Interpretative flexibility and conflicts in the emergence of Mobility as a Service : Finnish public sector actor perspectives

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Interpretative flexibility and conflicts in the emergence of Mobility as a Service: Finnish public sector actor perspectives

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A B S T R A C T

Mobility-as-a-service (MaaS) is still largely under development, with high uncertainties of its societal implications. This development is happening across sectoral, multi-layered, and multi-actor networks. Previous case studies on understanding networked governance of MaaS inform us that there is a range of challenges in the current institutional arrangements, lack of shared MaaS vision, divergent interests, and even conflicts over roles and responsibilities. These case studies have used analytical frameworks based on socio-technical transitions theory, complemented with theories from institutional and business studies. This study focuses on Finland, aiming to provide additional insights about perspectives of non-commercial actors. In particular, we provide a more sophisticated understanding of underlying reasons for conflict and lack of cooperation concerning an understanding of MaaS, its implications, and associated governance actions. The applied analytical framework is building upon concepts from the philosophy and sociology of emerging technology, as well as the contemporary political theory of Chantal Mouffe. Interview findings from seventeen non-commercial organisations have been classified into five categories, namely definitions, operational and business aspects, user perspectives, systemic effects, and governance. Discussion of these interview findings focuses on the interpretative flexibility of MaaS and governance processes in the context of inherent conflict in the value-laden mobility domain. The paper concludes with outlining directions for further synthesis in developing analytical frameworks for studies of governance and responsible innovation in the domain of emerging mobility technologies.

1. Introduction

There are large uncertainties in the emerging development trajectory of mobility-as-a-service (MaaS) and associated societal implications, as both technology itself and its social embedding are still malleable (Jittrapirom et al., 2017; Pangbourne et al., 2020; Arias-Molinares & García-Palomares, 2020). As previous research informs us, innovation processes around MaaS are essentially cross-sectoral, multi-layered, and multi-actor (Arias-Molinares & García-Palomares, 2020; Mukhtar-Landgren & Smith, 2019; Sochor et al., 2015). Decision-making in these innovation processes is challenging as none of the current institutions has a full understanding or control of neither technological development nor associated consequences. As actors outside of the commercial sector, such as public transport agencies, have traditionally played a central role in the provision of transport services (Hansson, 2011), these actors are also important for shaping the development trajectory of MaaS (Pangbourne et al., 2020; Smith et al., 2019;

Kostiainen & Tuominen, 2019; Li, 2019; Fenton et al., 2020; Polydoropoulou et al., 2018). Here, a central role in deciding about governance actions is assigned with the mutual co-creation of perceived potentials and challenges from MaaS that these non-commercial actors might have (Hirschhorn et al., 2019; Jittrapirom et al., 2018). As such, these perceptions consequently influence the varying level and role of public sector involvement (Smith et al., 2018). Case studies on networked governance of MaaS so far inform us that there is a range of challenges in the current institutional arrangements, lack of shared MaaS vision, divergent interests, and even conflicts over roles and responsibilities (Sochor et al., 2015; Kostiainen & Tuominen, 2019; Meurs et al., 2020; Karlsson et al., 2020). As one prime example of the challenges often highlighted in the previous literature is a fear from the public sector, such as public transport authorities. The fear is related to losing an influential position as a service provider, related to the potential shift away from public transport usage and all the associated adverse consequences for society (Kamargianni & Matyas, 2017; Smith

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et al., 2019, 2020; Jittrapirom et al., 2018).

In the policy studies around MaaS, Finland has been an often-focused case so far, as one of the places from where the idea originates, and where concrete actions for developing MaaS across multi-actor networks have been taken. For example, besides supporting funding from the Finnish Funding Agency for Technology and Innovation (Karlsson et al., 2020), following the approach of 'governing by enabling' (Audouin & Finger, 2019) and deregulation (Smith et al., 2018), the Finnish government has introduced new legislation specifically directed at MaaS (HE 157/2018). New legislation removed the quota for taxi-like services, as well as placed a requirement for opening data (e.g., routes, timetables) and application programming interfaces (APIs) upon transport service providers. MaaS emergence has been accompanied by a range of other transport regime changes in Finland, such as public transport network and policy changes (Weckström & Mladenović, 2020; Weckström et al., 2019) and urban demand responsive transport pilots (Haglund et al., 2019).

Previous studies about MaaS development in Finland have used mostly actor interviews, gathering opinions from different stakeholders. Those studies have shown divergence in perspectives among different stakeholders. For some stakeholders, there has been collaboration and trust (Smith et al., 2018), including claims of the alignment of vision on the political, public, and service level (Karlsson et al., 2020). These claims have been backed up by indicating strong governmental-level support (Smith et al., 2018; Surakka et al., 2018). However, there have also been many claims about not fluent cooperation between public and private sector stakeholders (Surakka et al., 2018). One such example was a supposed slow opening of APIs by the Helsinki Region Transport (HSL), with reasons such as concern about losing a direct link to customers, and time coordination with HSL's smartphone app (Audouin & Finger, 2018). Further analysis pointed out that lack of cooperation might be due to a lack of clear roles and responsibilities for different parties in the Finnish public sector (Mukhtar-Landgren & Smith, 2019; Surakka et al., 2018). These studies are highlighting further the suspicion and fear in the public sector of being dominated and losing control over the MaaS development trajectory (Karlsson et al., 2020). However, none of the previous studies has succeeded in providing in-depth explanations for stakeholder conflict and adequately accounted for this conflict in developing pragmatic governance implications.

