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Steering Smart Mobility Services: Lessons from Seattle, Greater Manchester and Stockholm

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Abstract: This paper explores how three cities (Seattle, Greater Manchester and Stockholm) have approached the governance of smart mobility services in the early stages of their introduction. The research finds that cities have limited steering capacity, and when they do steer services this is done on the assumption that smart mobility will deliver wider social, environmental and economic good. While broad-ranging benefits are yet to materialise to any identifiable degree, the potential for smart mobility to tackle some of the challenges of automobility undoubtedly remains, and the new services are acting to change mobility patterns in cities, at least for some people. We focus on the need to develop clear accountability arrangements between the public and the private sector, which we see as a necessary element of a collaborative governance approach that allows both sides to identify shared goals and maximise their achievement. However, we stress that developing a collaborative approach requires cities to govern with intent, which means that services need to be deployed or permitted with clear objectives and an understanding of their anticipated impacts.

Keywords: governance; smart mobility; sustainable transport; accountability; innovation



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1. Introduction

1.1. Smart Mobility Governance in Context

For nearly a century, transport systems have been dominated by automobility. Cars have facilitated a socioeconomic transformation by radically changing the range and speed of travel by personal modes and, as a result, have played a key role in redefining the land use planning of economic activity, housing, education, healthcare, retail and leisure. However, the inverse relationship between automobility dominance and economic, environmental and social sustainability, particularly in cities, is well-established in the transport literature [1] and in urban studies (for some early examples see [2,3]). Mass car use is linked to a range of negative externalities including congestion, poor road safety, poor air quality and social exclusion. Crucially, emissions from transport continue to increase year-on-year, and must be reduced dramatically if global warming is to be limited to 1.5 °C, or even 2 °C [4]. As such, cities need to deliver a drastic shift towards sustainable transport, more urgently than ever before.

In response to transport challenges, smart mobility rhetoric comes with the promise to enable the transition towards a smarter and more sustainable transport future, or a “smart mobility transition” [5,6]. The rise of smart mobility is attributed to a large extent to the rapid development of new technologies and business models for electric, shared and autonomous mobility. At the core of the narratives surrounding smart mobility services is the prospect to deliver a shift away from car ownership, which is replaced by on-demand access to a package of connected services. Smart mobility services also promise to contribute to the rapid decarbonisation of the transport system, through increasing travel efficiency and using low emission vehicles [7]. While the electric, shared and autonomous elements of the smart mobility narrative are not entirely new, their combined version has been compared to a ‘revolution’ [8] and a transition of similar scale to the automobility transition [6].

Considering that state intervention in the governance of transport has so far struggled to mitigate and eliminate the negative impacts of automobility, it is important to pay attention to the role of the state and public policy in steering a smart mobility transition [7]. Despite the ambitious narratives about smart mobility futures, there is already evidence that smart mobility services can have questionable or even negative impacts in relation to sustainable transport objectives. For example, Uber and Lyft have been found to increase congestion in cities in the United States [9], and research by de Bortoli [10] shows that dockless e-scooters only reduce carbon emissions under certain circumstances. Most importantly, even if the benefits of smart mobility services do materialise, past experiences have shown that technological innovation alone is not enough to address major transport-related challenges such as congestion, social exclusion and the reduction of carbon emissions—all negative externalities of automobility [11].

This paper draws from early work on the governance of smart mobility (for example [12,13]) and the growing body of literature that explores the interaction between the state and smart mobility providers, and introduces the concept of accountability regimes in the study of smart mobility governance to explore whether, and how, services can contribute to local sustainable transport objectives. To do this, this research is based on three in-depth case studies that explore smart mobility governance in Seattle, Greater Manchester and Stockholm. After a brief explanation of the terms used in this paper, the following sections provide an account of how smart mobility and accountability are discussed in the existing literature; outline the methodology used for this research; analyse how smart mobility is governed in Seattle, Greater Manchester and Stockholm; and discuss how accountability arrangements can be shaped for smart mobility services.

1.2. Terminology

This paper adopts a “flexible framing” of smart mobility focusing on three key elements: (a) services that combine innovative technologies and business models, (b) are provided by the private sector, and (c) are promising to transform individual and collective mobility. For clarity, a description of the types of services referenced in the following sections is provided below.

Bikesharing: systems of shared human-powered or electric bicycles, which are provided by a public or private operator. Bikesharing systems can be docked or dockless.

E-scooter sharing: systems of shared electric scooters, which are mainly dockless and provided by the private sector. Bikesharing and e-scooter sharing schemes are often collectively referred to as micromobility.

Ridesharing: platforms provided by the private sector that offer a service similar to that of a taxi, through a mobile application. In the United States, ridesharing platforms are referred to as transportation network companies (TNCs), a term that is also used in this paper.

Carsharing (or car clubs): systems of shared cars that are offered by private companies or by public authorities and are rented for short periods of time (minutes or hours).

Mobility-as-a-Service (MaaS): Butler et al. [14] (p. 2) refer to MaaS as a “system whereby traditional services such as public transport can be integrated with other on-demand and shared services, such as ride-, bike- and car-sharing, and a single online interface utilised for payment, journey planning and other traveller information”.

