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Perceived action spaces for public actors in the development of Mobility as a Service

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Abstract

The public sector is showing increased interest in Mobility as a Service (MaaS), as its introduction and market penetration is proposed to potentially disrupt the personal transport system. However, involved public actors are approaching MaaS very differently. This paper applies a neo-institutional perspective to study the activities of public actors in the ongoing development of MaaS in Finland and Sweden. To this end, it maps what policy instruments public actors are applying to govern the processes and discusses how this might relate to their perceived action spaces and roles. The contribution to the MaaS literature is twofold. Firstly, the analysis shows that public actors are applying a wide range of both hard and soft policy instruments in order to govern the development of MaaS. Secondly, a comparison across Finland and Sweden suggests that the perceived action spaces and the roles taken by public actors on regional and local levels are influenced by the activities of public actors on state-level. The paper concludes that public actors and policy instruments should not be studied in isolation. Rather, perceived action spaces and roles need to be analyzed in a multi-level setting, where processes of enabling and promoting can vary between societal levels, and where the roles of the public sector are negotiated not only between public and private actors, but also between different public actors.

Keywords: Mobility as a Service, MaaS, Policy instruments, Public role, Perceived action space

1 Introduction

The notion of Mobility as a Service (MaaS) has in recent years risen to fame among transportation scholars and practitioners. Several reports argue that the penetration of MaaS might completely change both how we travel and how personal transportation is organized (e.g. [1, 2]). MaaS advocates envisage a trillion-dollar industry in 2030 [3], and argue that it holds potential to streamline public spending on transportation services while also contributing to social goals such as reducing congestion and cutting carbon dioxide emissions (e.g. [4, 5]). As a consequence, both public and private actors are currently studying the development of MaaS and considering their potential roles in it.

MaaS was originally loosely described as a ‘mobility distribution model in which a customer’s major transportation needs are met over one interface and are offered by a service provider’ ([6], p.3). A more specific and commonly

accepted definition is yet to emerge. Nevertheless, scholars have identified key characteristics of MaaS, such as demand orientation, personalization and customization [7]. In this paper, MaaS is understood as a service, which both integrates a range of public and private mobility services and provides one-stop access through a common interface [8]. MaaS is thus an example of an intrinsically collaborative venture that requires the pooling of resources from both public and private actors.

The overall objective of this paper is to analyze the roles and perceived action spaces of the public sector in the development of MaaS, using two exploratory case studies from the Nordic context: Finland and Sweden. The point of departure is that the public sector can both stimulate and inhibit the development of MaaS, entailing that these processes can take on different forms, ranging from active promotion to more intangible processes of enabling and facilitation. To this end, the paper maps which policy instruments the involved public actors have applied in their attempts to govern the development processes, and discusses how these policy instruments relate to the roles and perceived action spaces of public actors. The purpose

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is not to compare the developments in Finland and Sweden, but rather to use findings from the cases in order to create a more holistic understanding of the public role in the development and diffusion of MaaS. Two research questions structure the analysis:

- Which policy instruments do public actors in Finland and Sweden utilize in order to govern the development of MaaS?
- Based on public actors' choices of policy instruments, which roles and perceived action spaces in relation to the development of MaaS can be identified?

The paper is structured the following way; we outline a theoretical framework by first specifying our neo-institutional point of departure, and thereafter describing our conceptualization of perceived action spaces, roles and policy instruments in more detail. We continue by explaining our research approach with regards to institutional setting as well as methods and material. In the results section that follows, we detail what policy instruments the public actors have applied, and lastly, we relate these findings to roles and perceived action spaces of public actors in the development of MaaS.

2 Theoretical framework

The analysis departs from a neo-institutional analytical framework developed for the analysis of institutional enablers and barriers for MaaS-related developments: Institutional Frameworks for Integrated Mobility Services (IRIMS) ([8, 9]). Institutions are here defined in terms of “a relatively stable collection of rules and practices, embedded in structures of resources that make action possible” ([10]: 39), including both the more formal aspect of institutions, i.e. the position of actors with a capacity to establish and determine rules, and informal institutions including the norms and values that permeate society [8, 11]. For March and Olsen, the emphasis of the informal aspects also includes an understanding of “organizational arrangements that link roles/identities, accounts of situations, resources and prescriptive rules and practices” ([12]: 691).

