological demonstrations. In the case of the Solent trial this includes developing approaches to managing drones as a potential new form of mobility and implications on dangerous goods movement protocols and the specific constraints of managing the movement of products in health settings. However, those seeking to promote the technologies also see the trials as a means of undertaking the socio-technical experimentation necessary to demonstrate their wider acceptance in society. The very limited nature of the trials means that they cannot possibly perform such a function. It can also be questioned whether those responsible for advocating the technology are best positioned to assess these broader positions, given their vested interests. Methodologically, our work also suggests the need to move beyond acceptance to broader debates, for which the decoupling of the two tasks is actually crucial. More attention should be given to how the trials can be used to help improve communi-

cation about the technologies and explicitly provide a starting point for public deliberation – and this has partly been our role in a parallel research project which addresses user groups, simulated environments and how to ask about these novel technologies.

Understanding the part that trials play within wider strategies and ambitions is important. It shifts the meaning of trials from being relatively stand-alone events to representing a step towards achieving wider aspirations.

The existing framing of delivery drone trials around medical uses is disingenuous in that it elicits socially desirable responses and masks the real ambition for the use of drones in logistics. More general visions of drone use have a greater likelihood of sparking interest and debate about the role of drones in future transport.

To achieve a shift from public acceptance towards a collaborative approach to defining future transport landscapes, greater integrity and clarity is needed in both engagement activities and methods for gathering the evidence on potential economic, environmental and social impacts. This will contribute to future regulation and governance, recognising that effort is needed to make the subject of drone deliveries contextual and relevant to those with no current vested interest.

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Practitioner reflections on citizen and user involvement in experiments

"...we should have been much more curious to talk to citizens and travellers about their needs and wishes, before we got started. We are very quick to think that we have a customer focus - but we often lose the customer perspective"

(Official 1, Public Transport Authority)

"I think it is important to define the stakeholder group, and to think about who the key actors are. It is relatively easy - in a smaller constellation - to establish a nice technical system. But what about the citizens, the users - will they agree?"

(Senior consultant at a Think tank)

– Chapter 6 –

Whose witnesses: An examination of the potential pitfalls of producing electronic vehicle futures through experimentation

Chima Michael Anyadike-Danes

Science communicators and scientists, in their engagements with the public, often take part in a discourse that presents the scientific method as being capable of producing objective knowledge free of bias. However, for decades science and technologies studies scholars, like Ludwig Fleck and Bruno Latour, have conducted research on the processes by which scientific knowledge and scientific objects are constituted and produced, and their findings would strongly refute this view. Such scholarly accounts stress the limitations and partiality associated with attempts at knowledge production. A subset of this scholarship, such as Charles Goodwin's and Annemarie Mol's works, reveals the very real difficulties of communicating results outside a lab. What the aforementioned scholarship, and the work of scholars like Banu Subramaniam does is to particularly highlight the propensity of those engaged in the production of scientific knowledge to ignore the knowledge claims of those situated differently, and instead to privilege accounts of outcomes, effects or results that accord with their professional sensibilities. In this chapter I am concerned with how the partiality of the results produced by experimentation can be acknowledged and the recommendations amended to reflect the concerns of those not initially imagined as being relevant to a pilot programme.

My exploration of these possibilities is conducted through a particular case study, a pilot programme that aimed to install electronic vehicle charge points in County Durham in the UK, and it considers the response of those running the pilot to both disabled residents and the county's equality and diversity officers' expressions of concern.

This chapter is based upon ethnographic fieldwork that I carried out with the officers of Durham County Council's (DCC) Low Carbon Economy (LCE) team between January 2021 and November 2021. As the global pandemic meant that, for much of the year, the council's officers had to work from home my ethnographic fieldwork consisted of shadowing LCE staffers online at various meetings they attended on video teleconferencing platforms. I then made copious notes on the topics discussed and, where relevant, conducted follow-up one-on-one interviews with members of staff and others involved in council programmes aimed at decarbonisation. SOSCI (Scaling on Street Charging Infrastructure), the pilot programme that is at the centre of my case study, ran throughout the period of my fieldwork. Its goal was to explore how best to site publicly accessible electronic vehicle charge points in three other local authorities' landscapes. The act of siting would produce findings which SOSCI would then share with other parties in the United Kingdom, specifically, those interested in making electronic vehicle charging publicly accessible. In the rest of this chapter, I will discuss in greater detail the reasons for the SOSCI pilot programme's existence, before detailing the exclusion and then inclusion of disabled people in the pilot, and the lessons that this might offer for those looking to design experiments that aid in thinking about how to create socially inclusive, decarbonised, transportation futures.

As Gijs Mom argues in 'The Electric Vehicle', with their origins in 19th century electric trams, electric vehicles are by no means a novel technology. Furthermore, the emergence of mass-produced internal combustion engine vehicles in the early 20th century did not wholly displace their electric counterparts. In fact, in the 1940s UK had one of the world's largest EV fleets, with many of them used to transport and deliver goods such as milk. However, this is not the role that the ruling Conservative party envisages that electric vehicles will play in a decarbonised future. This much was clear from the 2011 'Making the Connection: The Plug-In Vehicle Infrastructure Strategy' where Phil Hammond, the then Secretary of State for Transport, argued that

> *The idea that the only way to achieve our environmental goals is to force people out of their cars is pessimistic, outdated dogma. Low and ultra-low emission technologies, such as plug-in vehicles, offer the potential to reduce emissions but still allow people the mobility that they want and need - assisting in the battle against carbon without persecuting motorists.*

The report describes a future in which electronic vehicles have not merely replaced internal combustion powered vehicles, but one in which the way refuelling occurs is profoundly different from the current use of petrol stations. It details a time in which most EV owners will charge privately owned electric vehicles at their homes during off-peak hours. This action of charging off-peak will prevent the over-loading of the country's electrical grid. Furthermore, in this future a smart meter will help a driver with the home charging process. The meter will monitor a home's electrical consumption to identify the ideal

period in which to charge one's vehicle. This vision is informed by the central government agency charged with examining how transportation might be decarbonised. Since 2009, OLEV (the Office for Low Emission Vehicles), which was renamed OZEV (the Office for Zero Emission Vehicles) in 2020 to 'better align with government ambitions to be carbon neutral by 2050', has funded studies, run pilot programmes, and produced reports on various forms of EVs and the potential configuration of transportation futures.

However, the announced vision of the future does not accord very well with the landscapes that the DCC and other local authorities in the North of England govern. The DCC is responsible for one of the nation's largest local authorities by area and it is a largely rural landscape. The locations of the local authority's population centres were largely determined by the presence of coal. This same coal was then mined to power UK's industrial revolution. Owing to this specifically industrial heritage the proportion of the county's housing that is terraced is considerably higher than the national average. This means that houses in County Durham's more densely populated areas often lack their own driveways. Consequently, residents must rely on street parking and thus cannot be guaranteed access to a charge point outside their homes. Charging at home is thus just not viable for many. These circumstances not only present a challenge to the previously mentioned vision of the future but to residents' purses because in the UK it is currently far cheaper to charge one's EV at home than to make use of the charge points hosted by supermarkets, petrol stations, and the like.

The SOSCI programme is an attempt to solve the problem of charge point access that arose because of the previously discussed architectural inequality. The programme began life in

January of 2019 as a feasibility study funded by Innovate UK - a government agency whose role is to help finance the development of innovative new goods and services - and carried out by variety of private companies and third sector organisations, all with the goal of ensuring that people in such areas could use publicly accessible charge points no more than five minutes from where they dwelt. Furthermore, this phase of the experiment imagined minimal involvement of local government, stressing instead that it was concerned with helping local people develop the tools to identify and finance their own community charge points. However, by mid-2019 when SOSCI 2, a pilot programme which sought to install 100 charge points in County Durham, and 50 apiece in two other local authorities' bailiwicks, was launched this secondary goal was seemingly no longer central to the endeavour. Instead, the programme had bifurcated; in the other two northern local authorities, SOSCI continued with minimal local government participation but in County Durham the DCC was heavily involved and assigned an officer from the LCE team to the programme. Publicly accessible charge points in Durham were specifically intended for council land and local involvement in siting the charge points was mediated by the DCC who communicated directly with the distribution network operator – the company responsible for owning operating electrical infrastructure – to determine whether installing in locations favoured by the public was feasible.

Figure 1: A trio of electrical vehicle fast chargers in a 'park and ride' on the outskirts of Durham. Their placement illustrates the difficulties that wheelchair users were complaining about with respect to the height of the charge points.

THWARTING THE BIRTH OF ELECTRIC EXCLUSION

In March of 2021, three months into my fieldwork, I attended a meeting over Microsoft Teams between the LCE officer assigned to the SOSCI programme, officers from the equality and diversity team, and other council officers involved in an inter-departmental EV working group. The subject of the meeting was the accessibility of the EV charge points that the council was installing through the SOSCI pilot programme and other programmes. Specifically, concerns had been raised by members of the disabled community who had seen a local news report about the SOSCI programme's efforts to install a charge point in a car park in Durham city. What concerned them was that the charge point would be inaccessible to wheelchair users who drove EVs. Thus, while the Durham iteration of the SOSCI pilot programme might have been addressing architectural inequality there was a concern that unless it was amended the evidence it produced would be inadvertently discriminating against wheelchair users and creating a future which did not

take their specific transportation needs into account.

Government discrimination against wheelchair users and other disabled persons trying to make use of vehicles is by no means a new phenomenon in UK. In fact, it has quite a long history. For example, on the 19th of June 1999 the Bristol Evening Post published Liz Crow's article 'A Life in Chains'. Crow, an artist, disability activist, and wheelchair user, used the article to describe an ongoing, decade-long campaign of civil disobedience that disabled people had engaged in to secure accessible transport. She explained that it was not their first course of action, but they felt it necessary. Crow and her community had been perpetually stymied by both politicians and transportation companies who had continually recommended that if only they were 'to wait another 30 years' they would have 'a transport system that is accessible'. She further pointed to disability as a socially constituted phenomenon, arguing that 'two and a half million people in the UK are being disabled by the transport'. Crow's article described how she had been buoyed by the results of their direct action and conveyed that she and other disabled people felt they were on the cusp of reaching a fairer transportation future with equality of mobility for all. She concluded in a rather poignant manner by noting that were such a future to come to pass it would have the consequence of making public transportation in the UK truly public for the first time. While heartening, this future has never truly arrived. Articles in UK's national newspapers and various surveys continually make clear that disabled people still face great difficulty when accessing what is supposed to be a public transportation system. Thus, many continue to rely heavily on privately owned vehicles. This reliance becomes even greater in a rural local authority like County Durham, which my interlocutors felt has a relatively un-

derfunded and anaemic public transportation provision.

While the history I have just detailed serves as context for what the DCC's equality and diversity officers said, it was not mentioned in their argument. Instead, these officers focused on the specific instance of the parking lot and its EV chargers, and argued that because of the Equality Act of 2010 the council, and by extension the LCE council officer assigned to SOSCI, had a statutory duty to consider the needs of those with protected characteristics, which included the disabled. They observed that not considering the needs of such groups could expose the DCC to legal action. However, it was stressed that considering the needs of those with protected characteristics was different from supporting them. One could do the former and potentially satisfy the legal requirement without ensuring that the proposed development was in fact inclusive and non-discriminatory. With respect to the car park, they advised that the SOSCI pilot programme should make specific provisions for disabled EV drivers in the form of parking spaces specifically designated for them and with charge points that were easily accessible. They also suggested that the LCE officer should meet with the party that had first alerted the equality and diversity team to the inadequate infrastructure and discuss the possibility of altering it so that it was accessible for all.

Over the course of the conversation, it became that the equality and diversity officers' proposed changes to the provision of EV chargers in the car park represented something of a challenge for SOSCI. For example, when in response to the criticism over the number of spaces for the disabled, SOSCI offered to make the proposed car parking spaces accessible to wheelchair users, the equality and diversity team stressed that it would be better if there were disabled-specific EV spaces. The

challenge for SOSCI stemmed from the budget for the pilot programme, which was tightly defined and did not easily extend to include expenditure on such extra spaces. This was particularly true because the calculations informing the programme's budget were the result of faulty information and thus were not reflective of the full cost of installing charge points. Moreover, because the grant from Innovate UK was for a fixed sum of money, the DCC was responsible for paying the difference between the estimates and the actual cost. Finally, the council's car parks provided it with revenue, and thus proposals to alter them and reduce the number of parking spaces for internal combustion engine vehicles driven by the able-bodied were regarded as representing an added financial expenditure. This was a particularly tricky matter for the LCE team officer to navigate because the team had built its reputation within the council on reducing expenditure and increasing revenue, not the complete opposite.

Figure 2: An on-street electrical vehicle fast charger in Durham city centre. This is again illustrative of the lack of space for wheelchair users driving EVs who want to make use of these charge points.