2. Background

2.1. Smart Mobility Governance Challenges

There are no guarantees that smart mobility will deliver on sustainability goals, and early evidence has cases both for and against services. In addition, many of the services directly require some form of state facilitation, such as regulatory changes or permission to access and operate in the public space. The literature therefore shows a broad consensus that the state plays an important role in shaping and steering smart mobility services (see among others [7,13,15–17]). Docherty et al. [7] argue that, given the pace of innovation,

the window of opportunity when policymakers have a broad range of options to shape smart mobility services might be relatively brief. However, even at this early stage, the literature identifies significant challenges in governing smart mobility services. Six key governance challenges emerge from the literature: uncertainty, multi-level alignment, complex networks, volatile market conditions, disruptive provider practices, and data asymmetries.

First, there is often no clear path for state intervention when it comes to new services. Curtis et al. [18], Stone et al. [19] in Australia and Guerra [20] in the United States identify uncertainty as a key challenge in the governance of AVs, which are very much part of the “future of mobility” narrative but only just emerging in cities. The authors find that uncertainty is hampering proactive planning, resulting in a “paralysis” on the part of local authorities. Curtis et al. [18] demonstrate that while governments recognise that they have a role to play in the governance of AVs and in ensuring that policy objectives such as social equity are delivered, they have doubts about how this can be achieved. In addition, there are genuine knowledge gaps in relation to new modes, both in terms of the new technologies and the new business models. Furthermore, authorities may already have a diminished capacity to steer smart mobility services, resulting from previous neoliberal reforms [18,21]. As such, the purpose, mode and degree of state intervention in the governance of smart mobility is far from clear. It is also unlikely to be uniform in nature, depending on the specific capacity and willingness of authorities to steer services [15].

The literature also discusses the challenges that arise when authorities try to steer services. Docherty [22] explains how, in multi-level governance contexts, regulating and steering smart mobility services may result in conflicts between different government levels. Using as an example the regulation of MaaS, Docherty [22] explains that city-led regulations aimed at dramatically reducing vehicle kilometres travelled could conflict with national economic objectives, which are heavily reliant on vehicle taxation. As such, smart mobility policy alignment will require careful coordination across government levels and with smart mobility actors to ensure that societal goals are achieved and any potential conflicts are addressed through mutual agreement [22].

Furthermore, smart mobility expands and diversifies the network of actors involved in transport governance and sometimes changes the agenda of existing actors (see for example [23] on the changing agenda of bus operators in Stockholm). Therefore, steering smart mobility services is a complex process that involves multiple players, some of which may have powerful commercial interests that conflict with the cities’ priorities. This complexity of governance is aptly illustrated in Marsden et al. [24], who “zoom” into the management of curbside space in the era of smart mobility. They explain that curbside space, a valuable and highly contested public asset, is already under pressure due to poor management by authorities and changes such as the increase in home deliveries and the advent of micromobility companies. The introduction of new demands from shared mobility providers and, in the future, AVs, is expected to exacerbate this situation. The answer is not just about optimising the use of the space and pricing it appropriately, but also involves deciding what kind of “place for people” is desired and how to manage the trade-offs in demand, including for those uses which do not have a directly monetisable value. However, the authors argue that it is unclear whether the state is capable of acting to deliver change for the full set of public interests, or even understands what is at stake, while private actors actively seek to frame the debate, establish their claims, and shape what could be the “normal” curbside rules of the future [24].

In addition, governance challenges are created due to the practices of the new actors in the space of smart mobility. Smart mobility companies are often start-ups funded by Venture Capital (VC), which means that they are at once volatile and powerful. Smart mobility companies often change where they operate and even remove services from cities at short notice, resulting in a lack of stability in service provision [25]. Aside from the reliability challenges this creates for local transport networks, volatility has equity implications. Dill and McNeil [26] explain that, as pressures for profitability mount on

VC-backed smart mobility providers, there is evidence that they are raising prices, which may make them less viable options for lower-income people.

The literature also provides evidence that smart mobility providers are actively trying to reduce the state's steering capacity. Davis [27] explores the process in which Uber, Lyft and Sidecar were legalised in San Francisco, setting a strong precedent for other cities and countries. She explains that the providers in San Francisco moved tactically to pressure local authorities, first by arguing that they should not be regulated at all, then by ignoring regulators' orders to cease operations while building a strong user and driver base, and finally by lobbying senior and elected officials to support the development of favourable legislation for TNCs. At the same time, San Francisco's Mayor shifted the jurisdictional locus of debate on the regulation of TNCs to the state level, where regulators were more business-friendly than the city. This meant that the regulatory process was largely led by and benefited the TNCs but did very little to enhance San Francisco's capacity to deliver local objectives or improve the city's revenues. Other examples in the literature (see for example [28]) also demonstrate that TNCs take advantage of regulatory gaps to disrupt the local markets and create a base of drivers and customers, which gives them public legitimacy and power that they then deploy along with aggressive lobbying to promote their side of the legal arguments.

Finally, Docherty et al. [7] explain that data information asymmetries, where smart mobility providers collect a wealth of data on transport demand that is not shared with local authorities, also undermines the long-term steering capacity of cities. The authors argue that "[d]ata is the knowledge upon which the power to control the marketplace is built" and therefore a shift in the control of knowledge and associated power will make governing mobility much more difficult in the longer term, especially in a future where AVs become the norm [7] (p. 121).