In terms of institutional capacities, the policy instruments applied and utilized by public actors are placed center stage. It is well established that governing through rules and regulations has increasingly been complemented with multilevel interactive forms of governance within the transport sector [13]. A recent significant change in this space is the increasing incidence of collaborations in both transport policy initiation and implementation, caused by a number of institutional changes, e.g. deregulation, differentiation (in ownership and operational responsibility) and privatization [14, 15]. This is not to say that the role of the state has diminished, but rather that forms of government is shifting as formal rules and regulations co-exist with other forms of

governing and coordination. At the same time, these processes open up to new forms of power-relations between actors and stakeholders. Collaboration can thus be understood as both a broader institutional feature within the transport area, and an intrinsic characteristic in relation to MaaS [8]. Consequently, the two cases analyzed in this paper are situated in the interaction between processes of governance and government, where new forms of collaborative governance and partnerships have not replaced formal hierarchies – but co-exist side by side with formal governing capacities. The literature on governance generally emphasizes the complexity that comes with interactions between different public and private actors in (sometimes temporary) networks (cf. [16]). Even though there previously has been a tendency to view public actors as merely one of many stakeholders, current governance literature is emphasizing the particular role that public actors have in these processes [17–19].

In accordance with the neo-institutional framework the roles of public actors are intertwined with their perceived action spaces. Beyond the formal (actual) action space, the perceived action space is affected by how organizations and actors understand and perceive a given situation. Perceptions that may influence this include factors such as “knowledge of available actions and alternatives” ([20]: 39), but also different conceptualizations of what lies in the role of being a public actor, including the promotion of certain public values [18]. In this paper, perceived action space is operationalized through three ideal roles that public actors can take on in these processes, as outlined next.

2.1 On the roles of public sector actors

Previous studies have noted that MaaS requires new types of operational functions (e.g. [21–23]). These functions include both ‘MaaS Integrators’ that integrate the transport providers’ offerings technically and/or businesswise; and ‘MaaS Operators’, which bundle MaaS offerings and constitute the interfaces toward end-users of MaaS [24]. This paper considers both strategic and operative activities of public actors. Accordingly, it takes a broader approach to understanding how the public sector can participate in urban experimentations, such as the development of MaaS.

Besides the conceptualization of roles inherent in neo-institutional theory, the role-concept is currently discussed within sustainability transition studies [25], including debates on the roles of public actors in sustainability and experimental governance (e.g. [18, 26, 27], a,b). These roles can be analyzed both on the level of the individual, including emerging new roles for civil servants [28], acting in the capacity of networkers, facilitators [29, 30] or ‘green inside activists’ [31], but the role concept can also pertain to public organizations at large [26, 32], as done in this paper.

In the analysis of roles, we applied a theoretical framework developed for the analysis of the roles of public actors in local innovation processes [18]. In particular, this paper focuses on governance activities, i.e. how the public sector can use different policy instruments to facilitate and manage collaborative experimentation. The utilized framework identifies three ideal roles situated in the governance and government-nexus: Promoter, Enabler and Partner [18]. Public actors act in a Promoter role when they make active efforts to stimulate processes of innovation. This role is often associated with more traditional forms of government, and the policy instruments that these entail, including regulations and legislation. In the context of governance and collaboration, the literature on meta-governance (or the governance of governance) has emphasized how public actors take on an Enabler role rather than acting in the capacity of 'doers' (cf. [33]). This is described both in the more prescriptive governance research, where the advantage of governing through overarching frames rather than details is often emphasized (cf. [34]), and in empirical research where processes of meta-governance are seen as to include "governing mechanisms [that do] not rest solely on the authority and sanctions of government" ([35]: 360 cf. [18]: 992). Public governance can in this regard be described in terms of 'opening up' for other actors' action spaces in terms of e.g. service delivery ([18]: 993; [36, 37]). Similar changes have also been recognized in transportation system research. For instance, the role of public authorities has been described to be "gradually shifting from controlling and operating key activities towards becoming an enabler for market-based services" ([38]: 46). Another important push-factor for utilizing collaboration, from the perspective of the public sector, is the ambition to 'de-silo' administrative organizations [39] in order to achieve a more seamless policy delivery [40]. This leads us to the third role, where a public actor acts as only one of several actors in network or public-private governance, or in the capacity of a Partner. Here the emphasis is not on meta-governance as much as network governance, a process which can be described as a bottom-up process of interdependent and self-organizing exchanges of resources, with an autonomy from the state ([18, 34]: 993). The Partner role thus indicates a position where the public sector participates on more or less equal terms with other actors. In reality, these three ideal types of roles for public actors overlap and can only be separated in a theoretical sense. It is also important to keep in mind that roles can vary not only across public sector actors but also within organizations and over time.