This research aims to provide additional insights on the perspectives of non-commercial actors about underlying reasons for conflict and lack of cooperation in relation to the understanding of MaaS, its implications, and associated governance actions. Although this case study builds upon previous studies focused on Finland, in comparison, we focus on a wider range of stakeholders from the non-commercial sector, guided by two questions. The first research question is what kind of further differentiation of attitudes and objectives can be found across actors from different governance levels. The second research question is what factors provide further understanding for the lack of consensus around MaaS and its turbulent innovation dynamics. Our analytical framework also advances the state-of-the-art theory of emerging mobility technologies by building upon concepts from philosophy and sociology of technology, as well as the contemporary political theory of Chantal Mouffe. The following section elaborates the proposed analytical framework and associated interview methodology. Section three summarizes findings from twenty interviews of Finnish non-commercial actors. Finally, the last section provides a concluding discussion of findings, with implications for further governance actions and research.

2. Methodology

2.1. Analytical framework

For the development of our analytical framework, we recognize that recent special issues (Liimatainen & Mladenović, 2018; Hensher &

Mulley, 2020) and books (Amaral et al., 2019; Hensher et al., 2020) about MaaS largely use frameworks drawing from the multi-level perspective on socio-technical transitions theory, complemented with multi-level networked governance, institutional, collaborative innovations, diffusion of innovations, and business model theory (Fenton et al., 2020; Meurs et al., 2020; Karlsson et al., 2020; Audouin & Finger, 2018; Pangbourne et al., 2018; Smith & Hensher, 2020; Sarasini & Linder, 2018; Sharmeen et al., 2020; Docherty, 2020). In contrast to these developments, we need an expanded analytical framework to help with a) deepening interpretations of MaaS as an emerging technology, and b) understanding how to approach MaaS governance in the context of conflict. In line with previous research, rather than solely focusing on the structure of institutional arrangements, this analytical framework is developed as a means of interpreting the wider socio-cultural context of a Nordic democracy in which institutions of transport governance are embedded, but also to provide understanding on the relational arguments and deeper meanings of networked actors (Pangbourne et al., 2020; Marsden & Reardon, 2017; Erikson, 2015; Beers et al., 2019; Mattioli et al., 2020). Recognizing that state-of-the-art of multi-level perspective (Geels, 2020) already relies on a synthesis between the social construction of technology, evolutionary economics, and neo-institutional theory, we aim to contribute further to the sophisticated understanding of technological emergence processes and accommodating for conflict in governance theory.

The first premise for developing this analytical framework is that technology is not only technical but is irreducibly a social phenomenon, and is not limited solely to devices or artefacts, but also includes processes, services, and operating/business models. From this perspective, technology is not only instrumental, but is always value-laden, shaped by both dynamic and path-dependent interactions with human values and norms (Coeckelbergh, 2017; Verbeek, 2011; Winner, 2004; Mladenović et al., 2019; Mladenovic et al., 2016). As a particular form, emerging technology (ET) is still open to further reshaping, with associated uncertainties, thus presenting us with the Collindridge dilemma (Collingridge, 1980). Under such a dilemma situation, on the one hand, we are unable to estimate the changes from ET until it is fully formed and embedded in society, while on the other hand, changing a technological development trajectory is very difficult once the technology is fully formed. Moreover, ET is co-constructed through ideological visions and rhetoric, simultaneously framing the societal challenge and technological solution, with an intention to persuade as well as align the activities of different actors and, crucially, attract funding and publicity (Jasanoff, 2016). Thus, ET has multistability (Ihde, 1990) and interpretative flexibility (Pinch & Bijker, 1984), where technology working is the result and not the cause of it becoming a successful artefact, and where the success or reduction of the flexibility of interpretation is assessed through the lens of particular and usually limited social groups, even if the use is intended for a wider society. Similarly, the concept of 'rhetorical flexibility' has been used before in understanding the emergence of automobility in the US (Norton, 2011).

The second premise for developing this analytical framework is that governance dilemmas cannot be reduced to mere technical questions, but always involve making difficult value choices under various subjective constraints. These choices are always constrained due to the fundamental property of societal pluralism, including diverse social relations, in modern democracies. Here, in order to reflect on the governance of technology in the Nordic democracy context, we rely on Mouffe's distinction between the 'political' and 'politics', in the context of her agonistic idea of democracy (Mouffe, 2000, 2013). For Mouffe, the political is an undeniable dimension of antagonism in modern pluralistic societies. On the other side, politics is a set of practices, discourses, and institutions for governing human co-existence in these conditions that always have a potential conflict emerging. Mouffe and many other authors writing about the post-political condition consider that an agonistic democracy involves legitimate adversaries co-creating decisions, while not having agreeable views, but still having

unquestionable rights to present and defend those views. Thus, governance is in a sense a paradoxical activity, where the governance system must be able to handle tensions and generate decisions that are only partly consensual. At the same time, the governance system needs to acknowledge that some differences might remain unresolved – perhaps indefinitely. Similarly, such a contestation-oriented view of democratisation has provided lessons for cases of both governing non-transport innovation (Valkenburg, 2020) as well as for transport planning itself (Legacy, 2016).