Science studies scholars Steven Shapin and Simon Schaffer argued in 'The Leviathan and the Air-Pump' that it was Robert Boyle, the father of both chemistry and experimentation, who initiated the concept of scientific objectivity. For Donna Haraway, a feminist science studies scholar, one of the key features of Boyle's mode of experimentation was that it was a means to evaluate knowledge claims. She argued that a modest witness who 'is endowed with the remarkable power to establish the fact' performed this role. However, Haraway observed that this modest witness had a gender, a race, a class, and a nationality; specifically, it was a male, white, a gentleman, and English. As a result, what has been presented as objective witnessing of scientific phenomena is the product of a specific body in a particular time and place. As Haraway and others would suggest, the question then is how one responds to an experiment's lack of objectivity. This is what I discuss in the rest of this chapter; how the SOSCI pilot programme eventually came to be amended in response to claims that it was privileging the able-bodied.

The SOSCI programme members met with a disability equality consultant relatively soon after meeting with members of the Council's equality and diversity team. The consultant drew on prior work that they had produced on electric vehicle chargers and the British Standards Institute's (the body responsible for investigating, formulating, and issuing technical standards in the UK) BS 8300:2009, which details how buildings are designed to meet the needs of disabled people. On this basis they argued that not only did the pilot programme's parking spaces need to be widened to accommodate wheelchair users but that the technical object at the heart of the project, the EV charge point, needed to be redesigned to make it accessible to disabled

bodies. Specifically, they needed to adjust the height and positioning of the object to accommodate the reach of someone in a wheelchair. They also needed to create a clear space so that the charge point could be reached side-on, while allowing the user to return to the vehicle afterwards. While these modifications made the charge point usable by a disabled person in a wheelchair, the consultant pointed out that such a user would still require considerable upper-body strength to carry the cord from the charge point to the car to charge it. This amendment was thus a workable solution for creating a future fit for wheelchair-bound EV drivers but was far from perfect.

Having accepted the consultant's recommendations for changing the technical object the next step for the SOSCI pilot programme was to test these recommendations and see if they were acceptable to wheelchair users and other members of the public who were disabled. To do this, SOSCI enrolled disabled members of the public as witnesses to produce data for the study, with the County Councillor who held the climate portfolio announcing that the event would allow them to work out where they could improve what they were offering disabled members of the community. Thus, in October, as my fieldwork was concluding, the SOSCI project held an open day for several hours in a DCC car park and invited wheelchair users to come and scrutinise a mock-up of their proposed accessible design and to experience what it was like to connect these charge points to an EV. As COVID was still a concern, each interested group or individual had to pre-book a half-hour slot during which they could examine the work of the SOSCI project. When I spoke to SOSCI members after the event they hailed it a success. Furthermore, they expressed surprise at the extent to which members of the public were enthusiastic about becoming witnesses

and making recommendations on how to construct a transportation infrastructure that was less ableist.

While ideally the SOSCI pilot programme's development of an electric vehicle charging infrastructure would have been inclusive from the very start, they did, despite the financial and political costs, embrace the necessity of amending the design and producing new guidance that could inform the development of charge points not just in the DCC and two other local authorities taking part in the SOSCI programme but in local authorities in the United Kingdom more broadly. In doing so they signalled that they understood that a pilot project's outcomes and recommendations are strongly shaped by the ability of its participants to witness the project, and that when witnessing one produces evidence that is deeply informed by a variety of material and social factors. It was with this in mind that one of the other SOSCI partners had produced a report that partners drew attention to the fact that when installing public-accessible EV charge points, one also needed to consider and account for how one's gender shapes the experience of space. The partner observed that to reassure women who might have to charge their vehicles at night, as the Conservative government was imagining EV users would normally do, charge points should not be confined to the far corners of a dingy, dark lot but should be in accessible well-lit areas. This they stressed was a particular concern given that unlike a petrol station where one is there only briefly, one might have to charge one's EV for a far longer period.

Figure 3: A car park on the outskirts of Durham. The placement of the EV fast chargers' parking spaces and disabled parking spaces next to one another provides a perfect illustration of the different amounts of space they occupy.

CONCLUSION

In planning for a future in which electric vehicles are set to play a significant role it is necessary to avoid reproducing the preceding generations' errors. They produced transportation systems and infrastructures that discriminated against several different classes of people and thus were not truly accessible. The case study that I have discussed in this chapter is built upon some of science studies' foundational texts. My purpose in writing this chapter was to clearly demonstrate that when using the scientific method, be it in the form of experiments, living labs, or pilot projects, to envisage transportation futures it is important to continuously reflect on and act on the question of who is involved and who is consulted. Unfortunately, the DCC had failed to take such action, which meant the needs of the county's disabled population were not considered, which could have led to a future which further disabled them. Any reflection then needs to be followed up with an examination of how knowledge from those underrepresented parties can be incorporat-

ed into the study, as SOSCI did through hiring a disability access consultant. Furthermore, as should be clear from this case study, notions of experiments as an inherently objective form of knowledge production should be treated with a healthy dose of scepticism. This is of course not to say that there is no value in experimentation and that it cannot play a role in knowledge production; the point is just that the attribution of objectivity cannot be regarded as an acceptable cudgel for beating off the critical perspectives of those whose experiences are different. This is particularly the case when those different experiences are rooted in the critic's use of their own body. Instead, when faced with such dissenting voices it is necessary to take seriously their criticisms and act upon them, as SOSCI did by exploring the redesign of their charging points.

Key Considerations for Transportation Planning Experiments

- Who is/was involved in the design of the experiment?
- Who is/was interpreting your findings?
- What are the limitations of your experiment?
- Who are the key stakeholders?
- How are you engaging with dissenting or critical voices?

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Practitioner reflections on the need to get everyone on board

"When we carry out pilot projects, we want to spark a change and 'move the world'. And it's essentially about moving people - practitioners, citizens, and politicians. All these different actors need to be involved. Pilots should not only be run by, for instance, three committed innovation actors. Everyone who is supposed to 'move' needs to be part of the project"

(Strategist at an Innovation platform)

– Chapter 7 –

Designerly Living Labs: Design-driven experimentation

Martin Sjöman, Mia Hesselgren

Today, there is a broad understanding that new research methods are needed to achieve large-scale societal change. Across many sectors, there is a growing interest in experimentation and prototyping to handle the complexity of these challenges. In recent years, living labs, demonstrations and pilot projects have increasingly been used to develop, test, and implement new mobility solutions, often labelled 'smart mobility'. During the last decade, a new wave of urban experimental spaces has evolved in connection to the concept of 'Smart Cities', often labelled Urban Living Labs, Future Labs, or Transition Labs, broadly aiming for more systemic change (Sengers et al., 2019). However, all these methodologies are open to many interpretations. They are implemented differently and resist clear definitions, and the concept of living labs has been likened to a "wet bar of soap" (Hakkarainen, 2017).

A central idea behind these new modes of experimentation is to actively involve citizens or users in developing the changes and the latest technologies that will affect them. Thus far, however, Chilvers et al. (2018) conclude that in technological research, the 'dominant modes of participation' are still limited to user consultation, participation as consumption, being subjected to behaviour change interventions, such as 'nudging' or being provided with information. On the other hand, design

has a long tradition of participatory approaches. The last decade has seen a further movement towards co-designing *with* participants rather than designing *for* the users. New methodologies have emerged highlighting *making* to engage non-designers in creating and exploring future visions (Sanders and Stappers, 2008, 2014).

This contribution draws on our own experiences as design researchers from explorative and open-ended design-driven research setups to define a typology of living lab research strategies. We classify alternative strategies for setting up and implementing design-led experimentation by separating different research purposes and various forms of user participation. We start by introducing three examples of design-driven research experimentation projects. We then present two strategic choices that need to be considered when planning design-driven experimentation and the key aspects that we have found to influence these choices. In the last section, we outline and discuss 'provoking' as a design-driven strategy for user participation. In this discussion, we bring out how more explorative and design-led experimentation projects can be carried out. We argue that this type of research calls for participatory user approaches, but these also come with new challenges.

THREE EXAMPLES OF DESIGN-DRIVEN EXPERIMENTATION

Below are three examples of design-driven experimentation set up by our research group at KTH Royal Institute of Technology in Sweden.

A CAR-FREE YEAR

In our designerly living lab, "A car-free year" (see Hesselgren

and Hasselqvist, 2016), three families with children in Stockholm, Sweden, were recruited through advertisements on Facebook and volunteered to live without their cars for an entire year. Instead, they leased light electric vehicles such as cargo bikes and electric scooters. Adapting to this new and very challenging situation, the families acted as co-researchers, documenting their travels and reflecting on the changes they made in their everyday life. The researchers made continuous efforts to maintain a close, transparent, and trustful relationship with the participants. During the year, the families developed new car-free practices while identifying both barriers and often unexpected new forms of value, such as family time on a train or increased independence for the kids, who learnt to travel by public transport.

Future playing rules for mobility

In the design intervention study "New playing rules for mobility" (see Sjöman et al., 2020), nine car-owners were randomly recruited outside supermarkets in three suburbs of Stockholm, Sweden. These participants volunteered to try out three future mobility policy changes for six months. The policy changes were economic incentives designed to promote more sustainable travel. These included the participants paying for trips made with their car using a fixed rate per kilometre of travel, paying only half-price when travelling on public transport off-peak, and getting paid for bicycling. The research project paid the fixed costs for the car, and the pricing scheme was individually set up so that when travelling precisely as before, the cost would be the same. In the case of any savings, the participants received a bank payment. In the end, some experimentation was made, but little real change took place. Still, the envisioned future poli-

cies and the highly visualised costs made all participants reflect deeply on their everyday travel practices. Two participants expressed intense unease with seeing the total costs of using their car but did not see any alternatives. A small number of long vacation trips accounted for a considerable part of their yearly driving for several participants. Still, these vacation trips were not considered when accounting for the cost of owning the car.

Work closer, travel smarter

In this partly design-driven living lab, a Neighbourhood Teleworking Centre (NTC) was set up in an outer suburb of Stockholm, Sweden, to reduce work-related travel. The aim was to explore and discover what social and environmental changes and concerns would emerge in people's everyday lives and at work. At this point, which was before the Covid-19 pandemic, the research programme's partner organisations from both the private and public sectors did not display much interest in the project. The NTC was set up as an open-ended experiment, not a pilot. The setting up of the NTC encountered many challenges that helped identify barriers to this type of service, including social norms, teamwork and management practices at work, WIFI-technology limitations, policies, regulations, and trade union agreements.

The main challenge was that the recruited user-participants were often not allowed to work away from the main office. Rarely more than one day per week, except for a small number of participants whose working conditions permitted it, was allowed by the employers. However, access to the NTC led to several associated lifestyle changes and increased well-being for these users. For the partner organisations, engaging in resolving the practical issues around their employees using the NTC

led to learning experiences. After the two-year research project ended, three of them started developing similar concepts and solutions independently.

A TYPOLOGY OF STRATEGIES FOR DESIGN-LED EXPERIMENTATION

Depending on the research aims and the situation, different strategies are available when planning for design-led experimentation. Technology pilots and testbeds are often well-suited to answer specific questions, implying certain strategic choices for a pilot setup and implementation. In living labs, on the other hand, open-ended and explorative strategies may be required to answer more ambiguous questions. This requires other strategic choices to be made. In the following, we propose a typology of research strategies by identifying the *why* and *who* of experimentation spaces, explaining the dimensions of these choices and their implications for alternative research designs.

WHY: Why this research?

The first strategic choice to make regards the purpose of design-led experimentation: *why* the research is conducted and what kind of knowledge the research project aims to build. Different research purposes have implications for which research methods to use. Also, what kind of knowledge the project aims to produce depends on which stages in the research and development process (early or late) the project intends to cover.

Some projects aim to frame or understand a complex issue in an early research stage at one end of the spectrum. In the language of prototyping, a prototype can be used as a probe to support the analysis of complex contexts, and interventions can

be considered problem-making prototypes. In the case of the NTC example given above, we knew that we lacked the knowledge to design an optimal service or foresee its effects on people and travel, so we just opted to open the office space to see what would happen and start learning.

At the other end of the spectrum, in later development stages, prototypes are mainly used to validate a concept. In such cases, a proposed solution is already in place, and the project aims to test and evaluate it according to well-defined aims. Technology pilots and many living labs are closer to this end since their main concerns are user evaluations and adoption of technological artefacts; users are primarily engaged as consumers. Researchers are likely to take a more passive role in these experimentation setups, mainly evaluating the results. Weiland and others (2017) have argued that the technical aims are usually well-defined in technological pilots. Still, social aims or future visions are not, making it challenging to consider a broader or richer picture and pose more critical questions. In most traditional pilots, the focus is on testing, fine-tuning, and evaluating a new technology or service, and the pilot can be viewed as a first step in scaling up.

In the early research stages, the solutions envisioned may involve complex socio-technical entanglements where knowledge is still lacking for a complete design or large-scale institutional changes are required. In these cases, the aim of the experimentation may be to explore and understand a future scenario. Thus, the project's focus is on 'learning' (although there may be hopes of developing a full-fledged and viable service in subsequent projects). Action research has the dual aims of learning and making a change. Still, in our experience from the examples above, there is a difference between aiming to learn more openly

about an issue and aiming to define a solution that is functional and viable today. Taking the car away from the participants in A car-free year was certainly not a solution, but the challenges they met revealed what is required today to enable car-free living. These differences are summarised in Figure 1 below.