2.2 On policy instruments

The three ideal roles are in practice formed and developed through the choice and organization of policy instruments. In an institutional analysis, policy instruments are

traditionally seen as specific methods or tools applied to address public problems. As such they have been divided in a 'tool kit' consisting of a number of both so called hard instruments such as regulations and economic/fiscal means, and soft instruments such as e.g. organization/reorganization and information-based actions. Policies generally consist of a combination of different instruments, and over time these might change, be replaced, or remain as different layers [13]. The division between hard and soft instruments is fluid, and these tools might well co-exist. For instance, collaborations can be utilized both as a soft instrument through the arranging of 'meet-ups', or a hard instrument through contract-based partnerships with private providers of services. This fluidity is a central argument in the criticism of the 'tool-kit' metaphor, which also emphasizes the impossibility of separating instruments from the context in which they have been chosen and developed [41]. Instead, the processual and social context of policy instrumentations is highlighted, where instruments are both bearers of values and interpretations of the problem to be solved or handled. As such, the policy instruments also tell us something about roles and the perceived action spaces of the actors at hand.

Returning to the roles of public actors, we thus argue that choices of policy instruments for governing a specific innovation trajectory are related to what roles the public actors envisage and undertake in relation to innovation in general. For instance, pro-active use of hard policy instruments suggests a Promoter role, softer tools aimed at by 'opening up' a solutions space for the private sector indicates an Enabler role, and a strong focus on collaborative and informal policy instruments indicates a Partner role.

3 Research approach

3.1 Institutional setting

The reported research is situated in Finland and Sweden. From a public transport point of view, the two neighboring countries are quite similar. In terms of infrastructure, both countries have extensive networks of paved public roads, including highways and main roads, wide covering railway systems, and a few cities with metro and tram systems. In terms of services, well-developed public transport systems are open for the public in both countries, including unsubsidized long-distance trains and buses as well as subsidized regional and local trains, buses, metros, trams and on-demand services. Still, private cars are used for the majority of personal transport-related trips in both Finland and Sweden [42]. To address this issue, both countries are looking to improve the performance and alignment of personal transport service, including public transport. Accordingly, the public sectors in both Finland and Sweden have shown increasing interest in MaaS during recent years. This interest has resulted in a lot of MaaS-related public

actions (for a comprehensive summary of MaaS developments in Finland and Sweden, see [43]).

In Finland, interest in MaaS largely stems from a nationwide and on-going quest to develop a more cost-efficient transport sector and to identify new growth industries linked to digitalization [43]. The idea of MaaS was first proposed by private entrepreneurs around 2011, but was quickly picked up by the Ministry of Transport and Communications (LVM) as the crown jewel of their envisaged reform of the transport sector (cf. [44]). Since, the developments of MaaS and a proposal for reforming the transport sector, including the 'Transport Code', have been coupled. In recent years, several MaaS-related pilots have been performed around Finland, the most reputable being the on-going demonstration of Whim in Helsinki – a service that offers monthly packages of PT, taxis and car rentals (whimapp.com). Moreover, the first phase of the Transport Code, a new national transport law, was enacted in July 2018, and the public transport authority in the Helsinki region (Helsingin seudun liikenne, HSL) has launched an open interface for real-time data and digital tickets in an attempt to facilitate MaaS developments.