2.2. Interview collection and analysis process

We have selected a semi-structured expert interview as an exploratory method, as the objective was not to test a hypothesis but to provide a deeper description of the case at hand (Roulston, 2014). Expert interviews focused on actors from different layers of the Finnish public sector (i.e., national, regional, city), as well as advocate organizations. Judgement sampling, supplemented with snowball sampling, was used for expanding the sample. The sample size was considered sufficient when no new interview material or suggested key interviewees were available. After this saturation point, the total interview sample included 20 experts from 17 organizations. In comparison to previous interview studies in Finland, this study has the largest number of interviewees from organizations in the non-commercial sector, and is larger than in some benchmark studies (Gössling et al., 2016; Paulsson et al., 2017). Following the above analytical framework presented in section 2.1, the semi-structured interview protocol was developed. Interviewees have been asked to provide their definition of MaaS, reflect on the potential impacts for various societal aspects, as well as current and future roles of different organizations within the MaaS domain, with a particular emphasis on the public sector. In addition to influencing the interview protocol, the analytical framework was used for developing a coding scheme in ATLAS.ti, involving primary and secondary coders (Roulston, 2014). First, individual statements were identified and coded by the primary coder. Second, similar statements were grouped by looking for related characteristics, aiming to establish patterns. Codes were reconsidered in several iterations, until both the primary and secondary coder agreed on the coding scheme. The outcome was 64 codes, categorized under five different themes: 1) MaaS definitions, 2) operational and business aspects, 3) user perspectives, 4) systemic effects, and 5) governance. These five different themes are thus used as subheadings in the following section 3, in order to structure findings.

3. Results

3.1. MaaS definitions

The first set of interview findings relates to various aspects brought up while attempting to define MaaS. The most popular answer was the same used by many researchers where MaaS is defined as a single interface or a comprehensive platform. Respondents who considered MaaS to be a comprehensive platform, described it as one interface for all passenger information, having the capability to combine multimodal services into a single journey, and enabling payment for all those different services. Such an understanding was supported by claims of reducing the need to be aware or find all available travel modes. However, there were also many variations in the details of defining MaaS, including highlighting comprehensiveness, user-centricity, servitization, the role of public transport, bundling in packages, shared resources, and even aspects beyond mobility. Thus, in contrast to the concept of a comprehensive platform, many respondents highlighted only certain aspects when defining MaaS.

One of the contrasting definitions given was that MaaS is any mobility-focused smartphone application, exemplified by a statement from one respondent as: "all the apps which include mobility are MaaS", (Finnish Public Transport Association). Thus, any application providing

mobility services was considered to be MaaS, including e.g., Uber. On the other end of the spectrum of definitions, the broadest conceptualization was that MaaS is something beyond mobility. In particular, this was explained to mean any other services that could be bought along with mobility services, such as concert tickets. One respondent described it as follows: "looking forward when this is looked from the bigger picture that mobility services are only a small portion that you get when for example paying in the restaurant", (Traficom - Finnish Transport and Communications Agency). Besides, several respondents claimed that the customer is and should be in the centre of MaaS, offering her to purchase services needed without the need to pay for anything extra. Another key concept was servitization, where all mobility implemented as service is MaaS. Thus, public transport is MaaS, as "in a way we have been doing MaaS for years in public transport" (City of Tampere). Other responses included mentions of service packages in the form of monthly subscriptions defined by different user needs, as well as the need to implement MaaS with shared resources, along with the idea of sharing economy.

3.2. Business model and operations development

The respondents identified several operational and business aspects for MaaS development and implementation in practice. Overall, a well-functioning business model was a major point of challenge for many interviewees, as it does not exist yet. As one alternative for identifying a viable business model, several respondents identified piloting and experimentation. Nonetheless, respondents highlighted a fundamental challenge of different expectations from public and private sector actors, as the public sector is budget/cost-saving focused while the private sector is profit-focused. Amidst this, if one accounts for users expecting to lower their costs, the question of MaaS profitability arises. For example, one interviewee stated: "customers think that their mobility expenses should decrease, how to do business with that?" (City of Lahti). At the core of business model comments were also questions about revenue share and commissions, as highlighted by one interviewee: "no commissions for MaaS providers, it is their job to figure out how to make a business out of it." (City of Tampere). Moreover, public sector respondents did not see a viable situation where MaaS operators just resell their public transport tickets. However, respondents from cities stated that they could reconsider their position if MaaS operators can prove a significant enough increase in service levels and decreases in the car use. For many, public transport was considered the crucial part of MaaS in multimodal integration, and some respondents stated that MaaS is no threat to public transport. However, this not a united opinion, as there are parties that suspect MaaS could shift customers from public transport to other services.