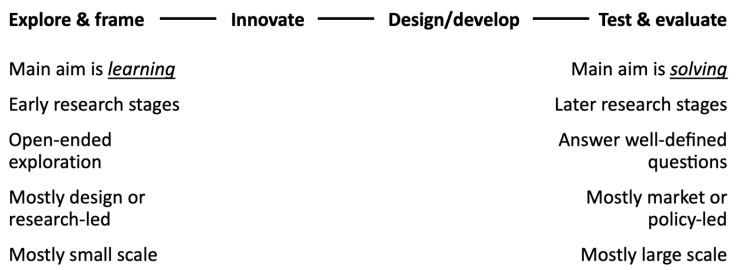

Figure 1: Five defining aspects of research in design-led experimentation spaces, at different stages of research and development from early (Explore and frame) to late (Test and evaluate).

In the more design-driven and open-ended experimental spaces that we have been part of setting up and outlined above, provisional concepts were used to learn about a possible future scenario rather than resolving it or answering well-defined research questions (see e.g. Sjöman and Hesselgren, 2020; Hesselgren and Hasselqvist, 2016).

In our experience, the balance between learning and resolving is a critical factor for the research design (See Figure 1). A commercial pilot aiming to evaluate and scale up a service generally requires many users and a quantitative focus. Conversely, staging future scenarios in the everyday lives of our participants requires close attention to their experiences and limits the number of participants.

WHO: Who has agency?

The second strategic choice is *who* should have agency in a design-led experimentation project. In our experience from the examples above, this critical aspect is notoriously challenging to handle in collaborations with a range of public, private, and academic stakeholders since there are ethical issues that need to be dealt with around the agency of users. Differences in views and understandings may be hard to bring out to allow discussions. When prototypes are tested and evaluated in technological pilots, the participants are mainly engaged as consumers providing usage data. When prototypes are designed and tested in relative isolation during development, users are often viewed as informants giving input upon request. However, users may be engaged as active co-creators or even co-researchers in more participatory approaches.

Engaging participants in open-ended design-led experimentation requires a close, open, and trustful relationship between the user-participants and the researchers and a keen focus on the links between the experiment and broader social and experiential aspects. In these research designs, the participants will be strongly affected by being involved in the experimentation, and there can be no claims to objectivity.

Figure 2 below illustrates this width of research approaches and roles by adding the *insider-led* mode to the right of Sanders and Stappers' (2008) notion of *for* and *with* users. Sanders and Stappers (ibid.) argue that research approaches designing *for* users involve a less active partnership *with* the user. Hence, we categorise the two other notions (*with* user and *insider-led*) as participatory approaches.

		"Participatory"	
	For user	**With user**	**Insider-led**
Solving focus	User/consumer	Co-designer	Community/movement
Learning focus	Informant	Co-researcher	Citizen

Figure 2: A matrix including six different modes of user participation

In practice, however, distinctions and terms are unclear, and the user is referred to various terms in different research contexts. In design contexts, the co-researcher role often implies acknowledging users as experts in their own lived experiences, and citizenship means taking an active role in a democratic society.

The differences between aiming to learn or solve have ethical implications for participation. When aiming to 'resolve' a situation in the here-and-now, a project may produce lasting changes that affect the lives of the users involved. In our view, this is where democratic values must come to the fore. When aiming to change a real-world situation, it is ethically and practically advisable to involve the people affected by the envisioned change, favouring more participatory approaches and a more equitable partnership between researchers and participants.

However, in our more learning-oriented living labs, the provisional concepts are not designed to resolve a situation in the here-and-now. Still, they are foremost meant as interventions to *provoke or enable* the user-participants to experiment. This means that we, as design researchers make the strategic choice of not asking the participants about which solutions they need. A car-free year produced rich learning experiences, but taking the car away is not a 'solution' that car-owners would suggest. Instead, in our living labs, our research approach has been to design and stay in control of the parameters of the interventions. Ethically, our stance is that we may ask people to participate in our ex-

periments, given that we inform them to the best of our knowledge about what they will experience and why the experiment is carried out. However, these methodological choices are often loaded with strong views on what constitutes participation, ownership, or agency.

Finally, different research strategies also imply different levels of agency for the researchers. As described above, in technology pilots and more traditional market- or policy-driven living labs, the researchers may take a more passive role, collecting user data and performing interviews. In some cases, they can take a more active role as an intermediary or by leading co-design sessions. However, they may have limited influence over the project's overall scope and aim. In insider-led research, as described above, a project's research questions and aims should be set by the affected user groups or communities.

Design-driven and exploratory research setups require a close relationship with user-participants, and setting up real-life interventions come with many practical challenges. For these reasons, they are costly to stage at a large scale, limiting our experiments' size. Also, when a working solution is not yet in sight in the early stages, it is harder to secure funding from policy or market actors. Therefore, our design-led experimentation projects have been research-led, meaning that the researcher's role has included scoping and framing the projects. Furthermore, in design-led research, like the director of a theatre play, a designer-practitioner researcher may envision future scenarios or concepts and practically orchestrate how this future is prototyped or staged in real-life. Moreover, we have used participatory approaches for engaging the user-participants.

PROVOKING STRATEGIES FOR USER PARTICIPATION

Our design-driven approaches to living labs have been set in early research stages, with an explorative learning focus and a participatory strategy of engaging the users as co-researchers. This section expands upon the design-driven methodology of staging 'provoking' or 'disturbing' interventions in real life and some connected challenges and considerations.

As outlined above, we argue that our design interventions are participatory as the participants take on roles as active co-researchers. Still, these and similar design-driven experiments have received criticism from proponents of other participatory approaches. The research agenda and the interventions should have been developed collaboratively with or by the participants. However, we believe the sustainable futures that we aim to explore and demonstrate from a design perspective would probably not be ideated or requested by user communities. These futures are mostly perceived as less convenient or in conflict with current norms. This also means that user communities are not easy to engage. In discussions with researchers from several Swedish smart mobility pilots, it has been clear that citizens' engagement in sharing schemes has not been easy to produce, even in small and closely knit rural areas.

Instead, our research group has developed a methodology built on a practice-oriented design inspired by researchers such as Scott and others (2011) and Kuijer (2014). Inspired by social practice theory, our design interventions have aimed to cause a 'crisis of routines' (Reckwitz, 2002) to reconfigure existing practices through design-led interventions. We have aimed to disturb or disrupt energy-intensive travel practices and create opportunities for our participants to experiment with new ones. Building on Sanders and Stappers' (2014) typology of co-de-

sign methodologies, we have thus used design to *provoke* rather than *serve* a community or a user. In this way, we have shifted emphasis from the innovation of future mobility concepts to user-innovation and to exploration of new practices that such concepts may be forcing or enabling. In a complex situation, we start by *making* something provisional and provoking with the primary purpose of creating learning. In this way, our research builds on a vision of future transformative change, but this change has yet to be realised within the frame of the current project (see Figure 3).

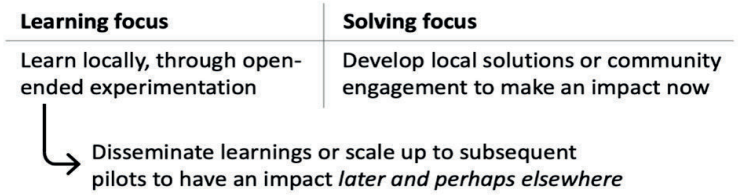

Figure 3: The temporal aspect of learning and solving focus in design-led experimentation

This design-driven research poses new challenges for user participation. As we have seen, the future concepts we wish to learn about are mostly not requested by users and may conflict with today's practices and norms. In an earlier paper (Hesselgren et al., 2017), it is discussed how this requires a balance of soft and strict strategies, meaning that the futures we envision and stage may either remove elements (like in 'A car-free year') or add new ones (like offering access to the NTC in 'Work closer'). Removing elements that constitute parts of the user-participants' everyday practices is a strict strategy as it forces the participants to experiment with creating new practices. 'Future playing rules' were soft as the interventions mainly offered in-

formation and opportunities to save money but still represented provoking rather than serving.

In her thesis, Hesselgren (2019) discusses how provoking, especially using strict strategies, may require recruiting curious and engaged early adopters or forerunners. In 'A car-free year', advertising in sustainability-oriented Facebook groups led to 74 families applying, out of which three highly motivated families were selected. Conversely, in 'Future playing rules', we found that when we prioritised recruiting a more random mix of citizens with different lifestyles, experiences and attitudes, the lack of intrinsic motivation led to little experimentation, even though monetary incentives were offered. The close researcher-participant relationship evoked a sense of responsibility that motivated the participants to put effort into providing input. Still, this did not extend to perseverance in experimenting with changing their everyday practices, with a few exceptions.

Building on these two experiences, we experimented with a format called 'Challenges' in 'Work closer'. In this three-year project, many participants found it difficult or were not allowed by their managers to work from the NTC for more than two or three days per month. In this situation, we successfully 'challenged' a mixed group of ten participants to try and use the NTC more for a limited time. We asked them to use it for a minimum of three days per week for three weeks while keeping a log of when and why this proved difficult. In 'Work closer', we also learned a lot from a small group of users whose specific working conditions allowed them to use the NTC more than others. Out of the 64 participants initially recruited, around 25 came to use the NTC regularly, at least for a shorter period. Around eight of them kept using it regularly, at least three or four times per month for the project's duration (with some

exceptions during the Covid-19 pandemic). For two of those participants, the new practice of using the NTC several days per week led to other related lifestyle changes and increased well-being.

These more active user-participants that may be called 'forerunners' have played a significant role in all our projects. In 'A car-free year', the recruited families were motivated by their high engagement in sustainability issues. This did lead to bias, but at the same time, it can be seen as part of envisioning a future where norms and attitudes have shifted in this direction. In 'Work closer', some user-participants had conditions that allowed them to make a change, and the researchers asked some to experiment. In all cases, the design intervention provoked or enabled change, and when experimenting with creating new everyday practices, the participants were not just co-researchers but also innovators.

A CONCLUDING REMARK

To carry out design-driven experimentation is challenging, and staging and managing a designerly living lab in real-life is time-consuming and demanding. Still, we argue that these research approaches are needed to break with taken for granted structures, norms, and practices. Design-driven research strategies provide possibilities for rich and shared learning experiences and enable identifying barriers and pathways to sustainable futures already in the early research stages.

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Practitioner reflections on how to approach experiments

"When we have a pilot, we may [think that we] already have a ready-made solution and may not back down, [and ask] 'is this really the best solution?' /... / Perhaps we should be a little more creative and tinker and tweak things a little more. /... / We may not reflect enough."

(Municipal official 2)

"In reality, we probably learn most from failure. But failure is not always allowed in pilot projects. To say 'no, we will not do this again.' /... / Perhaps we should be more explicit in stating that it is supposed to be a test, and that it is not certain that we will continue with it afterwards."

(Senior consultant at a Think tank)

– Chapter 8 –

What happens beyond the experiment? Reflections on a collaborative partnership in Stockholm

Kelsey Oldbury, Karolina Isaksson

Numerous studies on experimental governance from the last decade have emphasised how experiments should be seen as parts of a wider socio-technical context where norms and ideas, organisational settings, and local conditions constitute central aspects. In line with this approach, this chapter focuses on the ways in which experiments may have substantial impacts on the organisations and governance arrangements which they are connected to. In so doing, it challenges the often-recurring notion within the literature that experiments primarily originate from 'new' actors, and gives an illustration of experimentation based upon existing actor constellations. In our work, we have found inspiration in Frans Sengers' and others' (2021) discussion about what happens *beyond* experiments, i.e., what happens to parts, or wholes, of an experiment - and to the actors involved – after the experiment comes to a formal end, or even where, or when, experiments can be said to 'end'.

The chapter is based upon empirical research into a collaborative partnership with elements characteristic of experimentation involving the introduction of 'smart mobility' in public transport in the Stockholm region, Sweden. Drawing on the concept of 'embedding', the aim is to illustrate how experimental processes may have wider impacts than originally intended.

Specifically, we will focus on the shaping and reshaping of roles and relations, and the capacity of public actors to steer the development of public transport and smart mobility.

In what follows, we will introduce the case studied, followed by a presentation of the concept of embedding. Then comes a presentation of different parts of the empirical case in focus, including an analysis of a range of outcomes and impacts of the collaborative partnership.

COLLABORATION FOR SMART MOBILITY IN NORTH-WESTERN STOCKHOLM

As outlined in chapter 1, experimentation can describe a range of overlapping terms and approaches. In this chapter, the experimental space in focus is characterised by a collaborative partnership between a range of actors, and a set of interventions involving pilots connected to a specific geographical location which in itself is an area of major urban development (see further below).