In Sweden, the public sector's target of the MaaS development is more focused around the goal of increasing the market share of sustainable transport modes in general, and public transport in particular [43, 45]. The idea of creating customized multimodal monthly mobility packages was first generated in a project entitled 'Den flexibla trafikanten' (Swedish for 'the flexible traveler') and was later piloted in Gothenburg in a project called Go:Smart. The results of the pilot were in general deemed as promising in terms of user acceptance and impact on travel behaviors (e.g. [46]). Hence, a company was established to continue developing the concept. Moreover, the public transport authority in West Sweden (Västra Götalandsregionen, VGR) decided to perform a pre-study of their role if such a concept was introduced on permanent basis (mainly the role of their operational company, Västtrafik). Eventually, VGR decided to initiate a procurement process [47]. However, along the way the choice of process has been withdrawn multiple times. First, Västtrafik cancelled the procurement process to instead team up with other regional public transport authorities in Sweden in a joint effort of launching a national integration platform in 2018, and to establish Samtrafiken (a joint development company) in a position to become a national MaaS Integrator [48, 49]. However, due to financial reasons, this process was cancelled too. Since, both Västtrafik and a few other regional public transport authorities as well as a couple of other national authorities are trying to progress MaaS developments by financing, launching and supporting new and extended MaaS pilots.

3.2 Methods and material

The paper focuses on what types of policy instruments public actors have utilized to govern the development of MaaS in Finland and Sweden (RQ1), and on what the mixes of policy instruments can say about public actors' roles and perceptions of action spaces (RQ2). The analysis was performed in three steps. Firstly, the use of policy instruments was traced through a qualitative empirical analysis consisting of document studies, and transcriptions of semi-structured interviews with key MaaS stakeholders in Finland and Sweden. Secondly, the identified policy instruments were grouped in terms of formal/informal, and organized by using the four policy instrument categories: strategies/action plans, collaboration, financing and regulation (see Additional file 1). The definitions and interpretations of these categories are described in detail together with the empirical results in Section 4.1–4.4. As indicated in the theoretical section above, measures consist of a combination of different instruments which can be both hard and soft, thus motivating the need for more in-depth qualitative descriptions and analysis. Thirdly, the identified policy instruments were analyzed in relation to the three ideal roles: Promoter, Enabler and Partner. In this theoretical analysis, the policy instruments were seen as indicators of roles and perceived action spaces of public actors. Furthermore, the ideal roles are not exact replicas of reality, but rather a rendering of certain characteristics. As such, their purpose in the analysis was primarily to highlight empirical differences and similarities both between actors and over time, and to elevate the discussion by describing re-occurring patterns (cf. [18, 50]).

In the empirical analysis, we have chosen to focus on the actors that are involved in these processes of change. Thus, the choice of respondents is based on those actively involved in MaaS developments at the point of data collection (autumn 2016 - spring 2017). In practice, this entails an emphasis on regional actors in Sweden and local, regional and state actors in Finland. This choice does not reflect the transport competences attribution in the respective countries, but rather the scale on which these processes are being played out.

The document study comprised the official documents that public authorities have published in relation to MaaS, including information about regulations, programs, strategies and targeted funding calls. Accordingly, data was collected through a structured review of public actors' websites and databases, see Tables 1 and 2.

In the Finnish case, the website and databases of a number of state actors were reviewed: The Ministry of Transport and Communications (LVM); the Funding Agency for Innovation; the Transport Agency; the Transport Safety Agency; and Finpro, an organization that helps Finnish companies to go international and encourages foreign direct investment in Finland. On the regional and local level

Table 1 Documents and websites reviewed in the Finnish Case

Actor	Website	Documents
City of Helsinki	hel.fi	[51, 52]
Finpro	finpro.fi	[53]
Funding Agency for Innovation	tekes.fi	[54–56]
Helsinki Regional Transport Authority (HSL)	hsl.fi	[57, 58]
Ministry of Transport and Communications (LVM)	lvm.fi	[44, 59–63]
Transport Agency	liikennevirasto.fi	[64]
Transport Safety Agency	trafi.fi	[65, 66]

in Finland, the City of Helsinki and the Helsinki Regional Transport Authority (HSL) were studied.

In the Swedish case, the document analysis comprised websites and documents from similar actors on the state level: the Ministry of Enterprise and Innovation; the Transport Administration; the Innovation Agency; the Energy Agency; and Samtrafiken, a joint venture of public transport authorities and transport operators that aims to support coordination of public transport in Sweden. On the regional level in Sweden, the public transport authority for the county of West Sweden (VGR) and their operational company (Västtrafik) as well as the public transport authority for the county of Stockholm (SLL) were included, as these regions, to this day, arguably have been prominent in the development of MaaS in Sweden.