2.2. Smart Mobility and Accountability

At the heart of the concerns raised above are the trade-offs between the state, which wishes to see the new mobility services meet a set of sustainable transport needs, and the network of providers, who are competing to establish new smart mobility markets. Whilst some interests overlap, it seems clear that they are not fully aligned. To explore how smart mobility services can contribute to sustainable transport objectives, this paper focuses on providers' accountability arrangements and uses the concept of accountability regimes as a definition and analytical tool. According to Mashaw [29], any accountability relationship is described by at least the following six questions:

- To whom is accountability owed?
- By whom is it owed?
- For what is accountability owed?
- What is the process and how is it created?
- What are the standards that need to be met?
- What happens if the accountable party fails to meet these standards?

These six questions form an *accountability regime*, which we elaborate on in the case of smart mobility and then explore through the empirical work. The literature on the governance of smart mobility talks about the potential for steering of services, but the providers also have expectations of the state. As we develop into more of a mixed model of state, private, and partnership services, we argue that it is critical that the accountability challenges that emerge when the state tries to align services with local priorities are understood. This is particularly true as the wider literature suggests that public accountability becomes harder to achieve when multiple actors are involved in providing public services [30].

Noy and Givoni [31] demonstrate that "the concern of [. . .] transport entrepreneurs is primarily with commercial considerations and [. . .] their appreciation of what it takes to advance towards a more sustainable transport system is lacking. The belief amongst those entrepreneurs, it emerges, is that technological developments alone, specifically with respect to autonomous and connected vehicles, can lead to sustainable transport" [31]

(p. 1). Lyons [32] also concludes that large corporations are exerting significant influence in the ‘era of smart’ based on principles that are conflicting with traditional concerns of the public sector such as social and environmental sustainability as well as economic prosperity. Therefore, it is not sufficient to assume that smart mobility providers will strive to have a positive impact. Instead, it is necessary to ensure that providers understand transport policy objectives and the challenges involved in their delivery or, in other words, *for what* they are accountable.

Even when perceptions are aligned, there is no guarantee that smart mobility services will have a positive impact. Van Oers et al. [33] discuss how claims about the benefits of smart mobility applications carry a strong inherent legitimacy and therefore remain unchallenged, even when applications fail to deliver the societal benefits they promised. More specifically, the authors examine the claims about the transformative potential of data collection and use in smart mobility applications. They focus on the cases of two data management tools deployed in projects in France and the Netherlands aiming to optimise bikeshare operations and guide policy on cycling infrastructure, respectively. In both cases, the deployment of the data management tools was underlined by a shared understanding among all actors involved that their goal was to increase the share of cycling. The authors find that claims that data-led policy decisions are depoliticised gave legitimacy to the deployment of the data management tools, but their application lacked transparency, limited public participation and, crucially, led to the exclusion of non-smart alternatives. The research by van Oers et al. [33] points clearly to the need for robust accountability regimes that define *through which processes* and *by what standards* smart mobility providers are meant to contribute to local transport objectives.

The rapidly changing nature of parts of the smart mobility industry make integration between the public sector and providers difficult. So, whilst providing parking space for car share vehicles is a clear transaction and is sometimes managed through a tender process, the ability of local authorities to procure smart mobility as part of other services is more challenging. For example, TNCs seek to undercut some of the operational norms which underpin the traditional taxi industry. Whilst this benefits some groups, it can lead to problems in deploying them as part of social services. The research by Deakin et al. [34], for example, shows that TNCs raise equity challenges when providing services to older age groups or people with disabilities, such as shortage of wheelchair accessible vehicles, which points to the final accountability regime question: *what happens if standards are not met?*

3. Method

This research takes a qualitative, case-study based approach. The case studies focus on how smart mobility is governed in western European and North American democracies, where local governments were already considering the impact of new services on the delivery of their strategic objectives and on people’s lives when this research started. The case studies were selected through a longlisting and shortlisting process based on language, sample size, site visit duration and cost, and contingency criteria. Each case study includes all smart mobility-related developments in a city, instead of focusing on individual providers or types of services.

The data was collected through interviews with policymakers and other stakeholders involved in shaping smart mobility services in the three cities. A total of 22 semi-structured interviews were carried out, of which six took place in Seattle, six in Greater Manchester, and ten in Stockholm. In each city, the potential interviewees were identified so that their views would provide a comprehensive picture of smart mobility developments and plans. As such, there was no target number of interviews for each location. The approach to identifying a first group of interviewees was different in each city but, broadly, it started with a desktop review of smart mobility projects, and transport policies and strategies to identify the officers and other key stakeholders involved. Once the interviews with this initial cohort had taken place, more invitations were sent out, if needed, based on recommendations from participants or further desktop research.

The interviews focused on how cities had dealt with smart mobility services and any lessons learned, smart mobility policies and barriers to developing them, and on accountability arrangements for smart mobility. More specifically, the participants discussed what role they thought smart mobility services play in the local transport system, how this could evolve in the future, and how services can be steered through policy and regulation, and, more broadly, the interaction with smart mobility to providers and the role of smart mobility services in relation to sustainable transport objectives.