The collaborative partnership was established in June 2018 and consisted of three main organisations: the municipality of Järfälla, Stockholm's regional public transport authority (RPTA), and the private bus operator Nobina. The collaboration also involved two innovation companies[1]; one of them being connected to the municipality (Barkarby Science) and the other one (Nobina Technology) being a part of the bus operator Nobina.

The partnership, which was named 'Modern Mobility in Barkarbystaden' (or MMiB), was organised as a project with a pre-determined timeframe (2018-2020), founded on external

1 'Innovation companies' refers to organisations created by the municipality and bus operator to work with new ideas and technologies, which are separate, but connected to existing organisations.

funding from the Swedish Innovation Agency, Vinnova. Barkarbystaden (in English, the city of Barkarby), or Barkarby from here onwards, is the site of considerable new housing construction in conjunction with the extension of the existing metro line for the north-western parts of the Stockholm region. One reason behind the establishment of the collaborative partnership was the identified need to develop public transport and other sustainable mobility services during the years of housing expansion, i.e. during the coming years when people will start to move in, but the metro line is not yet complete. The three focus areas of the collaboration were:

- *The development of a bus rapid transit (BRT) line*
- *The piloting of automated shuttle buses*
- *The piloting of mobility as a service (MaaS)*

Within the collaboration, the bus operator had the main responsibility for delivering these three concepts.

A specific project structure was developed to guide and maintain the running of the different areas of the collaboration. This structure consisted of three layers: an overarching steering group, a project management group, and then an operative layer made up of different working groups (see Figure 1). These were each manned by representatives from the three main organisations. In the case of the automated shuttle buses and MaaS, Nobina Technology represented the operator.

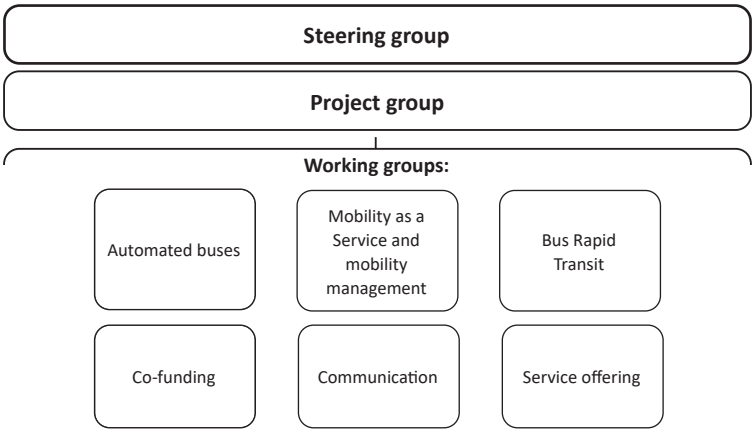
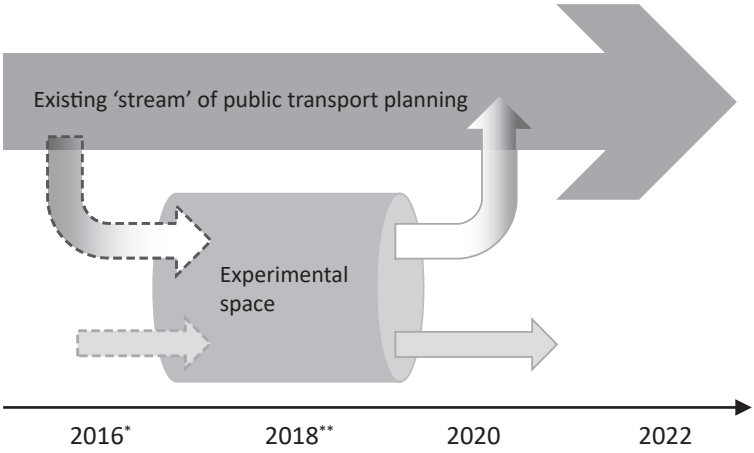


Figure 1: Overview of the MMiB organisational structure.

The collaborative partnership was built upon existing relationships and responsibilities connected to public transport. As described in detail by Oldbury (2021), the bus operator had already been selected by the RPTA in a previous procurement process to provide the 'ordinary' bus services in the municipality in question. Thus, the group of actors were connected by established planning processes, but in the experimental space discussed in this chapter they came together in a new context. The experimental space thus built on, but also marked a separation from usual patterns of working, which we illustrate in Figure 2. The focus on new services in public transport was also new territory for the actors involved.

Between the launch of the collaboration in autumn 2018 to its end in December 2020, pilots for the various services were set in motion. A series of pilots developing the automated buses started in October 2018. The MaaS pilot was launched in October 2019, involving a digital platform application 'Travis' owned by the bus operator, and the BRT line was launched in

August 2020. Although the collaborative partnership was the context in which these pilots were launched, they have continued to develop since the first funded phase of the collaborative partnership came to an end. This case therefore provides an opportunity to explore the wider impacts of experimental processes with a focus on things that happened beyond the boundaries of the initial experiment.



*2016: Nobina awarded contract to provide bus services in Järfälla & Upplands-Bro municipalities by Stockholm's RPTA.
**2018: MMiB collaborative partnership established

Figure 2: Figure visualising the relationship between the more 'ordinary' processes governing public transport provision and the experimental space, and the interaction between the two.

EMBEDDING

One key facet of experimentation is how and whether it can lead to broader changes. Turnheim, Kivimaa and Berkhout (2018) emphasise that this is a more complex process than simply 'scaling-up'. They suggest 'embedding' as a term which can

be used to better discuss the relationship between experimental spaces and the wider social and institutional environments in which they operate. Sengers, Turnheim and Berkhout have developed the discussion to explore the process and the mechanisms which lead to a wider impact beyond the "initial conception and setting" of an experiment (2021, p. 1150). This can be related to how, either the whole, or different parts of an experiment, develop in different ways or are transferred to different contexts. The same authors have developed a set of concepts to describe different 'mechanisms' through which processes of embedding can be understood: replication and proliferation, expansion and consolidation, challenging and reframing, and circulation and anchoring.

Replication refers to instances where an experiment is directly applied in new domains. *Proliferation* is used to describe how the core ideas of an experiment are taken and re-applied in a new context. *Expansion* describes how the outcomes of an experiment are grown or nurtured beyond the original initiative and begin to foster broader changes in a system. *Consolidation* is connected to processes of expansion and refers to how broader institutional arrangements and practices are altered as a result of expansion. *Challenging* refers to how an experiment questions the status quo, and changes existing rules, institutions and governance arrangements. Associated with challenging, are processes of *reframing*, where existing ways of seeing things are called into question. Finally, *circulation* is used to describe how knowledge gained through experimentation is mobile in organisational networks and social relations, and shapes policy and practice. This is related to how knowledge becomes connected to a specific person within an organisation, or moves and becomes *anchored* in, for example, a new setting. Altogether, these

processes refer to how experiments can lead to change inside, or between, existing institutions, or be transplanted and replicated in totally new contexts.

WHAT HAPPENED IN AND BEYOND THE EXPERIMENT IN BARKARBY?

A THREE-PART COLLABORATION

An overarching aspect of the experimental space discussed in this chapter was the emphasis on collaboration. In June 2018 the RPTA, Järfälla municipality, and the bus operator Nobina formalised their ambition to work together in a letter of intent, signed by leading politicians at the regional and local levels, and the bus operator's management level. This gave the collaboration an overarching political backing from the respective organisations represented in the new governance arrangement. An emphasis on three-part collaboration was maintained through organisational running of the project, with the three organisations being represented at all levels and in all areas of the project. The collaborative environment was also emphasised through the organisation of project events, such as kick-off and mid-way events for the MMiB, and by joint events at external conferences and hosting of international visitors.

The joint final report produced by the collaborative partnership to the funding body Vinnova in December 2020 stresses the three-part collaboration as one of the main take-aways from the project. Having representatives from each of the three organisations involved in meetings to discuss all matters at hand for that week (no matter the question or level) was described as key, as well as having defined aims in the letter of intent. In regular public transport planning, communication between or-

ganisations happens on a more one on one basis (e.g., between the RPTA and bus operator, or the RPTA and the municipality). Meeting as three parts in the governance arrangement has therefore re-framed and challenged existing ways of working and communicating. The collaboration has also been labelled 'the Barkarby model' in press material.

Efforts to introduce a similar mode of working as three equal parts also started to take place in relation to the more ordinary planning processes beyond the collaborative partnership. One example was an idea that emerged during 2020-2021 when representatives from the three organisations started to collaborate in the development of an updated Traffic Development Plan for Järfälla and Upplands-Bro (the two municipalities covered by the contract). Traffic Development Plans can be used within existing contracts for public transport as a tool to support actors working with developments in transport planning, and to connect changes happening in a contract's geographical area to more general changes within the public transport system. In this case, the focus of the new Traffic Development Plan was on urban developments in Barkarby and Upplands-Bro and how these might affect public transport demand. The future development of the BRT and automated shuttle bus line were also included in this document. The services launched through experimental processes and pilot projects have therefore started to be consolidated in formal documents.

Efforts to introduce the three-part collaboration into other areas and processes illustrate how this way of organising the relationships between these three actors has also started to challenge established hierarchies in public transport provision. This highlights how the organisational aspects of experiments and

governance arrangements can also start to expand and reframe established institutional relationships.

The pilot for automated shuttle buses

The piloting of the automated shuttle buses in the collaborative partnership formed a second stage of a pilot which had previously taken place in another area of Stockholm (Kista) in 2018. The automated shuttle buses were launched in Barkarby in October 2018. The service ran on a relatively short, fixed route, or GPS rail, in Barkarby with a standby driver on board, ready to take over in situations where the technology could not manage. From its launch the piloting of the shuttle buses in Barkarby was already an example of how a pilot can proliferate to a new context – where the core idea of an initial experiment is applied but also developed in new ways. In Barkarby, the shuttles were launched as a pilot taking place *within* public transport due to a clause in the procurement contract for bus services in Järfälla held by Nobina, which allowed for the piloting of new services during the contract period (see Oldbury & Isaksson, 2021). The piloting of this service was intended to develop the role of the bus in public transport and to explore the role of smaller automated vehicles in an urban area under development, on smaller streets not suitable for larger buses.

The MMiB project was finalised in December 2020, but the work with the automated shuttles has received new funding from Vinnova, to continue to develop in the same context. The new project aims to explore the development of on-demand services, where the shuttles would operate without a standby driver and instead be managed from a control tower. For this part of the experiment, what happens beyond the experiment is characterised by expansion and consolidation of the results

from the pilots in the MMiB project. In practice, what we see is continued work to foster the development of automated technology in public transport. This project includes the same actors involved in the MMiB project as well as researchers from KTH (Royal Institute of Technology, Stockholm). Other new partners will also be involved, including actors who will work with cloud-based video surveillance as well as the question of how information can be sent securely between the sensors installed on the shuttles and a control tower.

This part of the experiment remains firmly connected to the local context in Barkarby due to the importance of the institutional relationships already established through the MMiB. Consolidation characterises the development of the automated shuttles in terms of the growth in scope of the pilot, such as how the technology will develop, as well as in terms of the number of actors involved. There is also an aspect of challenging and reframing the status quo in public transport and the role of new autonomous technologies as existing rules and regulations are also negotiated as part of these developments.

The BRT line

The BRT line launched as part of the MMiB-partnership had already been assigned a specific role as a high-capacity service to imitate the forthcoming extension of the metro to Barkarby, which is planned to open in 2027. The BRT line was launched in August 2020. Much of the work within the collaboration had focused on the different measures which needed to be in place to be able to implement the BRT. This primarily involved seeking additional funding to build a new road in the earliest stages of the project. This funding was granted via a successful funding grant application for co-investment from the nation-

al Swedish Transport Administration. The state committed to 50% funding of the new road, while the municipality financed the remaining half. The municipality therefore also invested heavily in the new infrastructure for this service and was responsible for planning the new stretch of road. In 2019, work to construct the road for the BRT line started, and the process of ordering, finalising and approving the new BRT vehicles was also set in motion between the RPTA and Nobina. In August 2020, the new line was unveiled in an opening ceremony with political representatives from the municipal and regional level, and management representatives from Nobina, with four new electrified BRT buses running the new line.

In this part of the project, many of the investments made early on (i.e. the construction of infrastructure, and the purchase of new BRT vehicles) set in motion a process of consolidation and expansion. In this respect, the BRT is an illustration of how specific parts of experimental initiatives can be very dependent upon integration with existing institutions and spatial infrastructures. In terms of what has started to happen beyond the launch of the BRT within the MMiB project, the BRT is now being discussed in relation to the Stockholm region's broader public transport system, potentially as part of a new regional radial link, connecting Stockholm's western and northern suburbs. This part of the project therefore is also expanding in terms of the scale of the BRT. Ideas for the expansion of the BRT have also started to be consolidated in formal public transport planning documents.

The MaaS pilot

This pilot originated in more general strategies for MaaS developments in the Stockholm region, which is also discussed in

chapter 4 of this book. A pre-decided ambition for a MaaS pilot between the RPTA and Nobina Technology was woven into the ideas to be tested as part of the collaborative partnership in Barkarby. After extensive work to develop the new digital platform, known as Travis, and to establish agreements with mobility operators, the platform was launched in October 2019.