In addition to the document studies, verbatim transcriptions of 15 stakeholder interviews were analyzed qualitatively. The group of interviewees encompassed 17 representatives from key public actors in Finland and Sweden, chosen from the agencies described above (average interview time: 69 min). The nine interviewees from the Swedish case represented public actors at regional level, while five of the Finnish interviewees operated at a state-level, two at a regional level and one at a local level. The interviews took place between September 2016 and March 2017, i.e. prior to the launch of the Swedish mobility program in Sweden as well as the final vote on the implementation of the first phase of the transport code in Finland, see Section 4. A semi-structured interview guide

was utilized to monitor the interviews (see Additional file 2). The interview guide is based on the IRIMS framework [8], and thus follows the emphasis on formal and informal institutional dimensions mentioned in the theoretical section above. Therefore, the interview guide encompassed question regarding formal (e.g. what policies and laws do you think influence MaaS developments?) as well as informal institutions (e.g. what role should the public transport authorities have in a future MaaS ecosystem?)

4 Empirical analysis

The analysis of policy instruments is divided in four policy instruments that are frequently highlighted in the academic literature on public sector governing and governance (cf. [13]). These are governing through: strategies/action plans (4.1); collaboration (4.2); financing (4.3); and regulation (4.4). In the each of the four sections below, we first specify the criteria for selecting the different policy instruments, followed by an analysis of the empirical material.

4.1 Strategy management

Collaborative policy agendas cannot be imposed in a simple way, instead they need to be negotiated (cf. [40]). Therefore, arenas for negotiations are needed in processes of collaborative governance. One important arena for negotiations is the intra-organizational processes of policy coordination through the development of strategies, roadmaps or action plans. Here competencies within public organizations are

Table 2 Documents and websites reviewed in the Swedish Case

Actor	Website	Documents
Energy Agency	energimyndigheten.se	[67]
Innovation Agency	vinnova.se	[68]
Ministry of Enterprise and Innovation	regeringen.se	[69–71]
Region Västra Götaland (VGR)	vregion.se	[72–75]
Samtrafiken	samtrafiken.se	[48]
Stockholm County Council (SLL)	sll.se	[76]
Transport Administration	trafikverket.se	[77, 78]
Västtrafik	vasttrafik.se	[79–81]

brought together in order to delimit a shared understanding and develop more or less fixed frames and understandings within organizations. This can be understood as a way to 'de-silo' the internal structure of organizations in the light of new complex challenges and the challenges of increasingly fragmented urban governance [82]. In practice, this entails a development where strategy documents are becoming more central to public actors' governance approaches [83]. In terms of criteria for strategic management we thus, in the collaborative setting that characterizes MaaS, interpret these in a broad sense, including a range of strategies from broader processes of urban visionary planning related to continued survival, to more concrete methodologies for problem solving and the production of platforms for a shared understanding of the future (cf. [83]).

To date, a number of new arenas are being developed around MaaS, both on the global level, but also on a number of different national, regional and local levels. In Finland, some of the interviewees attributed a large share of their relative success of the development to the work of LVM. One of LVM's key contributions, according to the interviewees, has been to establish a 'national MaaS agenda' (cf. [43]), including formal strategies and agendas such as the Transport Revolution, the national intelligent transport system strategies and several documents related to the Transport Code, such as its three-phased roadmap. Inspired by the seemingly shared vision in Finland, an expert group working for the Ministry of Enterprise and Innovation in Sweden has recently developed a national roadmap for the development of MaaS in Sweden [71]. The roadmap coordinates other strategies, such as the Swedish Mobility Program [48] and the Transport Administration's action plan for intelligent transport system [77], in which MaaS is recognized as a prioritized area. Moreover, the national roadmap for MaaS was recently featured in the Transport Administration's proposed plan for the development of the transport system in Sweden [78].

Comparable policy instrument can be found at the level of regional public transport authorities, which in a similar way are attempting to establish their roles in the development of MaaS through the publication of strategies. SLL published a strategic direction including a roadmap in 2016 [76], in which they proclaimed that MaaS, if correctly designed, hold potential to contribute to their goals of increased public transport usage. Hence, they argued that it is essential to quickly take a position that both creates the conditions for the continued development of MaaS and contributes to the realization of their policy goals (ibid.). Moreover, both HSL and Västtrafik were working on strategies for MaaS at the point of the interviews.