A significant amount of disagreements was observed also concerning the question of where exactly is MaaS suitable for implementation. For some, MaaS was seen as a solution for low travel demand areas, where it is difficult to have fixed public transport service. For example, an interviewee from one of the largest Finnish cities claimed that there is no need for MaaS in city centres where people can easily walk or use public transport. Moreover, it was mentioned that MaaS data can be used for improving route planning and optimization in low-demand areas, as well as for combining statutory transport services (e.g., for children, elderly) with paying customers. On the contrary, respondents from small and mid-size cities were sure that MaaS is more suitable for large cities, where user volume is high enough for shared services, while there is also a variety of services for multimodal combinations. Thus, respondents from smaller cities were worried about the lack of a business model for areas with a scattered population, stated as "there are not many areas in Finland where market-based service could succeed without the public support" (Regional Centre for Economic Development, Transport and the Environment - Lapland). Interviewees highlighted that even if regulatory reform has pushed for market-based services, they have not seen evidence of private sector interest to operate in low-demand conditions.

As an example of this concern about attracting mobility services, one respondent stated: "there are no mobility services in here but is this the chicken-egg situation?" (City of Tampere). Some respondents stated that there could be subsidies for the private services in low-density areas and that small start-ups might need public sector support in marketing, due to lacking resources.

In addition to questions of spatial density, respondents from the national level also contrasted the temporal problem of peak and off-peak operation. Thus, similar to a low-density niche, MaaS was seen as filling in the niche in off-peak times. Ultimately, the hope was that this would result in savings for the public sector, as "the city could only focus on the trunk lines and no longer on the low inhabitant areas in the era of MaaS" (Ministry of Transport and Communications). Interviewees linked these challenges to innovation in the public sector's procurement processes, which could be an option for developing new services, but is also constrained by the need for neutrality in these processes. As an example, a respondent from the national level noted that "local authorities could think would it be possible to organize public transport in a different way" (Ministry of Transport and Communications). Moreover, some respondents highlighted that MaaS cannot solve the problem of lacking capacity during peak hours and overcapacity in off-peak hours, as a society still functions around work during office hours. One solution was hoped to be vehicle automation, which could eventually address these challenges in rural areas.

Besides these service aspects, respondents raised concern about several technical challenges in MaaS practice, especially related to opening access to APIs. As new regulation required the opening of APIs, there has been frustration on both the public and private sector sides. The public sector has considers that it has been difficult to open APIs, as the schedule was too strict, while technological know-how and resources are limited. Even if HSL API was only open for single tickets before, nowadays it is also open for seasonal tickets. Still, the public sector respondents considered open data to be an important principle. However, it was highlighted that in practice this should mean two-way data sharing, as the public sector should have access to the data from MaaS operators.

3.3. Understanding users and service design

Despite the uncertain business model, one of the frequent common threads across respondents was that MaaS should be designed in order to truly meet people's needs, and to put the user at the centre of transport service provision, with all the associated benefits. The core of the user perspective was the "need to change people's attitudes towards private cars and to be more positive to mobility services" (City of Mikkeli). This attitudinal change away from car dependency is recognized to be slow and difficult, consequently being a central challenge for MaaS development. Several respondents mentioned that easiness and effortlessness are important aspects, especially when compared to using a personal car, as "people will not change their attitudes in things that make their life harder" (City of Vantaa). There were several additional aspects described as part of this general idea of user-centricity in service design. In general, it was noted that public transport does not always provide the desired service for everyone in every situation, such as transporting children to hobbies or buying groceries. In addition, car ownership is associated with an investment trap into a purchased commodity, which does not encourage the user to use other travel modes. Furthermore, the user often does not fully understand the total costs and efforts involved with car ownership, including such aspects as maintenance and inspections.

Contrary to car ownership, MaaS is supposed to provide a similar level of door-to-door service. Moreover, MaaS should provide flexibility, so that "customers can use money only for those services they actually need, and funds are not tied to private cars" (City of Lahti). Thus, the price was considered as a good mechanism for encouraging sustainable behaviour. The concept of no ownership was associated further with

multimodal, first/last mile, and on-demand services that do not depend on fixed timetables and can be purchased when needed. MaaS is therefore perceived as a potential avenue to provide alternatives in regions where passenger car use was previously the only option. Here, the increased diversity for individual choice was considered as a positive thing for a mobility behaviour change. Another core aspect of attitudinal change is the accessibility of information about routing and ticketing, as it was believed that "we have places that have public transport, but people just don't know how to use it or where to find information" (Regional Centre for Economic Development, Transport and the Environment - Lapland). Some interviewees mentioned that such information could also include customized needs, such as safe routes for children. However, respondents recognized the challenge with travel experience, which is dependent on the journey, thus making it hard for MaaS operator to control the level of service and manage customer expectations. Finally, one interesting speculation was that more personalized services could also increase users' willingness to share personal data.

3.4. Systemic MaaS effects

All the respondents indicated large uncertainty about potential effects from MaaS development and implementation, as exemplified by one statement: "for now, we don't have proof of any kind of impacts" (Ministry of Transport and Communications). A frequent positive assumption was that transport system efficiency will increase. For example, it was mentioned that MaaS would enable the replacement of empty buses with on-demand micro-transit vehicles. Moreover, most of the speculations and concerns revolved around the amount of travel and the distribution of total modal share, as assumed adequate proxies for assessing sustainability effects. Regarding daily travel distances, there were contradictory opinions. Some respondents were stating that they "don't believe MaaS will affect the travel amount" (City of Tampere), as there is an expectation of increased transport system efficiency. On the contrary, other interviewees recognized that there is a risk that daily travel distances might increase, which might result in adverse effects for energy consumption and environmental emissions.