The interviews were transcribed manually and have been analysed using qualitative analysis methods. All interview transcripts were imported in the computer-assisted qualitative data analysis software (CAQDAS) NVivo 12 and were analysed in two stages using an inductive and then deductive coding approach. The inductive coding allowed for categories of data to be established and for findings to emerge from the data, acknowledging, however, that inductive coding is not carried out in a vacuum and is still informed by the theoretical underpinnings of this research. In the second stage, the deductive coding was then used to confirm the appropriateness of the coding framework that resulted from the inductive coding and examine whether data across the interviews fits the codes developed [35]. The codes generated by the analysis were used both in the construction of the case studies summarised in Section 4 and in the discussion included in Section 5.

This research draws from the case study construction process proposed by Patton [35] (p. 450), who states that “[t]he case study is a readable, descriptive picture of or story about a person, program, organization, and so forth, making accessible to the reader all the information necessary to understand the case in all its uniqueness. The case story can be told chronologically or presented thematically (sometimes both), presented with any context necessary for understanding the case”. Patton [35] (p. 450) adds that “in many studies, the analyst will work directly and selectively from raw data to write the final case study”. As such, in constructing the case studies, the primary purpose of the analysis was not to identify themes or patterns in the data, but to provide a full account of the developments and the context of each case. In addition, a key part of the case study construction was factchecking the interview data (particularly references to smart mobility developments) through local authorities’ records, local media sources and academic literature.

Finally, in the discussion provided in Section 5, the three case studies were re-coded thematically, broadly using the approach proposed by Braun and Clarke [36]. The coding was conducted manually, and the resulting themes are reflected in the subsections of Section 5 and are discussed alongside the existing literature.

Table 1 summarises the key characteristics of the case studies.

Table 1. Case study characteristics.

	Seattle	Greater Manchester	Stockholm
City Characteristics			
Population	737,015 (2020) [37]	2,867,800 (2021) [38]	978,770 (2021) [39]
Governance structure	Mayor/ Council (city level) and county council	Combined Authority (regional level) and 10 local councils	Mayor/Council (city level) and regional council
Transport authority	SDOT/KCM	TfGM, local councils	City of Stockholm, Regional Public Transport Authority
Public transport modes	Light rail, commuter rail, monorail, bus, streetcar, ferries	Tram, bus, commuter rail	Metro, tram, bus, commuter rail, ferries
Available smart mobility services	Carshare, e-scooter share, bikeshare, TNCs	Bikeshare, rideshare, carshare, e-scooter share, MaaS and AV trials	Carshare, rideshare, e-scooter share, MaaS and AV trials

Table 1. Cont.

	Seattle	Greater Manchester	Stockholm
Data collected			
Number of interviews	6	6	10
Organisations represented	SDOT, KC, KCM, City of Seattle, transport consultant	TfGM, smart mobility operator, research organization	City of Stockholm, Stockholm Region, KOMET, Drive Sweden, transport consultants, Stockholm Parkering

4. Results

This section summarises the key interview findings for the three case studies, focusing on the development of services in each city, their impacts, and on how participants saw the role of public authorities in steering smart mobility.

4.1. Seattle

Through a combination of the city's own openness and the providers' attraction to its demographics and business environment, Seattle has traditionally been an early adopter of smart mobility, with the first carsharing services in the city dating to the early 2000s. Seattle's institutions at the local (City of Seattle and the Seattle Department of Transportation) and regional level (King County and King County Metro) have extensive powers and autonomy, which have allowed them to introduce new, targeted policies and rules for smart mobility services. The Seattle Department of Transportation (SDOT) is regulating through permit systems providers offering carsharing, bikesharing and e-scooter sharing services. SDOT have also set out their strategic position towards smart mobility services in their New Mobility Playbook, which was published in 2017 and signalled that the city was open to new services but expected them to comply with local rules. The City of Seattle and King County (KC), who have historically shared the responsibility for licensing taxis, are also licensing several TNCs operating in the area, which has involved lengthy legal challenges around drivers' rights and maintaining powers at the local level. In addition, at the time of the interviews, King County Metro (KCM), the regional public transport authority, had completed several small-scale, targeted pilots that complemented the local public transport network.

The participants in Seattle provided a critical assessment of the impacts of smart mobility services, explaining that their benefits are yet to materialise and highlighting some negative impacts. The interviews showed a broad ideological alignment among participants that the state is responsible for steering smart mobility services. The Seattle case study provides an insightful assessment of the benefits and challenges of two methods of steering services: permit schemes and full procurement. The former is flexible and involves no cost for the local authority, but it only controls limited operational aspects of services and effectively offers no levers that the local authority can use to align providers with local objectives or to prevent them from leaving the city. Conversely, procuring smart mobility services allows the local authorities to closely manage services and monitor their impacts, but can be very challenging to negotiate with providers and requires financial investment by the authorities. In addition, the participants in Seattle showed a nuanced understanding of the smart mobility market dynamics and explained the role of venture capital investment in shaping services. The interviews provide a clear insight into the practices and priorities of different smart mobility providers, and highlight the conflicts between the often volatile smart mobility market that chases fast profits, and the provision of mobility as a public service.