The specific mobility services launched in Barkarby in 2019, as part of the pilot, were carpool services, shared bikes, and e-scooters. On top of this, a key part of the pilot was to realise the integration of the sale of single public transport tickets in a third-party application. Some specific services were located in Barkarby as part of the pilot, but Travis could also be used to buy public transport tickets and plan journeys across the whole of the Stockholm region. The pilot therefore initially operated on both a specific local scale, as well as the regional scale. Soon after the Travis app was launched in 2019 it also became possible to search for journeys at national level across Sweden in the application. In 2020, the Travis application was considered a finished product in terms of its development within the bus operators' innovation company and was consequently turned into a subsidiary business called Nobina Travis AB.

In September-October 2021 e-scooter services were fully integrated into the Travis platform, meaning that users can purchase e-scooter journeys directly through the Travis app instead of having to switch to a separate app. This integration means that other cities and towns where these e-scooter services are available now also appear in Travis, allowing the platform to expand to new markets and geographies. At the same time, we note that some of the mobility services launched initially in Barkarby no longer continue to supply the area, partly because of the Covid-19 pandemic. This means that local embedded-

ness has decreased as the geographic scope and market ambitions of the platform have expanded. At the time of writing, only the carpool service is left in Barkarby, as it was the only service that was able to sustain itself financially.

Altogether, the MaaS pilot thus quickly expanded beyond the original boundaries of the MMiB collaborative partnership. The expansion of the pilot has also been consolidated by a broadened number of actors involved, which meant that the governance arrangement offered by the initial collaboration has become less relevant for the further development of Travis. Aspects of challenging and reframing are also present, for instance the ways in which this pilot contributed to changing existing rules and arrangements regarding who is able to sell public transport tickets. This new arrangement is in itself a consolidation of the institutional link between Nobina and the RPTA. This also leads to other aspects of challenging and reframing since the bus operator, as the owner and developer of the Travis application, clearly emerges as the main strategic actor driving the development of MaaS as part of public transport. This marks a reframing of their organisational role and potential future role in the mobility system, if MaaS services become more prevalent. Travis can be viewed as an application which also challenges the Stockholm RPTA's own journey planning platform, which does not include any other mobility services than regular public transport.

CONCLUDING DISCUSSION

In this chapter we have discussed several elements of what happened beyond the collaborative partnership for Modern Mobility in Barkarbystaden. We have seen different outcomes

from different parts of the experiment, which makes it clear that the consequences of experimentation depend on the specific socio-technical configuration in question (i.e. MaaS, automation, or BRT). It is thus important to see new technologies and concepts in relation to the actor constellations and other socio-technical dimensions (including place-specific features) involved in realising them. The different parts of the experimental space discussed here highlight how this leads to various processes of embedding. For instance, for parts of the MMiB project, embedding is primarily about consolidation in the specific local context, while other parts have started to be integrated into planning and policy documents on a broader scale (such as the automated shuttle buses and BRT). Other parts have quickly expanded away from the initial experimental space and have started to challenge and reframe roles and relations in a more general sense (the MaaS pilot).

Through our work, we have found that parts of the experimental space could be understood as *experimentation to develop existing public transport services*. This was a key dimension of the automated shuttles and the BRT line, which were developed in close connection with the existing framework of public transport. These services illustrate a process of embedding that is closely connected to the place-based governance context. These services may to some extent challenge, reframe and redevelop what we currently think of as public transport today. Altogether however, experimentation with these services stays within the existing frames and structures of public transport governance and generally in line with established roles and relationships between RPTA and operator for public transport governance in the Swedish context.

In contrast we have also identified *experimentation for new mar-*

kets, as seen in the MaaS pilot in this case. As stated above, the development of the MaaS service quickly expanded beyond the original pilot, and even from the launch it was clear that Travis was not just being piloted locally, but included journey planning for the whole of the Stockholm region and there was an ambition to connect with other services on this scale. In this part of the experiment, the bus operator eventually emerged as a key actor in the MaaS market arena which is currently under development. The bus operator had been supported by public actors in taking this role at the local scale, but the decision to take the MaaS service further to new markets and geographies, with Nobina driving and steering the strategic development of the app outside the existing public transport framework, was never a matter of strategic discussion and joint decision-making within the MMiB project. With hindsight, we can see that this part of the experiment led to a challenging and reframing of rules and arrangements regarding who is able to sell public transport tickets. Nobina took a strategic position to explore and test a new role in an uncertain field of the market. In comparison, the public actors took a more supporting and enabling role which, however, also entailed a risk of losing the direct relationship with the travelers who chose to use the Travis platform instead of buying tickets directly from the RPTA. From this case, what looks like a predominantly market-driven development trajectory for MaaS raises questions as to whether MaaS creates a governance vacuum, and whether public actors are missing a window of opportunity to steer developments proactively.

We also looked at the collaboration itself as one part of the governance arrangement. Though the constellation of the key actors is not new, the process of structuring and managing the MMiB has been a more extensive way to collaborate and has

led to the three-part collaboration becoming a central outcome of the experiment. This new governance arrangement can also be understood as a way to challenge and reframe established structures of working. The emphasis on collaboration in this case illustrates a shift away *from* a more hierarchical positioning structuring the relationship between the three actors, *to* more of a network logic, characterised by 'equal' relations. This increased emphasis on collaboration on equal terms blurs some of the important differences in terms of roles, responsibilities, mandates and interests among these actors. Therefore, in experimental spaces like this one, we see the need for a wider reflection on not only what actors have in common, but also what they do not have in common, and who benefits from a more collaborative logic. If an increased emphasis on collaboration leads to a larger influence for market actors, public actors should establish strategies for how public interests will be secured, also beyond the scope of the formal experiment.

Overall, this chapter emphasises that it is necessary to think about the consequences of different parts of an experimental space. What happens beyond the experiment does not just concern the technologies or concepts being piloted, but also brings ripple effects which extend outwards from more temporary governance arrangements.

This case shows that experimental spaces can lead to a further development of relationships and ways of working across organisational borders in a changing context, but also bring new challenges and potentially transformative effects on relationships and mandates in public transport planning. The concept of embedding and associated 'mechanisms' (e.g., expansion, consolidation, challenging and reframing etc.) offers a vocabulary to discuss what can happen beyond the experiment. These terms can help guide actors working within experimental spaces in discussions about different trajectories of what is taking place within an experiment. Some questions which actors entering collaborative partnerships characterized by experimentation could reflect upon are:

- What are the implications of this experiment in the long-term for my organisation?
- What are our common goals within this collaboration? How do the project's goals link to the broader goals of my organisation? In which ways do they not?
- What kind of processes does my organisation have in place to discuss and transfer relevant lessons from this experiment to our current ways of working?
- Are new processes needed to bridge more temporary experimental projects and more traditional/conventional ways of working?

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Practitioner reflections on three-party collaboration

"We have created new forums where we meet in a three-party collaboration and discuss strategic issues related to our urban development, how we build and the need for public transport and how these needs can, in this type of three-party dialogue, be met by the transport authority and the operator. /... / We would not have done it in the same way if we had not had the MMiB project."

(Municipal official 1)

"When you sit down together as three-parties /... /it leads to much better solutions than the traditional process. You can also develop solutions in a much shorter time. We established a new BRT-line with a completely new infrastructure /... / in eighteen months. Usually, in the best case scenario an investigation would take two years, and then this would be discussed for another two years, and then construction would start. Or it would just end up in an office drawer. /... / So it has generated a kind of short cut in terms of decision-making and mandate. But it's not entirely without challenges. On several occasions, we have developed solutions in the three-party collaboration, but then when it is sent into the silo for the usual [decision-making process] it gets clogged."

(Representative from bus operator)

– Chapter 9 –

Smart Mobility Experimentation

- Reflecting on a Public Transport Authority's Convoluted Journey with Mobility-as-a-Service

Göran Smith

Mobility-as-a-Service (MaaS) is an umbrella term for services that enable users to plan, book, and pay for multiple types of mobility services through a joint digital channel (Smith 2020). From late 2013 to early 2014, what is often referred to as the world's first MaaS pilot took place in Gothenburg, a city located in Västra Götaland, Sweden. The outcome was promising; the pilot participants appreciated the service and substituted private car use for shared and active mobility during the pilot period. Inspired by these results, the regional public transport authority (PTA) for Västra Götaland[1] has since performed a suite of experiments to further explore the MaaS concept and to facilitate its implementation. Still, seven years later, MaaS is not available in Västra Götaland, apart from via one commercial service that integrates public transport with parking, and in a few small-scale pilots.

In this chapter, I briefly describe the PTA's journey in relation to MaaS as I see it, and, with the benefit of hindsight, reflect on

1 The formal regional public transport authority for Västra Götaland is a political body called the Public Transport Committee. The committee´s main task is to conduct overall strategic work for the development of public transport in the region, which they do in close collaboration with the civil servants at the Public Transport and Infrastructure Division of Region Västra Götaland. Västtrafik AB, a company owned by Region Västra Götaland, performs the more detailed planning and procures the public transport offering, which then is delivered to the citizens by private operators. In this chapter, Region Västra Götaland, the Public Transport Committee, and Västtrafik AB are treated as one organisation and referred to as the PTA.

what I believe has hindered greater progress. The reason that I judge that I have something to say about this is that between

2016 and 2020 I was employed as an industrial doctoral student at the PTA. In this dual role as civil servant and aspiring researcher, I was specifically assigned to oversee and analyse the PTA's work on MaaS and to revise their MaaS strategy based on my insights. As I argued in my doctoral thesis from 2020, this exploratory and participatory research approach gave me a unique opportunity to acquire an empirically grounded understanding of the dynamics of MaaS developments. Still, now that some time has passed and I no longer must navigate the constraints associated with my dual role at the PTA (see Smith 2017), this chapter arguably gives me an opportunity to step back and reflect more broadly on my experiences.

Given the ground-breaking but convoluted nature of the PTA's journey with MaaS, I believe that it can be an informative case for other public authorities that set out to experiment with smart mobility concepts such as MaaS. Hence, inspired by the literature on projectification and experimentation, I end the chapter by proposing what there might be to learn for public authorities. I considered the two selected strands of literature to offer a valuable frame of reference for this analysis since the former explains how the prevailing project logic within the public sector in Western countries shapes expectations on experiments, and the latter highlights the need to move beyond a narrow focus on scaling the outcome of isolated experiments. Researchers Torrens and von Wirth (2021) have suggested that, taken together, the two strands of literature instead propose a much wider view of how experiments can be organised and through which mechanisms they can stimulate societal trans-

formations. This perspective helped me critically reflect on the PTA's strategic decisions in relation to MaaS.

THE PUBLIC TRANSPORT AUTHORITY'S JOURNEY WITH MOBILITY-AS-A-SERVICE

In 2011, an internally funded project entitled The Flexible Traveller (Swedish: *Den flexible trafikanten*) introduced the MaaS concept to the PTA. The project report suggested that MaaS services, if comprehensive, reliable, and personalised, could reduce transport costs, increase perceived transport flexibility, and contribute to more sustainable travel behaviour for family households and small companies in urban areas. This resonated with the PTA, which was on the hunt for new and cost-effective means to increase the modal share for public transport. The MaaS concept was therefore further developed in a two-phased research and development project named Go:Smart. The most acclaimed outcome of this project is arguably the six-month UbiGo pilot in Gothenburg, which showcased how a MaaS service can work in practice and indicated that the concept can attract user interest and help users substitute private car use with mobility services and active mobility (see Sochor et al. 2016).

Some of the actors involved in the Go:Smart project established a joint company to refine and commercialise the piloted service. However, the PTA considered that their involvement would violate the procurement law. Instead, the PTA identified five strategies for how to proceed with the MaaS concept: (i) taking a passive role to possibly get involved at a later stage, (ii) helping the private market develop MaaS services by opening digital interfaces for data and tickets but not intervening beyond that, (iii) initiating a pre-commercial procurement process to in-

ject money into the MaaS market, (iv) contracting a private actor strongly associated with Västtrafik via a service concession agreement, and (v) procuring a MaaS service for Västra Götaland based on the piloted MaaS model. It was concluded that the fourth strategy was best suited to delivering a cost-effective MaaS service that would contribute to increased sustainable travelling as well as an improved perception of the Västtrafik brand. Following a period of inaction during 2015, the PTA therefore initiated a so-called request for information process in spring 2016 with the goal of identifying appropriate concession agreement terms.

The interest in the request for information process was large; representatives from 65 organisations showed up at the kick-off. Nonetheless, the dialogue that ensued made it clear that neither the PTA nor the potential bidders had sufficient experience of MaaS to allow for fruitful procurement. The process was therefore cancelled. In 2017, the PTA instead chose to invest in a nationwide initiative that aimed to establish a publicly controlled intermediary data platform. The logic behind this initiative was that such a platform would lower the entry barriers for both those operating MaaS and for mobility service providers, and would thus facilitate the development of many different MaaS services. However, this initiative was discontinued as well due to lack of support from key actors. Consequently, the PTA had to amend its MaaS strategy once again. Inspired by the second strategy outlined above, its new and current tactic aims at enabling and stimulating private actors to integrate and resell digital public transport tickets as part of MaaS offerings.