In summary, public actors at national and regional levels have, so far, frequently utilized strategies and action plans to govern MaaS developments. These can be understood as processes of meta-governance, or attempts of public

actors to take charge of the development by its agenda setting privilege. Further, this indicates that they might be taking Promoter and/or Enabler roles.

4.2 Collaboration

Due to the nature of MaaS, collaboration is a vital policy instrument. Following Vangen et al. [37], collaborative governance is defined as a deliberate choice to govern by bringing organizations together to implement public policy. In this context, collaboration is not initiated in a spontaneous bottom-up way, but instead it is enacted top-down in order to attain certain goals. The key feature of collaborative governance as a policy instrument is organization. As a technique, it concerns the government design of collaboration, including the distribution of responsibilities, information channels and decision-making processes (cf. [37, 39]). In this regard, public actors can choose to approach and govern collaborations in different ways, with varying strength and involvement [18]. In the governance literature, this has sometimes been described as policy-making in the 'shadow of hierarchy', where meta-governors can regulate and even reduce the autonomy of various actors ([19]: 236). Accordingly, in terms of criteria selection, we understand the policy instrument collaboration as ranging from those processes that are governed through hard governing tools such as contracts, to through soft governing tools such as 'meet-ups' where different stakeholders are invited with the ambition to initiate processes through placing people 'in the same room'. As we will see, public actors in Finland and Sweden are at current applying a wide range of approaches in relation to collaborative governance of MaaS.

Lack of coordination and cooperation has been identified by stakeholders as potential barriers in the development of MaaS (e.g. [84]). In Finland, LVM has utilized a collaborative process for developing their MaaS agenda and for preparing the Transport Code. LVM has organized these processes through both formal and informal formats. For instance, they have engaged with other actors in the emerging MaaS ecosystem by participating in ITS Finland-led workshops (a non-profit association that aim to promote the development and deployment of intelligent transport system in Finland) and by establishing a 'new mobility' think tank. However, many interviewees also mentioned informal gatherings, such as personal meetings and after-work activities as important arenas for knowledge sharing. LVM has furthermore enabled international collaboration by co-founding a public-private partnership aimed at facilitating diffusion of MaaS services, called the MaaS Alliance (maas-alliance.eu).

In Sweden, public actors have tried to ignite collaboration through the use of policy instruments, ranging from hard tools such as procurement processes, to more informal softer policy instruments. The state level has,

to this day, not been as actively involved in the development of MaaS as the Finnish case. In its place, two public transport authorities (VGR/Västtrafik and SLL) have been aiming for a policy stand. Västtrafik initially chose a traditional and formal/regulative organization for collaboration, as they decided to develop MaaS through a pre-commercial procurement process. In this process, the knowledge sharing was formalized to a request for information session, in which private actors was given the opportunity to comment on questions posted by the PTA. Smith et al. [47] concluded that “the chosen procurement process was likely inappropriate for managing a situation where uncertainties were as high as in the described case, and where a majority of the actors involved (both procurer and bidders) did not have any substantial, previous experience in MaaS” (p.10). On the state level in Sweden, several arenas for knowledge sharing have been established since Västtrafik’s discontinued attempt to procure MaaS. One important aspect, that is closely related to other forms of soft governing such as governing through visions, strategies, action plans and information, is the arrangements of collaborative workshops or meet-ups. Examples in this space include the workshops within the Swedish Mobility Program, the meet-ups arranged by KOMPIS (the administrative body that manages the ministry’s national roadmap for MaaS) as well as the process of Challenge from Sweden (an innovation contest initiated by the Energy Agency).

In summary, public actors have, so far, used collaborative governance and organization as both a hard and a soft policy instrument, thus indicating the varying ambitions of state and regional actors. Collaboration is also a policy instrument that overlaps with other instruments. One example is the usage of strategy management which, as indicated above, was often organized as a collaborative processes and used as a form of meta-governance. While these forms of governing might indicate that public actors see themselves as Promoters, taking charge of the development of MaaS, also other interpretations of perceived roles are possible. For instance, the perceived role might also be that of an Enabler, where the ambition of the public actor is not to take charge, but rather to facilitate or speed up processes by connecting relevant actors to each other. There are reasons to believe that this ambivalence is characteristic for the development of MaaS, where public partners are simply indecisive in relation to which role to choose.