4.2. Greater Manchester

Greater Manchester's experience with smart mobility involves a combination of small-scale trials focusing on MaaS applications, and interacting with provider-led carsharing, bikesharing, and ridesharing services. Given the limited scale of smart mobility applications, discussions with the participants from Greater Manchester focused more on their aspirations for smart mobility, rather than the lessons learned from their experience. At the time of the interviews, TfGM were in the process of articulating their smart mobility vision for a funding application to the Department for Transport (DfT), which proposed integrating smart mobility services with the local transport network in order to fill gaps in local transport provision under a MaaS ecosystem. However, this application was unsuccessful, and, at the time of writing, it appeared that the majority of its proposals would not be taken forward without this funding. This is a sign of Greater Manchester's efforts to shape smart mobility being bound by their limited regulatory and financial autonomy, as transport governance in the United Kingdom is heavily centralised. Indeed, the DfT have developed a national strategic position towards smart mobility services, and are expected to make regulatory changes that will also apply to Greater Manchester. Nevertheless, in the recent years, more powers have been devolved to the Greater Manchester Combined Authority (GMCA). The flagship change for transport is GMCA's 2021 decision to bring the deregulated bus market under local control, a major shift in local transport powers, which the participants argued would also influence their future position on smart mobility.

Most participants in Greater Manchester demonstrated a strong faith in the ability of smart mobility services, particularly MaaS, to transform the way people travel, arguing that it has the potential to provide on-demand, tailored mobility and that, as long as people are provided with all the information, they will make the "right" travel decision. This is perhaps surprising as the interviews happened at a time when the collaborative working relationship with bus operators was deemed by many to have failed, and while the city was reflecting on the withdrawal of the Mobike dockless bikeshare pilot after only 15 months of operation in 2018. In discussing the future of smart mobility in Greater Manchester, the participants expressed diverging views on how the state should deal with services. Some of the participants argued that smart mobility should be steered through regulation so that services help meet specific local needs. However, others argued that regulation would impede innovation and discourage investment in the region. The participants considered that a collaborative approach is mutually beneficial for smart mobility providers and local authorities, and can help change people's travel behaviour.

4.3. Stockholm

Stockholm's experience with smart mobility services involves several small-scale trials focusing on MaaS, shared electric vehicles and mobility hubs, and interacting with provider-led ridesharing, carsharing, and e-scooter sharing services. In addition, the provision of smart mobility services is integrated in mainstream policy as an alternative to providing parking spaces in new housing developments in the City of Stockholm. Stockholm Region have also run their own smart mobility pilots, which were focused on MaaS applications. At the national level, the strategic innovation programme Drive Sweden and the parliament-appointed committee KOMET were both exploring how smart mobility services can be supported through trials and changes in legislation, demonstrating little doubt that smart mobility services will also be aligned with local objectives. Interventions in Stockholm were fragmented across different organisations, which partly reflects the organisations' different remits, but was also reported to be indicative of long-standing siloes in Swedish governance.

The participants in Stockholm advocated a hands-off approach to managing smart mobility services, stressed that innovation should not be suppressed, and argued that it is not the local authorities' role to tell people what to do, but rather to give them sustainable transport options to choose from. In particular, Stockholm Region's pilots and policy positions show that they are willing to allow smart mobility providers an active role in

shaping the future of transport in Stockholm, albeit they forecast that the local public transport network will remain the key mobility provider in Stockholm. This market-oriented approach reflects a wider shift towards neoliberal policies across Sweden [15]. The participants also linked the openness to new services to maintaining Sweden's reputation as a country leading on innovation. Similarly to Greater Manchester, the narrative about the future benefits of smart mobility was often contradicted by the challenges experienced by the participants involved in implementing trials in the present. For example, the City of Stockholm and the national government have faced challenges with e-scooters and ridesharing, respectively, and have introduced rules and regulation that address the issues caused by the services, while facilitating their continued operation. Finally, the participants in Stockholm discussed the role of smart mobility in relation to the private car and stressed that the commercial viability of services depends on the introduction of policies restricting car ownership and use. Nevertheless, despite their astute observations on service profitability, participants in Stockholm showed a limited understanding of the global smart mobility market dynamics.

5. Discussion

This section discusses the themes that emerged from the interviews and is informed by the literature included in Section 2. The discussion is split in two parts. The first part (Section 5.1) focuses on what shapes smart mobility governance. This analysis draws from theories of governance and adopts an open understanding of governance as a complex process of interaction between government and non-government actors [40], which is shaped by the policies, forms of organisation and politics in each location [41]. Governance is also understood as a process that evolves over time and reflects the sociopolitical and economic developments in each context [42]. Furthermore, the discussion takes into consideration the literature on urban and regional governance and the theories on multi-level governance to analyse the interaction between global, national, regional and local actors [43]. Therefore, the analysis aims to capture the variety and contingency of smart mobility governance in the three cities, while also paying attention to issues of power, resources and legitimacy [44]. The analysis is more granular compared to the existing literature, which either provides a general discussion of the governance of smart mobility or examines individual types of services and issues.

The second part of the discussion (Section 5.2) uses the literature on accountability from Section 2.2 as a departure point to examine how accountability regimes can be shaped for smart mobility services to contribute to sustainable transport objectives and particularly to help address the climate emergency. The six-question framework developed by Mashaw [29] is used to structure the analysis of current and future accountability regimes for smart mobility, and provide an open and nuanced discussion of the governance and accountability challenges that emerge in different contexts. This analysis goes beyond the existing smart mobility literature that considers accountability by largely focusing on the regulation of services to manage their externalities.