The PTA's strategy pivots since the closure of the Go:Smart project can be interpreted as stepwise moves toward less hands-on involvement in the development of MaaS – from specifying

the design criteria for a single MaaS service for the entire region to enabling a plurality of externally driven MaaS services that the PTA has little control over (see Smith 2021). The changes in the PTA's strategy can, moreover, be understood as a gradual process of realising the immaturity and complexity of the MaaS concept, which led the PTA to take a few steps back – from trying to reap the benefits of MaaS immediately to focusing on exploring the potential of the concept and on learning how it can be developed and governed.

In 2018, the PTA started working on developing the digital interfaces, the processes, the internal organisation, and the generic contract needed to enable digital third-party resale of public transport tickets, and in the years following, these elements were tested through a suite of experiments, with the overarching goal of moving from short-term MaaS pilots to permanent MaaS operations. The first pilot that the PTA initiated was in collaboration with the municipal parking company in Gothenburg in 2019. Initially, the plan was merely to test the application programming interface for ticketing and the billing processes, but following a smooth collaboration with the parking company, a successful integration of public transport tickets in the local parking app, and a positive response from its users, the pilot period was first extended and then made permanent in 2021. As of November 2021, 29.121 public transport tickets had been sold through the local parking app (939 tickets per month on average), see Figure 1. This corresponds to approximately 0.02% of the PTA's ticket revenue. In a questionnaire distributed to users in September 2019 (n=105), 46% of the respondents fully agreed that the possibility to buy public transport tickets using the local parking app made it easier for them to travel by public transport more frequently (18% agreed to

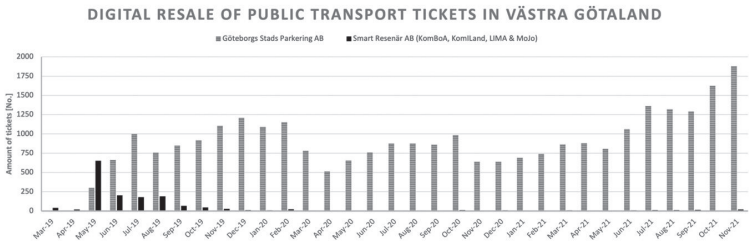

Figure 1: Digital resale of public transport tickets in Västra Götaland per month, March 2019 – November 2021.

Additionally, the PTA was involved in four MaaS pilots between 2019 and 2021 aimed at exploring potential markets for MaaS: KomBoA, which focused on MaaS for housing associations; KomILand, which focused on MaaS for rural areas, and LIMA and MoJo, which both focused on MaaS for employers. The integration of public transport tickets in the external MaaS apps piloted in these cases was carried out by the company Smart Resenär AB. As evident in Figure 1, the resale of public transport tickets was limited in all four pilots though, apart from during the first few months of the KomBoA pilot; 1.603 public transport tickets had been sold in total in November 2021 (49 per month on average). The modest ticket sales can in part be explained by the Covid-19 outbreak but also indicate that the piloted MaaS offerings and apps have not been able to compete with existing alternatives, such as private car use and existing mobility service apps, including the PTA's journey planning and ticketing app.

Overall, MaaS is still an insignificant phenomenon in Västra Götaland, with next to no impact on the daily life of citizens, and the PTA's understanding of how MaaS can contribute to an increased modal share for public transport under what con-

ditions has not developed much since the initial UbiGo pilot. The PTA's goal of moving from short-term pilots to permanent MaaS operations was, moreover, postponed on multiple occasions before the PTA finally announced that it welcomed all types of resellers in March 2022. Prior to that, only actors within the parking sector were eligible to become resellers, which is why the municipal parking company in Gothenburg, at the time of writing this chapter (March 2022) is the single reseller with a permanent contract. These results are arguably below the PTA's initial expectations. They therefore make possible a discussion on what might have hindered greater progress.

WHAT HAS HINDERED GREATER PROGRESS?

Yet, prior to scrutinising the lack of progress in this case, it is important to note that MaaS developments have not met expectations elsewhere either. Public authorities across the globe are finding MaaS difficult to realise in practice, and the concept´s proposed user appeal and ability to change modal choice is yet to be proved. Nonetheless, given that MaaS has been a prioritised topic for the PTA for seven years, the limited tangible results warrant a discussion on what might have hindered greater progress. Next, I will discuss five strategic dimensions that I believe have shaped the PTA's suite of experimental MaaS activities and influenced the outcome negatively: time and place; vision and ambition; collaboration and partners; objective and focus; and internal organisation.

Time and place

MaaS is a concept in its nascency, and it was even more so back in 2014. With a few exemptions, such as in Helsinki and Berlin,

public authorities are not yet involved in permanent MaaS operations. Hence, the PTA has had little previous MaaS experience to lean on when setting out on their MaaS journey. This has made it difficult to address questions such as: What roles are regional public transport authorities legally allowed to take in the delivery of MaaS?; What is a fair business deal with external MaaS operators?; and What might MaaS lead to in the long run? The PTA has, in other words, acted as a front-runner in relation to MaaS developments, which has resulted in them facing challenges and uncertainties that followers do not have to deal with to the same extent. People inside and outside the PTA have on many occasions questioned whether this forward-leaning position is appropriate for the PTA. Still, it is backed up by the regional development strategy for Västra Götaland. In addition to making sustainable travelling the norm, the PTA's overarching strategy goal is to ensure that Västra Götaland sets an example in the transition to a sustainable and competitive society.

It has also frequently been questioned whether Västra Götaland is appropriate for MaaS developments. Västra Götaland is in large parts sparsely populated, and Gothenburg, the largest city in the region, is with its 580,000 inhabitants quite small from a global perspective. Neither parking and congestion problems, nor the supply of mobility services in Västra Götaland is comparable with the situation in metropolitan regions. At least in theory, this makes it more difficult to compile a MaaS offering that is on a par with, or outperforms, the convenience of private car ownership, especially given that many mobility service providers lack the digital capabilities required to participate in MaaS. On the other side of the coin, Västra Götaland has a comprehensive public transport network and the penetration rates for internet access and smartphones are high – conditions

that have been pinpointed as fundamental for MaaS adoption. Yet both the early timing of and the peripheral geographical setting for the PTA's engagement with MaaS have probably influenced the ease and speed of development negatively.

Vision and ambition

The MaaS concept is surrounded by catchphrases such as 'the biggest transport revolution of the 21st century', 'the end of car ownership', and 'a new ambition for public transport'. Although persuasive for visionaries and investors, such rhetoric can be scary for organisations prone to minimising risk, like public authorities (see also chapter 2 by Berglund-Snodgrass). In the case of the PTA, MaaS' proposed capacity to revolutionise public transport has led them to think twice before enabling such developments. In particularly, this influenced their decision to postpone the launch of their digital third-party resale function, despite regional politicians (i.e. the Public Transport Committee) ordering them to make it happen.

To manage the perceived risks of MaaS, the PTA's strategy has since 2018, in practice, been to proceed step-by-step via small-scale experiments. Benefits of this incremental approach include that it requires little adjustment to the organisation's overall strategy and that it caters for a multitude of complementary experiences where each experiment carries relatively low risk. However, in contrast to high-profile demonstrations, small-scale experiments generate neither awareness among citizens, nor attention among influential stakeholders. Thus, such experiments do not build up pressure to succeed; the organisation does not invest much of its reputation in the piloted concept. In the case of the PTA, the undertaken MaaS experiments can be compared with the 2015 – 2020 large-scale demonstra-

tion of electric buses in Gothenburg (ElectriCity, electricity-goteborg.se), which paved the way for the introduction of the largest fleet of electric buses in the Nordics in Gothenburg.

Collaboration and partners

Continuing the comparison with the ElectriCity demonstration, which among others was co-sponsored by the City of Gothenburg, Volvo AB, and Ericsson AB – three of the largest employers in Västra Götaland – the PTA's key MaaS partners have, beyond academic institutions and funders, been Smart Resenär AB, EC2B AB, and UbiGo AB – three start-up organisations with fewer than ten employees in total. Start-ups are arguably often more swift-footed than large organisations but are in most cases less influential and do not have as deep pockets. MaaS is situated in a low-margin industry, requires system-level changes as well as the involvement of many actors, and competes with well-established services and well-known brands. Hence, champions of the concept in key positions across public and private sectors, as well as long-term investment might be needed for MaaS to thrive. In the case discussed in this chapter, the top politicians, civil servants, and managers at the PTA have been vocal proponents of MaaS experimentation. This, I believe, has been essential for keeping MaaS on the agenda, despite the lack of tangible success.

Although some market reports predict that the market size for MaaS will head north of $40 billion by 2030, the private sector has thus far shown lukewarm interest in investing in MaaS experimentation. The PTA's decision to enable third-party resale in 2018 was in large part motivated by the belief that this would be the quickest path to gaining insights on what effects different types of MaaS services can have under different cir-

cumstances. Regardless of what role one believes that the PTA should take in the use phase of the MaaS innovation process (cf. Smith 2020), one can discuss whether an initial do-it-yourself-approach could have generated more tangible results and thus better chances for learning about MaaS. However, such an approach would have required the PTA to invest (even) more in MaaS experimentation. It would also have required the PTA to be comfortable with entering a legal grey area.

Objective and focus

The PTA has focused on adhering to their current rule book, as interpreted by their legal consultants. This might have saved them from legal processes and bad press. Still, it has also barred them from integrating other mobility services into their journey planning and ticketing app for public transport, and thus from easily leveraging their existing public transport user base for MaaS experimentation. More generally, the choice to not challenge laws and regulations has limited the PTA's action space in relation to MaaS. The MaaS pilots that the PTA has been involved in have, moreover, all invested heavily in technology development – trying to make application programming interfaces, administrative systems, data exchanges, and user interfaces work flawlessly. I wonder whether such a technology-centric focus is the most cost-effective approach to gather the user insights needed to learn about MaaS and about the governance of MaaS developments.

As mentioned earlier in this chapter, my interpretation is that between 2016 and 2018 the PTA pivoted their MaaS strategy to focus more on learning and less on reaping immediate results. The employment of me as an industrial doctoral student is also a testament to that learning objective, I believe. Nonethe-

less, the decision to invest in MaaS experimentation despite not knowing what MaaS can lead to, and for what cost, was still constantly questioned internally during my time at the PTA. MaaS developments were compared with other, less radical but more pressing and better-defined improvement areas, and then often not prioritised in the short-term despite being at the top of the long-term strategy. Basically, despite the outspoken learning objective, MaaS was in practice often valued and prioritised based on its merits in contributing to short- and medium-term performance indicators.

Internal organisation

Overall, my experience from the PTA is that MaaS was a prioritised issue among high-level decision-makers and among the people assigned to work with MaaS developments but not in the organisational layers in-between. MaaS was described as a key strategy in steering documents and in external communication, but the internal status was for the most part low, which was reflected in the staffing, budgeting, and priority of MaaS projects. Many of the people involved with MaaS at the PTA have described their work as a constant battle to defend their line of work to colleagues – an experience that people working with MaaS at other Swedish public transport authorities share.

I appreciate the inertia of large organisations, and also that the MaaS turn is not an easy transformation for any public authority. Yet I have two observations regarding the internal MaaS organisation at the PTA. Firstly, two conflicting institutional logics – market and bureaucratic logics – seemed to be at play at the PTA, which made it difficult to agree on priorities in relation to MaaS across different divisions and departments. People involved with visions, longer-term strategies, and R&D work at

the PTA (such as me) generally appreciated the MaaS experimentation. In contrast, people focused on daily public transport operations and continuous improvement work often saw is as a waste of time and money. A clearer strategy on how to prioritize incremental versus radical innovation needs could perhaps have made it easier to reach consensus. Secondly, I believe that the PTA's choice to run the MaaS programme as an R&D project instead of embedding it in the continuous improvement work might have made it much easier to launch MaaS experiments but also made it more difficult to institutionalise the outcomes of the experiments and to stimulate broader, persistent transformations across the organisation.

WHAT IS THERE TO LEARN FOR OTHER PUBLIC AUTHORITIES?

The most straightforward, but not very encouraging, take-away from this case is that experimentation with smart mobility concepts is not an easy task for public authorities. In theory, it seems easy to design, execute, and evaluate smart mobility experiments. As an example, a policy brief on urban mobility pilots written by Zipper (2020) states that "The critical element of a successful urban mobility pilot is the development and articulation of hypotheses that the public sector will test with data, often with assistance from an external group" (p. 1). As illustrated by the PTA's convoluted journey with MaaS, the situation is often messier than that in practice though, with conflicting objectives, interests, logics, and discourses to balance, internally as well as between partners – which has also been discussed by Fred (2020) and Stål et al. (2022).