Regarding mode split, the uncertainty of effects was identified in relation to all the transport modes. The largest hope was that MaaS would reduce the percentage of car use, by freeing people from car dependency, as "it is not a victory for car use" (City of Helsinki). However, this decrease in the car use was also seen to depend on the location, as in many places there might not be other options for travel. Moreover, some respondents believe that cars will remain an important part of life in people's lives in the future. In fact, some respondents feared that MaaS could also increase car use, for example through car sharing, if prices are low and usage is made easy. Similarly, some respondents commented that if taxi services are designed as part of a monthly package, their usage might also increase to the disadvantage of public transport. For example, one respondent highlighted: "I am sceptical of combining taxi services with monthly tickets to public transport, we shouldn't increase the use of cars" (Regional Centre for Economic Development, Transport and the Environment - Lapland). On the contrary, interviewees believe that MaaS can bring more users to public transport, especially in urban areas, because "the saturation point for public transport is close, we need new ways to get people from cars to public transport" (City of Espoo). These positive effects for public transport were expected to be achieved if MaaS is designed with complementary first-mile/last-mile services, and if it expands the public transport ticket sales channels. Moreover, as public transport is not profitable in many places around Finland, ridesharing services were seen as a viable alternative for an inefficient system. In the context of public transport branding and associated marketing resources, a question was raised: "eventually will public transport authorities sell their services only to MaaS-operators or will public transport agencies sell directly still to the customer with their own brand?" (City of Lahti).

Regarding the modal share of walking and cycling, there were also contradictory opinions. As an example of positive expectations, one respondent from the national level claimed that: "there are results that MaaS has a lot of potential to increase the share of sustainable modes" (Traficom - Finnish Transport and Communications Agency). Similar to this respondent who believed that walking and cycling will increase due to the use of shared resources, others also expressed beliefs that walking and cycling will increase due to public transport use increase. Contrastingly, other respondents pointed out that easily accessible vehicle-based and last-mile services might decrease walking, and have consequent adverse effects on health. Moreover, additional uncertainties were expressed about overall car-based congestion levels rising in Finland, and the consequent effects on various environmental pollutants, such as noise and particulate matter. As for land use effects, respondents recognized that there has been little discussion on how MaaS might affect it. Nonetheless, hopes were expressed that "MaaS makes mobility smarter so that the city space can be used otherwise" (City of Lahti). As it was highlighted that cities have inherently limited space, which is something that MaaS itself cannot solve, comments were made about uncertain reduction or relocation of parking supply.

Despite the above-mentioned difficulties with the business model, the respondents expect some positive economic effects from MaaS. Even though the implementation of MaaS was seen as challenging, MaaS is believed to be able to generate business opportunities and expand the local industry. Furthermore, it was stated that the car industry influences the outflow of capital from Finland, such as in the form of manufacturing, fuel, and spare parts. In contrast, MaaS could influence monetary flow from/to Finland, which is expected to have positive effects on the national economy. For example, one respondent pointed out that "servitization can bring some of the millions we use on private cars to Finland" (City of Espoo). Finally, improving transport connections was also seen as a way to improve local competitiveness, and help smaller cities attract new tax-paying residents.

3.5. Governance

The last theme identified comments about recent regulation, and roles and responsibilities in relation to cooperation across different actors. In general, even if many respondents have underlined the critical importance of public–private cooperation, especially if public transport is to be the foundation for MaaS, several non-cooperation challenges and conflicts were identified. First, Finnish re-regulation has been praised internationally as a good example, which is something that was agreed with by the respondents from the national level. However, besides central government officials, no respondents had positive acknowledgement, with strong critique specifically from cities and interest groups. The central point of criticism was that regulation had not accounted for challenges in the daily implementation related to transport services. Therefore, the law was considered unrealistic, as the government level actors were not seen to know enough about the actual everyday transport system planning and operation. In particular, the criticism around implementation related also to the lack of transparency, as the opinion of parties executing the law were not taken into account, highlighted as "it feels like decisions have been done behind closed doors" (Association of Finnish Local and Regional Authorities). Furthermore, the law was criticized for apparent uniformity, while cities in Finland differ substantially. In relation, respondents highlighted that the market-based approach was pushed onto low-density regions that might not have viable markets. Moreover, there are clear administrational challenges, such as the fact that municipalities are not allowed to organize public transport outside their region. This hinders service coordination, and also requires additional workload if MaaS operators would need to make individual contracts with separate municipalities. Thus, interviewees highlighted that instead of enabling as intended, regulation was not the best starting point for cooperation, as it was one of the main causes of conflicts.

Elaborating on challenges in cooperation, several aspects have been pointed out related to the fear of losing power and adverse effects, different definitions of MaaS, and contradictory expectations from different actors. The fear of losing power was associated with the expectation that if the transport system is not controlled by the public sector it will not be designed to answer societal goals anymore, especially through promoting public transport. Such differences in expectations between actors are highlighted with the quote that "public sector needs to take care of societal goals and private only of their own economic goals" (Association of Finnish Local and Regional Authorities). On the contrary, a respondent from the national level highlighted that "public and private are allowed to have their own interests but everyone should have the same shared objectives" (Traficom - Finnish Transport and Communications Agency). In addition to cross-actor differences, expectations for the speed of development have also differed from reality. The comments were that the development in practice has been rather slow and not focused on the actual implementation, with some interviewees highlighting that effort was mostly rhetorical. As an example of expectations in development dynamics, one respondent stated, "it will probably take years for an actual MaaS service to come" (City of Tampere). An additional challenge that has been highlighted was the existence of current siloes and travel mode-specific thinking, as "different transport modes are considered separately" (Regional Centre for Economic Development, Transport and the Environment - Uusimaa). Many respondents highlighted that both public and private sectors need to find a way to cooperate, and that dialogue and information sharing are important in a fast-moving field.