5.1. What Shapes Smart Mobility Governance?

5.1.1. Context Matters

Overall, the three case studies show that the way smart mobility services develop in a city is affected by the pre-existing institutional context and powers, and the local policy traditions. The legislative and financial autonomy of cities plays an important role in how smart mobility services can be governed. The institutional and policy contexts shape the available avenues of introduction for smart mobility services in each city, and define the space within which services can be steered. The comparative analysis of the three case studies strongly reflects the research carried out by Hodson et al. [45] (p. 1), who stress the importance of local context and argue that "urban transitions are not about technological or social innovation per se, but about how multiple innovations are experimented with, combined and reconfigured in existing urban contexts and how such processes are

governed.” In addition, smart mobility is often shaped concurrently and in a fragmented way by multiple actors across different levels of government, creating policy alignment challenges as there is frequently not a settled view of what smart mobility is and what it should achieve. The three case studies also show that smart mobility governance can be highly political, reflecting pre-existing policy traditions of each place. There is also a strong link between smart mobility policies and the ideological positions regarding the role of the state and the role of innovation, which may vary between government levels.

Furthermore, smart mobility services are shaped by providers’ corporate decisions and strategies. The case studies showed that often, once operators have launched in a city, they can take tactical action to increase their leverage and shape local decisions. For example, in Seattle, TNCs used the local base of drivers and customers that they developed while the local authorities were preparing TNC-specific rules, to lobby for these rules to be reversed or amended in their favour. Further proving the influence of market forces, the case studies provide an insight into the decisions providers make to attract venture capital investment. For example, the shift from shared bikes to e-scooters, as well as ‘rogue’ launches which demonstrate that cities cannot stop a service, were both actions attributed to providers’ willingness to make bold moves to meet the investors’ preferences. Consequently, decisions about where to launch a service may be completely unrelated to their potential transport impacts in a city. For example, Browne [46] (no page) reports that European e-scooter companies outperformed their American counterparts in 2020’s funding rounds, as “[i]ndustry executives and investors say Europe is a better fit for such vehicles than the U.S.”. However, research on the impacts of e-scooters across multiple cities consistently shows that e-scooters have a much higher potential to replace car trips in North America than in Europe, where they overwhelmingly replace walking, cycling and travelling by public transport (see for example [47]). In addition, many participants argued that services often operate at a loss, and the case studies show that providers are willing to make swift changes in their operations once they decide to focus on profit-making. While it is expected that smart mobility providers are guided by their commercial interests, these can leave cities at the mercy of decisions based on global capital flows, rendering irrelevant any efforts to steer services or capture their benefits locally.

5.1.2. Approaches to Steering

The local context and providers’ corporate strategies delimit the space within which local authorities make their decisions on how to respond to smart mobility, before smart mobility services are even introduced in a city. Authorities then act in different ways, which can be grouped under the conceptual categories of not steering, enabling policy, and proactive policy. This categorisation draws on work by Wallsten et al. [15], who show that these categories often overlap in the same location.

Firstly, the case studies demonstrate that cities often cannot steer smart mobility services. The lack of appropriate provisions in regulation or the lack of powers at the local level are the main reasons behind the inability of cities to act, which often becomes evident when providers launch their services without consultation with the local authorities. However, cities also choose to not steer smart mobility services. As explained, the cities’ approach towards smart mobility reflects their pre-existing political landscape and governance traditions. There is a clear link between the participants’ arguments about whether smart mobility services should be steered and their ideological views on the role of the state. The arguments for a hands-off approach align with neoliberal narratives on the role of the state, where the market can be self-regulated through competition, the state should only intervene in the case of market failures, and citizens shape the market through their choices. This approach was particularly prevalent in Stockholm, demonstrated by the complete lack of engagement between the City Council and the dockless bikeshare provider EU-Bike that operated across the city, and their initial wait-and-see approach to e-scooter regulation, even when multiple providers had put thousands of e-scooters in central Stockholm. However, considering that market failures in transport provision have

been long established, a hands-off approach can also be seen as a conscious decision to not require a more equitable provision of smart mobility services across different social groups and areas of the city.

The decision to not take any steering action is also closely linked to a view of innovation as an inevitability that cities cannot control. As such, regulation and steering, aside from hindrance, were also considered pointless by some participants, who argued that by the time governments introduced official regulations, a smart mobility service may have already been overtaken by the next market development. In addition, given that creating rules takes effort and money, and services are so disruptive, there is a risk that efforts to steer them will be a waste of valuable resources. In this narrative, it is not just the rapid pace of innovation that cities should yield to, but also the innovation itself. Calls for passive acceptance of new services involve an assumption that they are inherently good, both because they are presented as sustainable and efficient alternatives to private cars, and because they offer people the benefit of *more choice*.

Secondly, the case studies show that cities can take an enabling approach to smart mobility, which was most prevalent in Greater Manchester. This approach involves allowing services to be accommodated in existing regulatory environments, for example through signing a Memorandum of Understanding, making small changes in legislation, or even using their convening power to support providers, but without making any significant efforts to steer them. The rationale behind enabling services is closely aligned to that of not steering. The participants expressed their faith in the benefits of services and argued that cities should “collaborate rather than regulate” as the market is changing rapidly and there is still a lot to learn about smart mobility. Welcoming services in a city is also associated with attracting new investment and creating new jobs, thus contributing to the cities’ economic development ambitions.