Is the main goal of an experiment to learn about potential

paths forward or is it to facilitate market introduction? According to the Swedish Innovation Agency, which has funded most of the MaaS pilots in Västra Götaland, both goals should be achieved simultaneously. However, my interpretation is that the expectations of MaaS propelled by the success of the UbiGo pilot pressured the PTA to focus on market introduction, which in turn, made them overly concerned with technical and business development to the expense of user studies and user involvement. As a result, the PTA has learned a lot about how to integrate with other actors' technical interfaces and what to put into MaaS contracts, which has ultimately enabled them to make its tickets available for third-party resale, but has made little progress in terms of reducing the uncertainty about adoption, use patterns, and behaviour change, which has hampered their decision-making and continues to surround the MaaS concept in general (see also Mladenović & Haavisto 2021).

Had I known what I know today in 2014, I would have recommended the PTA to follow-up the initial UbiGo pilot with investing in more MaaS experiments enabled by simple service prototypes to explore longer-term use patterns as well as the appeal of other variants of MaaS. Here, it is important to note that such experiments do not have to conform to a standard pilot project process; there are many other, less stringent, types of processes, such as grassroots initiatives, that can teach us about smart mobility concepts as well (see Torrens & von Wirth 2021). I would, moreover, have encouraged the PTA to formulate and communicate more precisely defined learning objectives to avoid misunderstandings about intentions across partners and to minimise the risk that the success of the experiments would be evaluated against performance indicators centred on the short-term merit of MaaS.

Turning back to the market introduction objective, this case study highlights that it can be difficult to agree on how to proceed after a collaborative experiment, regardless of its success. The people involved with MaaS at the PTA have been criticised, externally, for putting a wet blanket on the MaaS innovation process when ending pilots, and internally, for being unreliable and acting inappropriately when extending pilots. Here, I believe that new types of hybrid structures and processes that bridge the gap between time-limited experiments and permanent operations are needed. Regarding processes, pre-commercial procurement is an approach that could be further explored. In terms or structure, the PTA has established a hybrid organisation, the Innovation Arena, that is tasked with supporting internal development activities and with facilitating continuous cross-project and cross-organisational learning. To avoid the detachment of experimental activities, and thus limited potential for persistent impact, it is important to embed such hybrid spaces in the line organisation, I believe. Matching structures and processes with innovation opportunities does not make the organisation innovative on its own though. As discussed by Thomke (2020), complimentary measures that build a culture of experimentation and learning across the organisation are needed as well.

Finally, the PTA's decision to stay within the boundaries of what their legal consultants interpreted that the legislative framework allowed them to do can be questioned. The laws and regulations that influence the action space of regional public transport authorities were written long before the introduction of apps for public transport ticketing, the influx of electric scooters, and the Covid-19 pandemic. Consequently, they are not yet adjusted for smart mobility concepts, such as MaaS. Ex-

perimental activities should arguably not be limited to what is easily achievable (Torrens & von Wirth 2021). Hence, I would recommend public authorities that want to engage with smart mobility experiments, to explore, at an early stage, their legal action space and identify ways to extend it if they find that it blocks the innovation pathway deemed most appropriate for achieving sustainable and just transport systems. One approach for doing that, which has been applied to other types of mobility transformations (see Burden et al 2021), is to set up a policy lab that analyses concrete cases of conflict in collaboration with involved and affected stakeholders.

Based on the PTA's experience with MaaS, fruitful smart mobility experimentation seems to require a visionary long-term strategy that looks beyond the current legal framework but still has intermediate goals that are aligned with the maturity of the concept and thus address the issues that hinder further decision-making. Furthermore, strong leadership and determination at multiple organisational levels, an institutional environment that favours experimentation and offers hybrid spaces for cross-experiment reflection, influential and capable partners to collaborate with, and a shared understanding of how and when to measure success, all seem to increase the likelihood of transformational effects.

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Practitioner reflections on the need for reflexivity

"We often want [pilots] to be as big, and as finished and complete as possible. But we should also focus on the small steps, small pilots. Instead of testing a whole solution at once, perhaps we could take smaller parts and then weave them together"

(Official 2, Public Transport Authority)

"You can write role descriptions and have all kinds of thoughts about how to work together and how to share tasks on paper. But once the practical work starts, we notice that it is not that simple. There are often much greater mutual dependencies than we initially thought. We have seen that we need to be able to move responsibilities and roles around in order to be successful"

(Official 1, Public Transport Authority)

– Chapter 10 –

Lessons learned about experimentation in an era of transformation

Karolina Isaksson, Kelsey Oldbury, Greg Marsden

This book has focused on experimental spaces, which are today often framed as possible – and promising – ways of working to provide knowledge for breaking path dependencies and enacting transformations of transport and mobility systems. In the introduction, we discussed how experimental initiatives within transport and mobility tend to be surrounded by high hopes regarding how to find paths forward to reduce climate emissions from transport, as well as prospects for a more energy efficient, smooth, and user-friendly mobility system. At the same time, there is a lack of systematic analyses of the impacts of experimental spaces, especially when it comes to how to move from the immediate and measurable outcomes to transforming wider practices. Overall, there are specific lessons to be learned regarding the role of public actors in securing sustainable paths of development in an era of experimentation.

In this final chapter, we will highlight the clearest lessons learned from the chapters and the reflections from practice included in this anthology. An overall conclusion is that, while experimentation in the transport sector today is often motivated by goals for climate emission reductions and sustainability transformation, many experimental initiatives have only very tenuous connections to specific emission reduction targets, or transformative learning objectives. Thus, the specific trans-

formative potential and the pathway to realising such potential are not always clear. In this chapter we discuss governance implications and how public values can be secured in experiments, as well as the boundaries of what can be achieved with experimentation. We aim for insights which enable experimentation to better open up its longer-term transformational potential, where that exists.

WHAT KINDS OF EXPERIMENTS HAVE WE SEEN?

In chapter 1 we presented experimental spaces as the umbrella concept we use in this anthology to discuss a range of interventions currently being made to test and implement new concepts and technologies in the transport sector. One of the six main similarities we outlined in the introduction was that experimental spaces are commonly used to test novel technologies. To begin our concluding chapter, we therefore see a need to briefly reflect on what is being experimented with in the examples from the transport sector which have been included in this anthology. The range of examples influences what we can say in this concluding chapter when it comes to strengths, limitations, and governance implications of experimental spaces.

Altogether, the eight empirical chapters cover a range of interventions such as the testing of drone technologies in medical logistics, the piloting of charging infrastructures for electric vehicles, different examples of developing and testing Mobility as a Service (MaaS) and automated buses, and other types of testbeds, platforms, and collaborative initiatives for public transport innovation. Other chapters discuss themes such as risk taking related to experimental initiatives, and the potential of design led interventions to reconfigure user practices connected to the private car. In terms of what could be described

as the 'content' of experimentation, these quite different examples shed light on the range of experiments taking place in the transport sector. These examples could be viewed as illustrating different points on a scale of experimentation and the content of the experiments discussed here can be viewed in terms of closeness or distance to current policies and practices. Some examples of what is being implemented in experiments have more immediate implications for established ways of planning and the politics of car use (such as pilot projects for stricter parking norms, or charging infrastructures for electric vehicles), while other examples (such as automated buses and drone logistics) seem further away and part of a somewhat distant technological future. To draw on the term used by Fred et al. in chapter 3, the range of examples of what is being experimented with in the transport sector have different proximities to the present in terms of their political implications and the risk(s) they pose.

STRENGTHS OF EXPERIMENTATION

Several of the chapters, as well as the insights from practice, have highlighted strengths of experimentation, most notably related to qualities of openness and learning. We have seen examples where experimentation as a governance mode has created an openness to reflect on and adapt to insights that are shaped along the way, leading to amendments and the redesign of emerging sociotechnical configurations. There are also experiences that demonstrate that experimental approaches - if carried out in an open and explorative way – can be used as a means of 'provoking' and exploring transformative pathways.

Several of the chapters illustrate how experimentation can be a useful and manageable way for established institutions to engage with new topics, to give new technologies a context, and

for public actors to learn more about new (possible) sociotechnical realities. Chapter 6 presented insights from a pilot project where new bridges were being established between public innovation projects and members of the public, something which was also pointed out as a potentially important quality of experimentation in the experiences from planning practitioners engaged in think tanks and innovation platforms. Several chapters illustrate how experimenting, if used wisely, can provide public actors with a richer evidence base for learning more about the possible benefits and risks (both practical and/or political) of new technologies.

In the book, there are also insights into experiments as collaborative spaces which can bring new perspectives on established ways of working, and in some cases also alter the ordinary hierarchy of collaboration that usually steers transport and mobility planning. According to public and private organisations involved in a large pilot for 'modern mobility' in the Stockholm region (see chapter 8 and reflections from planning practitioners on three-party collaboration on pages 181-183), it would have been even more challenging to set up the pilots for automated shuttles and MaaS within the framework of a conventional governance structure. Their descriptions indicate that if there is a need to develop new concepts and ideas, then more open, explorative, and flexible spaces for testing and learning have an important role to play – especially in times of transformation. This insight is also discussed in length in chapter 7 on design-driven experimentation. Experts and officials involved in experimentation often come back to the sense that 'ordinary' spaces of planning and governance are not delivering sufficient results in relation to the challenges that society is facing. Experimental spaces are understood to provide important territories

and processes for working things out, specifically when there is no, or minimal legislation, strategies or policy measures in place. In other words, and as stated previously in literature on experimental governance, spaces of experimentation can work as important "state[s] of exception" (Torrens & von Wirth, 2021, p. 9), and experimenting is sometimes understood as the only, or at least most appropriate way for something new to emerge and for working things out in times of change.

LIMITS OF EXPERIMENTATION

The chapters also highlight the limits and risks of experimentation. There are challenges related to differing and sometimes incompatible visions, goals and interests among actors who are collaborating in experiments. Experiments risk masking such differences, making potentially diverging or incompatible intentions and outcomes of a new technology less clear. As discussed in chapter 5, experimental spaces can create new arenas for vested interests to use experiments as a Trojan horse for rolling out certain technologies or concepts. Also, from chapter 4 and chapter 8, we have learned that experiments can lead to longer-term effects, which raises questions about the influence experiments have on the legitimacy and accountability of public decision making. For instance, we have seen examples where decisions of principal importance have been taken in experimental spaces because it was required for the pilot project in question – but without any broader discussion about the principal and strategic content of the decision. Issues of transparency and accountability as noted in previous research (Karvonen et al., 2014; Eneqvist, 2022) continue to be a shortcoming of experimental approaches. This is perhaps unintentional, but it is avoidable with greater attention given to directly addressing

these issues in the bidding process.

Some chapters have highlighted that experiments are sometimes characterised by a narrow, techno-centric agenda, with a very limited space for public engagement, scrutiny, and political debate. There is also a risk that the framing of experimentation as temporary projects leads to public goals and responsibilities being forgotten or set aside in favour of the practical procedures of implementation. In these respects, experimental spaces can be far from the ideal of open, flexible, and collaborative spaces for learning. This was mirrored in the experiences of planning practitioners and other professionals involved in experimentation in the transport sector, who pointed at the importance of establishing processes for more in-depth reflection and consolidation of broader learning outcomes of experimental spaces.

Across the chapters, we have seen a tendency to frame innovation as a value in itself, with only a loose connection to societal challenges, such as the urgent need to reduce greenhouse gas emissions from transport, or secure social equity and inclusion. This seems somewhat paradoxical, since the climate crisis, and the need for rapid sustainability transformation, is often referred to as a main motivation for public actors to engage in experimentation. It seems that these large societal challenges are easily watered down and taken over by other agendas, such as mere technical developments and the establishment of new mobility concepts with a sometimes unclear potential to contribute to emission reductions from a wider systems perspective.

In relation to this, some of the chapters have illustrated that the learning outcomes associated with experimentation are dependent upon a capacity to take risks (both practical and political). However, public sector actors sometimes find it hard to balance public sector logics with experimental logics. As dis-

cussed in chapter 2, 3 and chapter 9, experiments are in practice often kept at a distance from the more ordinary operations in policy and planning, or are carried out in ways that create parallel processes. Altogether, the distance between experiments and ordinary operations – which can be caused by an unwillingness to take risks, or as a way to cope with different logics – means that the feedback from experimentation back into the public, democratic decision-making processes becomes weak. Planning practitioners and other professionals involved in experimentation stress that this, in turn, also limits the opportunity to learn from experimentation. Finding ways to build bridges between experimentation and the ongoing planning, policy and political process is likely to be a critical part of unlocking any hope of transformative potential.

SOME GOVERNANCE IMPLICATIONS OF EXPERIMENTATION

1. Strategies for managing different governance rationales

From the contributions in this anthology, we have seen that experimental spaces lead to tensions in 'ordinary' planning and governance, when the public sector logics meet the logics of experimentation. As discussed by Berglund-Snodgrass and Mukhtar-Landgren in an article from 2020, public sector logics build on a formal governance structure resting on a democratic and bureaucratic function, where issues such as legitimacy, predictability, and a clear separation of roles and responsibilities between politicians, civil servants, and private organisations is key. According to the public sector logics, it is essential to base decisions on formal regulations which have been legitimately decided, and that policies and plans build on established knowl-

edge. Encouraging experimentation as a component of governance opens up for another logic of governing, characterised by the ideals of collaboration, exploration, testing, and learning along the way. When engaging in experimental spaces, the public sector logics are thus supplemented "with an informal, hybrid layer" (Eneqvist et al., 2021, p. 3).