4.3 Financing

Financing is a policy instrument that features the use of “monetary techniques and tools, either to levy resources intended to be redistributed (taxes, fees) or to direct the behaviors of actors (through subsidies or allowing deduction of expenses” ([41]: 13). As indicated in previous research, the public funding of pilots is an important aspect of

facilitation of MaaS, as well as the funding of broader innovation programs [84, 85], an aspect also highlighted in the literature on experimental governance [18].

As previously mentioned, public actors have a key function in collaborative governance, and one of the reasons for this is the instrument of funding. In Finland, LVM and the Funding Agency for Innovation established a joint program for MaaS in 2014, and soon thereafter the Funding Agency for Innovation published their first call for funding of MaaS Operators. Since, the Funding Agency for Innovation has funded several pre-studies and pilots in order to kick-start the development. Moreover, Finpro has initiated a growth program for MaaS, aimed at challenging Finnish companies to act upon the global business opportunities of MaaS and at increasing the awareness of Finland as a leading MaaS country and a great target for MaaS-related private investments (exportfinland.fi/maas). In this sense, the ambition of the state agencies seems to be to enable the development of MaaS through financing trials conducted by various private or public actors. Public actors in Sweden are also investing in MaaS related research and development. For instance, the Innovation Agency funded the 2013–2014 pilot of UbiGo and has recently published a call for more pilots (linked to the national roadmap for MaaS in Sweden). Moreover, several large-scale research projects have been funded. In relation to previous policy instruments, it is also interesting to note that a general requirement of funding agencies in almost all calls are that pilots and projects need to be collaborative in order to gain funding, again indicating how these policy instruments often act in a supplementary manner.

Public sector actors in Sweden, have to this day, also planned to make another major type of MaaS-related investment, as the partners in the Swedish Mobility Program planned to invest in developing and operating a national integration platform that was supposed to enable distribution of operational data and tickets from transport service providers to MaaS Operators. One of the logics behind this decision was to decrease the investment needed in order to set up shop as MaaS Operator, e.g. to cut the need of developing an integration platform and for integrating the interfaces of multiple actors [49].

In summary, public actors have, to date, primarily used financing to facilitate MaaS-related experimentation in the respective countries. This suggests that they are taking Enabler and/or Promoter roles. However, the planned (but canceled) developments in the Swedish Mobility Program indicate that some actors also intend to use financial means in a Partner role.

4.4 Regulation

Legislative and regulatory instruments are arguably the archetype of governing ([41]: 12). They are intrinsic to the formal aspects of institutions [8], but they also exercise “an axiological function” by setting out “the values and

interests protected by the state” ([41]: 12). In relation to the development of MaaS, the balance between serving the public interest and enabling for the private sector to participate and innovate has been described as tricky, yet vital [85].

Legislation is often reported to act as a barrier for innovation and change in the transport sector. Here, the public sector role as drafters of “legislative framework that affects the potential of different transport modes” ([84]: 41) is described as fundamental. Accordingly, a key task for public actors in the promotion of MaaS has been suggested to be to remove legislation barriers (e.g. [86]). These discussions have permeated national debates in Finland. The regulatory changes proposed in the Transport Code have, to this day, been pivotal for the development of MaaS in Finland. In the first phase, which came into force in July 2018, road transport was addressed. From the perspective of MaaS, the reformation stipulates two major changes, which can both be seen as examples of hard policy instruments. Firstly, the permit requirements for acting on the public transport and taxi markets were lowered, which LVM hope will lead to the development of new transport services and easier market access. Secondly, the act forces all transport service providers to provide their operational data as well as their single ride tickets for third-party resale and use in an interoperable format. With these measures, the ambition of LVM is to facilitate the combination of several transport services into MaaS offerings. The minister of transport and communications summarize their objectives as follows: “We want to make sure that users, people and businesses, have access to high-quality transport services. It is no longer necessary or reasonable to provide specific provisions on each transport mode but to enable services that meet the customers’ needs” ([87]: 1).