Finally, the case studies show that cities can take a proactive approach to steering smart mobility, which was prevalent in Seattle. The arguments for state intervention lean towards welfarist principles, where the state shapes the available transport choices in a way that meets the objectives they have set. However, the case studies show that taking a proactive policy approach towards smart mobility services is not necessarily the same as steering, as policies themselves are often the product of compromise with providers and other government actors. In addition, policies and regulation are largely directed at operational elements of the services and at addressing their negative impacts, instead of genuinely steering the services towards addressing specific needs of the cities and producing positive outcomes. For example, SDOT’s permits system, which is an example of a proactive policy approach, set out fees and detailed rules for smart mobility providers, such as data sharing requirements and parking standards for micromobility services. However, as the participants from SDOT explained, SDOT made no financial commitment towards the services alongside the permits, which meant that they had no leverage if providers wanted to stop their operations. Furthermore, the participants admitted that local rules, however prescriptive, were unlikely to shape providers’ operating decisions, which are made based on their global performance. Therefore, local authorities are at best steering the products of the market, rather than the market itself.

The three case studies show that there is not one fixed position of the state on how to intervene in steering smart mobility providers. Even the more planned approaches are quite limited in scope and remain significantly exposed to much broader global corporate decisions. We turn now to what this means for the accountability regime around mobility services.

5.2. Creating Accountability Regimes for Smart Mobility

The three case studies offer little insight on how to capture the benefits of smart mobility services. This section discusses how accountability regimes can be shaped so that smart mobility contributes to the delivery of local sustainable transport objectives, through answering the six questions outlined in Section 2.2. Firstly, we discuss *to whom*

is accountability owed, and by whom is it owed. In all three cities, there was an expectation that providers' promises of car trip replacement and better first-last mile connections would materialise, regardless of the local urban form, transport infrastructure or modal split. Therefore, there is an implicit assumption that providers are accountable to cities for being a viable sustainable transport option. However, a hierarchical approach of public authorities as "the regulator" and smart mobility providers as "the regulated" may be very limiting in delivering collaboration. We argue that there is a need for new accountability arrangements based on partnerships, where providers and cities identify mutual benefits and develop two-sided reciprocal relationships. This proposal is also supported in the broader governance literature. Ndubisi et al. [48] explain that relationships around non-ownership services, such as shared mobility, carry uncertainties, power asymmetries and risks for both the providers and the users of the services, a complexity that cannot be managed solely through contractual relationships. The authors propose that, beyond the contractual framework, there is a need for trust and commitment from both sides to invest in and maintain a good relationship. Drawing from relational contract theory and reflecting key principles of network governance (see for example [49]), Ndubisi et al. [48] identify good communication and information sharing, good interpersonal relationships, and acknowledging mutual interests as key elements of a trusted and committed relationship.

As such, it is worth reflecting on the extent to which cities should reasonably expect to draw benefits from relationships to which they have little input. In the case of smart mobility, contracts include the rules and regulations that are meant to proactively shape and steer services, largely aiming to address the negative externalities caused by smart mobility operations. However, these externalities can also be mitigated by investing in services in a way that delivers mutual benefits for cities and providers. For example, cities can improve the integration of smart mobility services in the transport system through creating mobility hubs and infrastructure that can safely accommodate electric micromobility services such as e-scooters and e-bikes. Furthermore, cities can invest or partly invest in services themselves, where they can help meet specific needs in locations that are not commercially attractive, or to introduce incentives to ensure availability of the services and consistent quality. In addition, cities need to dedicate appropriate resources to stay attuned to market developments and commercial aspects of services to understand where, and if, services may fit in their local context. In other words, if cities see a role for smart mobility services in their transport systems, then they need to be open to the idea of providing subsidies, as already happens with other *forms of public transport*.

At the same time, cities need more nuanced tools to build partnerships with providers. Barriers posed by local administrative processes, including the inflexible methods of procuring services, were mentioned multiple times during the interviews and are also discussed in Wallsten et al. [15]. However, smart mobility services should not be seen as a faster way to introduce a service by avoiding official—and democratic—processes of procurement and consultation. Instead, local authorities need to amend their own rules to build in nuance and speed that allow them to work more flexibly with smart mobility providers.

Nevertheless, it remains important to remember the bottom line: cities are accountable to their citizens. This means that while partnerships, trust and commitment are important, they can only be pursued with the smart mobility providers who are willing to consider joining cities in delivering benefits to all their citizens. This research shows that, at least for now, this is not often the case. Smart mobility services are usually not introduced through democratic processes and consensus and, especially when they are unregulated, there are few provisions in place to ensure they are equitable. The public are perceived as customers of the services whose will is demonstrated only through their purchasing power. This leaves citizens who do not use, or indeed oppose the services, having to deal with them as a fait accompli. Crucially, there is a danger that the services themselves are designed to appeal to a narrow part of the population who are young, well-educated, already highly mobile, and wealthy [26]. Indeed, there is evidence that services appeal mainly to such groups, offering

them more mobility opportunities, rather than increasing accessibility for who have limited options (see for example [50]). Therefore, it is the responsibility of local authorities to ensure that services are accessed equitably and embedded in participatory decision-making processes, and, consequently, that discussions with citizens reach a broad audience and focus on long-term outcomes rather than short-term outputs of smart mobility services. Overall, it is not just providers that are accountable to cities, but accountability regimes for smart mobility overlap with the cities' accountability to their citizens for delivering equitable and sustainable transport solutions.