In practice, the principles of shared ownership and leadership and 'learning by doing' that experimental spaces imply, clash with the bureaucratic logic where roles are supposed to be separated, where it is essential to always know who is responsible and accountable, and where regulation and legislation constitute the framework for decision-making. As discussed in the literature (see e.g. Vakkuri et al., 2021), hybrid spaces also involve settings where goals might overlap or even be incompatible, for instance when social goals motivated by public value meet the private sector logics of profitability. Altogether, and as demonstrated for instance in chapters 4 and 9, experimental spaces where different rationales meet are often complex to handle for public organisations. At the same time, and as formulated by Smith in chapter 9, hybrid forms of governance could also be developed and applied more consciously, as a way of bridging different institutional logics and creating possibilities to make use of the advantages of experimentation (e.g., openness, flexibility, exploring and finding new ways of working or solving issues) while making connections to conventional ways of working. If so, it is important that the relationship between more temporary experimental spaces and the conventional processes within an institution or organisation are transparent and clear. For public actors specifically, it is key that democratic principles of transparency and accountability are discussed in relation to experimental processes and are not sidelined. It is also important to

mitigate the tendency and risk of establishing a 'parallel logic' (i.e. experiments taking place in parallel to the conventional line organisation), which have been discussed by practitioners. In publicly governed and financed institutions it should always be possible to trace a clear line of decision making.

2. What is to be achieved through experimentation?

Another insight from the contributions in this anthology is the importance of having clear ideas about what is to be achieved through experiments (predominantly) funded by public money, especially for public actors who have a role of securing public value. What learning objectives is experimentation intended to fulfil, about what, and for whom?

We argue that if public actors continue to fund experimental activities with considerable amounts of public resources, for example through state funded innovation programmes, it is critical that experimentation is shaped by an intentional approach regarding the realisation of public value, including principles of equity, accountability, transparency, and alignment with political goals regarding climate and sustainability transformation. This requires, among other things, a clear idea regarding not just *what* should be achieved by means of experimentation, but also *how*, and *why*. This implies an approach and awareness of potentially incompatible goals, and a strategy for how values such as transparency and accountability should be achieved and maintained in processes of experimentation.

Several chapters in the book have shown that early stages of experimentation can be formative for long-term developments. We have also learned, especially from chapter 8, that there is often no clear border between an experiment and its surroundings, and that initiatives and arrangements that are planned to

be temporary can have long term effects when ideas and results stretch and move to other contexts and situations. For public actors involved in experimentation it is therefore essential to not only formulate clear learning objectives for a specific experiment or intervention at the start of it, but also to follow up and ensure these learning goals stay in focus as things develop, and as experiments and pilots start to shape and reshape broader policy and planning contexts. As many texts have highlighted, there is not necessarily a clear point 'after' or 'beyond' the experiment where it is possible to assess and measure results and decide what happens next, since what happens next may already be taking place. This presupposes an ability to reflect on, and actively engage with, risks and opportunities for public value that may come up along the way, and points to the need for an adaptive approach where results and insights are followed up and responded to throughout the process. It is also important to reflect broadly about what is learned and to what extent the idea of monitoring 'results' implies direct, measurable effects, or if it can also include processual knowledge and learning which cannot be measured by means of quantitative indicators. Also, there might be good reasons to adjust expectations regarding the speed at which results are anticipated to be seen, and think carefully about strategies for interpreting and analysing results from different perspectives. Failure, which could be in meeting the goals, in establishing business models or in the technology, is an inevitable part of some experimentation (unless the experiments have no transformational risk). Failure, in whatever dimension, also brings learning. The closing off of paths is not necessarily negative and new unanticipated paths might open. This risk needs to be embraced as part of the experimental process and the actor engagement.

In other words, ensuring public value(s) in experimentation demands an extensive engagement from public actors. This engagement means much more than just initiating a string of experiments with a focus on implementation. A more strategic approach is needed, one which can ensure and follow up how experiments contribute to public value and to political goals. A capacity to manage unanticipated or unwanted effects is needed, as well as a plan for how results, knowledge and learning can be analysed and developed on a more strategic level, beyond the patchwork of the individual experiments (Eneqvist, 2022).

3. Awareness of politics and power

Several of the chapters have demonstrated that experiments are not neutral. They are processes where values, politics and power dynamics are at play. This insight is not new but has been discussed in previous research on urban experimentation (Caprotti & Cowley, 2017). Still, the scope for critical reflection regarding politics and power seems to be limited in several of the examples of experimentation discussed in this anthology. For instance, chapter 5 on drone trials illustrates how the positive connotations of drones for medicine delivery to remote places serves as a favourable starting point for gaining public acceptance, despite the fact that a large-scale application of drone-technology for other uses would create very different goal-conflicts for society. Similarly, chapters 4 and 8 illustrate how private companies with stated interests of individual profitability are allowed to have a major impact on public pilots and collaborative arrangements, without this being problematised by the public actors. Even where there is alignment between public and private sector interests as with the roll out of electric vehicle (EV) charge points, as chapter 6 suggests, who is

allowed to shape those experimental processes has a significant bearing on who wins and loses in the outcomes.

Considering the key issues at stake for establishing sustainable trajectories for the transport sector, and the vested interests in this policy area, it is of key importance to establish a critical awareness in the political and planning organisations involved in experimentation regarding what experiments and experimental spaces might bring, not only in terms of possibilities but also risks – including effects that go beyond the immediate impact(s) of single pilot projects. The positive rhetoric regarding sustainability, climate transformation, and collaboration which tends to permeate experimentation and pilot projects today is no guarantee that these possibilities will actually be realised. Neither does it preclude a shift in power relations among public and private actors, or the risk of excluding specific perspectives and groups.

However, a general awareness of the power dynamics at play is not enough. It needs to be complemented with a more practical capacity and practices for continuous reflection on, and ways to work with and make clearer priorities between the different goals and interests of the actors involved (or not involved) in experimentation. To enable this, it is essential to also make long-term, informed analyses of possible risks of experimentation – for instance the risk of pilots being a Trojan horse for specific interest groups, or a way to incrementally shift power and mandate between public and private actors. There is also a need to maintain critical reflection on the benefits and risks for both users and non-users of, for instance, new mobility concepts. If we end up with an overly pronounced focus on insights from trials and experiments, we might risk 'designing out' the non-users or possible losers from the technology or concept in question.

CAN EXPERIMENTATION SUPPORT TRANSFORMATIVE CHANGE?

The motivation for this book was to explore the extent to which experimentation could contribute to sustainable transport transformations. First of all, it should be noted that the examples of experimentation included in this book are based on quite different ideas about sustainable transport transformations and what this might imply in a near or somewhat distant future. There is often a general sustainability rhetoric surrounding specific interventions, but analyses of potential impacts at the system level, or impacts in the longer run (anticipated or unanticipated), are not very apparent in the cases explored. The possible contributions of experimental initiatives to climate and sustainability transformation and emission reductions are therefore uncertain, and it seems reasonable to question whether experiments - at least the type of experiments that have been discussed in this book – can provide anywhere near what is required to reduce emissions from the transport sector, and at the speed which is needed. Hence, it is important that experimental initiatives are not used as substitutes for other types of measures, such as legislation, regulation, or new political visions, which are also needed in the transformation of the transport system. Of course, this does not mean that experimentation cannot have an important role to play. But if experiments are to contribute to transformative change, then a more active, critical reflection on the content and methods of experimentation – as well as further realisation of possibly promising results – is needed. We see the provision of spaces and processes for critical reflection as an important task for public actors.

Secondly, we have noted that most of the experimental spaces in focus in this anthology consist of relatively small, demarcated

initiatives, where it is often unclear what will happen with the results after the project has formally ended. It has become clear – not least in workshop discussions with practitioners – that the small-scale and temporary project form can mean challenges for practitioners in building knowledge and taking potentially promising insights further. If experimental approaches are to contribute to a transformation of the transport system, it is of critical importance to create broader forums and methods of working that can ensure that experimental spaces can become sites for wider learning and actionability. We see the need for arenas and processes where the knowledge from individual experimental initiatives can be consolidated and synthesised and used as a basis for continued transformation-oriented initiatives.

A third reflection, based on the examples included in this book, is that further consideration is also needed of the relationship and interaction between different scales of governance and experimentation. Many chapters focused on the work of local and regional actors, with a backdrop of financing from national level funding organisations. As mentioned in the introduction, transformative change in the transport sector crosses urban and regional boundaries and overlapping governance jurisdictions. We therefore see a need for research to further explore the multi-level implications of experimentation, specific roles and responsibilities for public actors at different levels, and as Smith suggests in chapter 9, to consider whether there is a need for new kinds of intermediary organisations.

As discussed previously, many of the examples of experimental spaces included in this book have seemed to end up in, or mirror, challenges related to parallel logics, where there are only loose connections between the experimental space and the more ordinary spaces of decision making. Only a few of

these examples have reflected clearly stated ambitions to challenge the structures, mobility practices and power relations of today's transport system. To ensure that experimental initiatives can make a clearer contribution to a sustainable development, we see a need to make the content of experimental initiatives more clearly transformative, i.e., more focused on challenging the assumptions of contemporary transport policy and planning regarding, for instance, the assumed standard modes of transport or the extent of travel. Results of experiments also need to be more actionable in a near future. If not, there is a risk that they might in practice serve to maintain the status quo, or even become points of distraction – something which we cannot afford, considering the urgent need for real results in terms of reduced emissions. A general take-away from this book is also the need to link the development of new technologies and concepts to questions about use and learning, and to keep reflections about inclusion alive. At the same time, there is also a need to reflect upon how quickly results need to be achieved. In some cases, experimentation is allowed to happen at a rapid pace and with an immediate impact on various citizen groups and public space – most clearly illustrated by the case of EV charging points in chapter 6. EV charging is an example of a technology which is currently being rolled out rapidly across cities around the world, even though we still do not know much about how people will use electric vehicles and what other types of impacts they might have. The general approach here seems to be to learn and manage risks and benefits as we go.

Altogether, what we have seen in this book is a mix of strengths and weaknesses of experimentation. Some cases demonstrate the potential for experimentation to stimulate transformative learning and to challenge the status quo. Other

cases have a much less clear transformative potential and might even risk serving as points of distraction or arenas for maintaining the status quo and strengthening existing power relations in the transport sector, instead of challenging them. With less than eight years to go to 2030 we face some very difficult questions on climate strategy: if we are to continue working with experimentation as part of the solution, it is essential to use it in a much more transformation-oriented way than is currently the case. To encourage a more coherent governance approach, and a public capacity to steer with experimentation, we see a need for more conscious strategies and frameworks to strengthen public actors when they enter experimental spaces and to secure public value and a focus on climate and sustainability. We see a tendency in society today to hope that experimenting and technical innovation 'will do the job' by offering new, smart solutions to the climate and sustainability crisis which does not require difficult decisions to be taken. However, this is a false hope. Experimentation can, at its best, support public policy and planning to take more rapid and bold steps forward in the transition to sustainable mobility and accessibility. Still, experimentation can never replace the need for politically and publicly led policy and decision-making processes with clear priorities and choices regarding possible ways forward.

Key questions for practitioners taking part in an experiment (e.g. pilot project, test-bed, living lab etc)

- What is this experiment designed to help you learn about? In what ways can you ensure that the lessons and results are relevant for pressing issues today?
- How do you intend to establish processes for reflecting on, and consolidating, the lessons learned?
  Can failure also be considered a part of learning?
- How do you plan to discuss, map out and manage possible risks – including risks that go beyond the specific project implementation?
- What are the links between the project group for the experiment and the more conventional practices of planning and politics in your organisation?
- How will different publics be included in the design and implementation of the experiment? How will you take into consideration how different groups of the public may be excluded from participating?
- What are the overlapping and diverging interests at play amongst the different organisations involved?
- When, how, and by whom, is it decided in what form an experiment continues? How can chains of decision-making be transparent in experimental spaces?
- How will the experiment support public policy and planning for transformative change and the realisation of climate and sustainability goals? What other initiatives or policy measures are needed beyond the experiment?

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THE climate crisis, together with other urgent sustainability questions, emphasises the need for a fast and pervasive change within the transport sector. During the last few years, different kinds of experimental initiatives, and the possible role these can play in climate and sustainability transformations, have become a staple of research and policy development contexts. At the same time, questions remain unanswered regarding the strengths and limitations of experimentation, and how experimentation can support transformative change.

This anthology brings together insights and reflections from research and policy practice regarding experimentation for sustainable transport. It includes eight individual chapters focusing on themes such as risk-taking, the key features of innovation-producing environments, possible synergies and conflicting interests between actors involved in experimentation, as well as issues related to design-led approaches, public involvement, legitimacy and the possibilities and constraints related to different governance rationales.

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