Overall, some respondents believed that the public sector monitoring and policies will continue to have a role as "bad effects will happen if there is no possibility to regulate the attractiveness of the non-desired services" (City of Helsinki). However, opinions about roles and responsibilities, as well as focusing on what to monitor, highlighted uncertainty and lack of consensus throughout these aspects. As roles and responsibilities were not clear, there were several expressions of a need for a wider and larger discussion about them. In contrast, some respondents considered that roles should form organically, as discussion just generates juxtaposition. Moreover, a respondent representing cities stated that as there are so few services yet that it is hard to define any roles. The overall challenge in national governance was recognized as "difficult, since situation changes so quickly" (Traficom - Finnish Transport and Communications Agency). Inconsistencies about roles appeared even between respondents on the national level themselves. One respondent from a governmental organization stated that they have had a clear vision on the roles, but it seems the vision has not been so clear on the city level. Similarly, a message from the national level was that "the publicly owned MaaS model is not something we are doing" (Ministry of Transport and Communications). Another respondent from the same group stated that the purpose of the law has not been to tell exactly what different parties should do in implementation, but rather to enable.

Elaborating further self-perceptions about roles, the governmental organizations saw that their role is to legislate and make sure there are no legislature-based obstacles that would prevent MaaS, and to make sure the law is abided. Moreover, interviewees from the governmental organizations also saw their role to maintain dialogue with different parties through different networks and forums. Regional-level organizations (excluding HSL) did not explicitly see a role for themselves as they are not planning the whole transport system, but just supplementing the areas where there is no service. Respondents from cities stated that the city's role is to be an enabler by creating attractive public transport and "to make integrable APIs and give space for private operators" (City of Lahti). Moreover, cities want to be innovation platforms and help MaaS operators to operate. Some cities specifically underlined that they will never be MaaS operators that it is the job for a private sector, as it would be too rigid if the public sector would be a MaaS operator. It was stated that city-level public organizations are local, and

therefore unable to build regional MaaS service. In addition, one city specified that public transport is a tool to guide urban development and that should stay in public hands. For themselves, the advocate groups saw the role of an observer and supervising municipalities' interests. In contrast, respondents from advocate groups thought that cities should have a stronger role, as they could even function as MaaS operators, or that they should be able to choose if they want a market-based model or something else. Furthermore, advocate organization interviewees saw that as infrastructure investors, cities should have means to influence marketing, selling, and development. Some respondents were clear that the role of the private sector was to generate market-based services to supplement public transport. Private companies were hoped to be braver, innovative, and patient, which is required since markets are not established quickly, and the transition process involves taking risks and tackling problems.

4. Discussion and conclusion

4.1. Interpretative flexibility of MaaS as an emerging technology

The interview findings show a range of factors over which there is a higher or lower degree of consensus in understanding across different actors. The summary of the above results is presented in Table 1, where each column corresponds to a coding category and the subsection in the section 3. In a Weberian sense, the classification in this table should not be interpreted as rigid categories, but as further unpacking of details of the Finnish case, relative to the gaps in the previous literature. Thus, the table should be interpreted together with the findings presented in corresponding subsections of the section 3. Overall, one can see that as we move from left to right columns of Table 1, the number of points with a lower consensus increases. In addition, even when we speak about MaaS definition, the results showed that the Finnish non-commercial sector actors lack a commonly shared understanding, in line with the concept of interpretative flexibility of ET. Even if there are some similarities in understanding, this is mostly surface-level agreement, while there is a disagreement about the in-depth meaning of MaaS across different actors.

These conflicting perspectives have not been only limited to what MaaS is or could be, but also how to implement it and what are its

potential impacts. The existing lack of services, implementation of a market-based model in a low-density country, and lack of technical knowledge, in addition to the economic aspects, are some of the causes for uncertainties. Moreover, even if there was some similarity in emphasizing the need for user-centricity in service design, the conception of the user was narrow, focusing on rational choice with objectively evaluating costs/benefits with more information, thus missing important aspects of habits and norms underpinning modern car dependency. Similar to the previous emphasis on the potential misunderstanding of the relationship between commercial and sustainability considerations related to smart mobility development (Lyons, 2018), interviews identified opposing expectations from the public and private sectors. In addition, these expectations have been higher compared to the slow development and lack of action in reality, which further created friction between the different stakeholders. In contrast, a legislative change that was intended to enable cooperative development has actually pushed actors at the subnational level into conflict. This conflict has especially revolved around a working business model.