Next, we examine *what is accountability owed for, what is the process and how is it created, and what are the standards that need to be met*. Smart mobility is not a "cutting the Gordian knot" type of solution to bypass transport problems rather than work through them. In fact, this research does not find that smart mobility is yet seen by cities as providing the drastic sustainable transport shift promised by providers. The impacts of smart mobility services in the three cities examined are rather unspectacular, unclear, or even negative, and the pace of their adoption seems more like a quiet, undirected transformation than a revolution. However, the interviews demonstrated a strong, and sometimes unshakeable, faith in innovation and an acceptance that there is a need to continuously innovate to meet people's evolving demands from mobility. The continued support of smart mobility, despite the lack of substantial benefits, is considered a case of technological optimism that masks the need for systemic change in the transport system. To ensure that smart mobility services do contribute to sustainable transport objectives, it is proposed that cities need to govern smart mobility *with intent*. This means that services need to be deployed or permitted with clear objectives and an understanding of their anticipated impacts. This is not to say that cities should set strictly defined targets even for services that they are not familiar with, but rather that they should deploy smart mobility with a prior, mode agnostic idea of what success looks like.

Governing with intent involves specifying what purpose smart mobility services are meant to serve and the scale and pace of change they are meant to deliver. Cities need to deploy place-based and problem-led solutions, and not one-size-fits-all solution-led services. Cities have different "starting points" in their transitions, different capacities to act, different demographic, socio-economic, political and cultural contexts, different transport systems and infrastructure and therefore different needs in their route to sustainability [7]. Indeed, the participants in this research could easily articulate the local challenges that they were looking to address, both in the local transport system itself and in how it is governed. Matching local needs to the right types of smart mobility services can be achieved through clear leadership from local, regional and national authorities.

To ensure that smart mobility services help address local issues and deliver public value, it is also necessary to monitor and measure their impacts. As Marsden [51] explains, monitoring and measuring the impacts of services requires a degree of realism and proportionality about what can be considered a direct impact of smart mobility. Monitoring frameworks should be carefully considered to include indicators that reflect local needs and priorities and assess the impact of smart mobility services on users and the wider transport system. The assessment of impacts should consider what benefits smart mobility users *and non-users*, as well as, in the context of partnerships discussed earlier, whether services are commercially viable to deliver public value and whether they need to be regulated differently or supported by a subsidy.

Finally, we ask *what happens if the accountability standards are not met*. Once cities have developed clear accountability arrangements for smart mobility, they should be able to see whether services fit the local needs before they are introduced, or, while they are in operation, if they continue to delivery public benefit. If this is not the case, cities should ask themselves whether the public resources that go into dealing with a particular service are better spent elsewhere. While the interviews showed that ensuring accountability and defining what is the benefit of a service are complex processes, they also demonstrated the cities' hesitancy to say no to a service, regardless of its impact. This research argues that

in creating accountability arrangements that help shape smart mobility, cities should also create processes that allow them to question and reject the services that do not meet the local accountability standards. Otherwise, smart mobility can become more of a distraction than a disruption, taking up resources and space in the public discourse that are disproportionate to the benefits it delivers. Table 2 summarises the proposed accountability arrangements.

Table 2. Proposed accountability arrangements.

	Cities	Providers
Who is accountable and to whom is accountability owed?	Cities are accountable to citizens and providers are accountable to their stakeholders. Also, cities and providers have reciprocal relationships and are accountable to each other and jointly accountable to citizens.	
For what is accountability owed?	Providing sustainable mobility. Cities are accountable to providers for developing a context supportive for providers' operations (infrastructure, subsidies etc.) and providers are accountable to cities for contributing to the achievement of sustainable mobility objectives and following local regulation.	Providing good quality services. Providers are accountable to cities for contributing to the achievement of sustainable mobility objectives and following local regulation.
What is the accountability process?	Local democratic process. Partnership agreements and local smart mobility regulation.	Corporate processes. Corporate mobility regulation.
What are the standards to be met?	Democratic accountability standards. Shared and mutual objectives and standards that support local sustainable transport objectives, mitigate externalities, and ensure that providers' operations remain commercially viable.	Corporate targets. Corporate mobility regulation.
What happens if standards are not met?	Cities should be able to reject and ban services that do not meet local objectives.	

6. Conclusions: Smart Mobility in the System of Automobility

There is a need for rapid, systemic change in the transport sector driven by the pressing need for decarbonisation. Therefore, it would be a mistake to consider smart mobility in isolation from the wider system of automobility. While we argue for a cautious and deliberate adoption of smart mobility services, we also acknowledge that they are being scrutinised for aspects of their operations, including road safety, impacts on congestion, and creating street clutter, which for a long time have been broadly accepted as an inevitable element of automobility. Smart mobility services cannot achieve their full potential while the transport system remains dominated by the private car. The success of services is, among other factors, a function of reducing car ownership and dependence. Smart mobility currently serves only a small part of the travel market, and the long-term commercial viability of services can only be secured if they start replacing a large share of current car trips. At the same time, it is perhaps naïve to assume that a non-systemic solution such as smart mobility, which effectively entails providing additional mobility options using new business models and internet-enabled platforms, can topple automobility. Smart mobility services are not leading the transition to sustainable transport. However, if governed with intent, they can be valuable tools for transport authorities in their efforts to achieve the rapid and radical changes needed as part of a just transition to a decarbonised, post-car transport system.

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