Despite the wish for actors to "speak the same language on MaaS" expressed in the recent review (Arias-Molinares & García-Palomares, 2020), the reality of MaaS development trajectory at this stage is that there is no socially accepted definition available in Finland. Thus, MaaS is still in the phase of interpretive flexibility, with ambiguity due to different conceptualizations from different actors, and with its societal value not being demonstrated or agreed upon. As there are multiple groups with multiple meanings assigned to MaaS, with multistability of perception and interpretation, we have to recognize the important influence of wishes, fears, and values in the competition between narratives and contested meanings. Thus, given the interpretative flexibility, it is clear that MaaS development is not solely technical, but unavoidably a socio-political process, with all associated procedural complexities and power re-distributions. Conclusively, we must accept that as MaaS is still emerging, that variations in MaaS definitions and associated actions will continue to be inevitable – at least for some years.

4.2. Lessons for governing transport system and innovation processes

Accepting the interpretation that there will not be an agreement around MaaS for a while, the central question for transport governance

Table 1
Summary for key high and low consensus points in five analysis dimensions.

	MaaS definitions	Business model and operations	User requirements	Systemic effects	Governance
Higher consensus	• single interface for information and payment • digitally based • multimodal integration	• need for business model formulation • need for experimentation • unclear cost/profit expectations • public transport as the backbone • difficulties with opening of APIs	• user needs at the centre • difficulties in changing attitudes towards private cars • commodity of private car • use cases of public transport • service level control	• transport system efficiency increase • economic/business effects • municipal competitiveness	• public–private cooperation • challenges in implementing new legislation
Lower consensus	• platform vs. application • pricing and bundling schemes • servitization domain boundary	• revenue sharing • customer base • demand areas • demand periods • combining services • sales channels • data use • data sharing • vehicle automation	• scope of user requirements • mechanisms of behavioural change • pricing effects • available information • on-demand service • first/last-mile services • privacy norms	• daily travel distances • congestion levels • shift away from car use • shared modes split • active modes split • energy consumption • environmental emissions • health implications • land use • service branding	• legislation process transparency • market differentiation • administrational responsibilities for organizing services • procurement and contracting procedures • subsidies for private services • organizational support in marketing • development speed • policy silos • information dissemination • monitoring mechanisms • role and power re-distribution • governance process rationale

of emerging mobility technologies (Pangbourne et al., 2020; Docherty et al., 2018; Moscholidou & Pangbourne, 2019; Cohen, 2018) becomes even more important – how do we govern to achieve public value, efficiency, and equity? This question is especially important if we are to develop institutions of transport governance if we consider the context of Nordic democracy, while they are also relevant for the EU context. The first part of the answer lies in ensuring the involvement of public sector actors from different governance levels in the MaaS development processes themselves, as previously suggested (Smith & Theseira, 2020; Lucken et al., 2019; Arias-Molinares & García-Palomares, 2020; Pangbourne, 2020). Such involvement would be especially relevant for the Nordic governance context that is usually considered to have a higher public–private collaboration level than most of the other contexts. However, there are additional details to be taken into account in ensuring the involvement of the public sector. As ecosystem formation will continue to lack clear consensus on roles in strong and loose social networks engaged in co-constructing understanding, vision, and evaluating MaaS performance, involvement of the public sector is especially important. This involvement of public sector actors will have to happen on all governance levels as they have inherently different objectives, while regulations are layered and packaged between local, national, and international levels. As this regulatory ambivalence cannot be resolved overnight, inter- and intra-organizational learning processes will continue to face challenges in structures and patterns of interaction among actors. Such actor-level challenges, already observed in spatial planning processes (Eräranta & Mladenović, 2020) and emerging in often-unanticipated ways, will go hand in hand with a continuous redistribution of roles, responsibilities, and power. Moreover, decisions about concrete MaaS development actions will continue to happen in the hybrid institutional networks with distributed (ir)responsibility and ever-changing dynamics of decision-making. What is important in this state of distributed (ir)responsibility for MaaS development trajectory is that the public sector does not allow further propagation of the institutional void. Basing governance in the Nordic context just on a *laissez-faire* approach might limit or further blur individual and institutional accountability, as well as propagate further the undesired path-dependencies of the currently unsustainable transport system. On the contrary, we do not advocate either for a complete top-down state-control approach to governance. Instead, we advocate for a third way, beyond a red-herring fallacy of irreconcilable state vs. market dichotomy – with this third way being referred to as 'activist laissez-faire' (Colander & Kupers, 2014).

The second part of the governance answer lies in actively embracing the inherent conflict in the value-laden mobility domain, which is a part of modern pluricultural society, having a wide range of judgements in the desirable forms of everyday life. Even if the Finnish society is more uniform than other Nordic states, it is increasingly being diversified and will continue so in the foreseeable future. Thus, this value-laden view of mobility paves the way for a culture of technological innovation that is more tolerant of inherent conflicts between different systems of meaning. Similarly, we must ask ourselves – does a multitude of MaaS definitions actually harm the conversation if this multitude is expected to last for a while, with defining MaaS being a process and not a stable state? As already recognized by Collingridge, governance of technological innovation is fundamentally about 'muddling through' in the context of incumbent powers and vested interests. Drawing further from Mouffe, we can conclude that disagreements are not only legitimate in a modern democracy, but might also be necessary, as opposed to too much emphasis on early consensus and aversion towards confrontation. Instead of ending up with apathy and disaffection, embracing inherent conflicts does not mean getting rid of mutual respect between different stakeholders. In fact, if actors openly acknowledge the limits of achieving consensus, they might be able to present passionately their views without being considered as an adversary. Such process of "conflictual consensus" also recognizes Collindridge's double-bind dilemma, where technology assessment cannot be objective and

comprehensive before we have to make decisions. In the Finnish context, the national governance level should also openly recognize its responsibility for actively nurturing dedicated forums of friction in the innovation processes. Such dedicated national-level forums are essential for having challenging discussions over difficult questions of sustainability, as opposed to simply worrying about hurt feelings of individual actors or an apparent temporary slowing down of innovation processes.

The third part of the governance answer relates to the wider reflectivity about innovation processes and institutional transition, where there is a need to avoid depoliticized decisions and exclusion of the wider public in the agonistic debate. At the centre of responsible MaaS innovation debate lies a question of which groups are allowed to influence the process of emergence, besides the current constellation of stakeholders. For a flourishing innovation ecosystem, citizens need to be established as powerful participants in the envisioning and evaluation activities, alongside networks of actors from different societal sectors. Potential re-politicization of MaaS development, going hand-in-hand with enabling wider societal learning, requires that debate moves away from narrowly defined expert circles, thus avoiding the potential problem of building path dependence based on limited knowledge. Such a perspective on citizens as active participants in shaping the future, and not just passive consumers, is an important feature of the wider socio-cultural context of a Nordic democracy. In particular, further development of innovation indicators and public access to those would help in avoiding "gold plating" certain technological alternatives through financial subsidies or taxation allowances. Having in mind a potential degradation of trust in the public sector, and following the principles of Nordic democracy, transparency of decision processes will have to remain a central ingredient for not pushing aside controversies. This transparency and open participation in decision processes can also rely on developing open-source standards on the functional requirements for MaaS operation. Moreover, such innovation processes cannot have a dominant focus on technical development and anticipated positive effects, while avoiding questions of wider (re)distribution of consequences or solidifying existing societal inequalities. Simultaneously, there is an urgent need to develop experimentation processes used for different stages and by different responsible actors, while reformulating procedures for openly collaborative technological development. More useful frameworks for enabling the practice of critical citizen engagement and agonistic deliberation will be an essential component of such development (Frenken & Pelzer, 2020; Mladenović, 2019). Finally, having in mind the irreducible uncertainty and complexity of MaaS, we have to recognize that we are offered an historical opportunity to envision new pathways for alternative mobility futures based on systemic and speculative thinking (Sustar et al., 2020). Such envisioning needs to happen in even more responsible innovation processes, as opposed to further cannibalization and enclosure of the mobility commons.

4.3. Future research directions

This case study has aimed to use an enriched conceptualization of emerging technology and governance together with more empirical work on non-commercial actor perspectives about MaaS. However, we have to recognize that transport research lacks both similar empirical studies, and lacks operationalized conceptual frameworks from philosophy and sociology of technology. In contrast, other interdisciplinary fields have recognized for decades now that language and discourses by different actors shape the possibilities of technological development. In fact, discourse is not a world unto itself, but is a part of institutions of civil society, and exercising power (Latour, 1993). Further interview studies around MaaS should aim for recognizing such rhetorical functions in the governance of emerging mobility technologies (Pangbourne et al., 2020; Mladenović et al., 2020). These interview studies could be complemented with document analysis as well. Here, concepts from the sociology of technology, such as socio-technical imaginaries, can be rather useful for interpreting localized governance cultures and

decisions about sustainability transitions (Jasanoff & Kim, 2015; Bergman et al., 2017; Rosenbloom et al., 2016; Pesch, 2015; Ingeborgrud, 2020). Also, conceptual frameworks for qualitative analysis should connect more closely to the domain of responsible innovation and ethics of emerging technologies (Brey, 2016; Brey & Hansson, 2017). Having in mind further bridge-building, transport studies scholars are strongly encouraged to continue establishing links with the fields of socio-technical transitions studies (Kivimaa et al., 2021) and political economy (Mattioli et al., 2020). Besides the limits of the current case study, the perspective of multi-actor governance would also require future interviews with stakeholders from the private sector, as well as relating meanings documented from citizens. Possibly, these explorations could combine with the iterative design of the business model, as well as broader exploratory scenario studies (Mladenović & Stead, 2021). Besides interview studies, MaaS rhetoric analysis could benefit from larger document analysis, especially a longitudinal one and focused on marketing materials, in addition to openly available policy documents. Finally, a word of sincere collegial warning is in order. As academic writing has an active framing function in the emergence of socio-technological pathways, transport studies scholars are strongly encouraged not to fall into a pitfall of irrational exuberance with MaaS. As previously observed in other domains of emerging (mobility) technologies, this exuberance can rely on unreflective optimism and even dangerous technological determinisms (Mladenović et al., 2020). Consequently, just as we advocate for forward-looking responsibility in technological development for other stakeholders, transport studies academia needs to nurture a constructively critical stance towards MaaS and other numerous emerging (urban) mobility technologies.

CRediT authorship contribution statement

Miloš N. Mladenović: Conceptualization, Methodology, Validation, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Noora Haavisto:** Methodology, Investigation, Data curation, Project administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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