Instances of hard policy instruments are also found on the regional level in Finland, where contracts are used to govern the development at hand. In this regard, HSL has developed a generic contract that regulates their relationship to MaaS Operator [57]. After negotiations, this contract enabled them to sign a contract that enables MaaS Global to resell public transport tickets. The general contract specifies that eight types of single adult tickets are eligible for resale, and that HSL will neither charge any fees, nor offer any compensation for ticket sales. HSL will offer route information, timetable data, real-time data and disturbance information as well as an open interface journey planner free of charge, but does not provide any service level agreement for these services. MaaS Operators are responsible for pricing their own products and should report quantity of ticket types sold on daily basis (including customer group and zone). HSL will send monthly invoices according to these sales reports. Further, MaaS applications must be tested by HSL before release in order to ensure security and

technical performance, and MaaS Operators must issue a disclosed bank guarantee or a collateral approved by HSL against credit sales. The collateral should approximately correspond to the sale of travel tickets for an average of 1.5 to 2 months. As of data, MaaS Operators are controllers of the information that is being processed in connection with its service and the offer. They should provide personal data, contact information and service information of the customers who use HSL’s services, when the disclosure is in accordance with the legislation, for instance the Personal Data Act [88] and the Information Society Code (917/2014). In addition, MaaS Operators should provide HSL with non-personal information related to the use of HSL’s services, such as anonymous travel data. MaaS Operators are furthermore responsible for customer feedback and complaints, including for HSL journeys. They should report to HSL on customers’ experiences and feedback for HSL journeys. Further, MaaS operators must adhere to some restrictions regarding visual identity. In general, customers should understand that they are using HSL services and tickets. For instance, HSL defines the terms under which the HSL logo can be used to market MaaS Operators services and HSL’s ticket inspectors must be able to check third-party distributed HSL tickets according to normal procedures. In terms of responsibility, the contract also stipulates that HSL does not guarantee that public transport services are uninterrupted or that the information systems and interfaces are uninterrupted. HSL is also not liable for damages caused by short-term traffic incidents to MaaS Operators or their customers. Lastly, compensation for potential large and long-term traffic disturbances (e.g. public transport strike or stoppage) will be agreed upon separately.

In contrast, Swedish actors have less first-hand experience of re-regulations and contracts in relation to MaaS. However, Västtrafik has evaluated legal aspects in terms of how the current legislation limits their action spaces. Moreover, they started develop regulatory terms and a basis for agreements with MaaS Operators in cooperation with Samtrafikfen as part of their work with the Swedish Mobility Program, and is (as of 2017) working on drafting a generic contract for reselling their tickets. This contract will include a number of hard instruments in order to delimit the relationship between the public transport authority and private actors, using the contract as a policy instrument.

In summary, the Transport Code indicates that the national government in Finland is taking on a Promoter role, and that they have used several different policy instruments to do so. This also indicates that there is a strong belief that the Finnish state has a substantial action space in relation to MaaS, and that it can use this action space in order to encourage innovation.

Simultaneously, HSL's generic contract implies that they are leaning towards a Partner role, indicating a possible tension between the state and regional level in terms of perceived roles and action spaces.

5 Results and discussion

The policy instruments applied by public actors in the development of MaaS in Finland and Sweden can be summarized as illustrated in Table 3. Consequently, our first finding in this paper is that public actors are applying a wide range of both hard and soft policy instruments in order to govern the development of MaaS, and that these policy instruments act in supplementary ways.

Reports issued within the field of MaaS are highlighting the importance of support from local and regional public actors (e.g. [4]), and there is also a growing recognition that the realization of MaaS requires not only “a stronger collaboration between the public and private sector, but also a need for the public sector to oversee these developments [...] with respect to quality, affordability, access and inclusiveness” ([89]: 8). The prospect of these expectations is highly dependent of the actual and perceived action spaces of these actors. Here we find a distinctive difference between the two cases.

State-level actors in Finland have taken an active Promoter role in the development of MaaS, for example through the preparation of the Transport Code, but also by trying to create first-class pilot environments (cf. [64]) and by funding MaaS-related pilots. At the same time, these promoting activities have – in tandem with very active private actors – limited the perceived action spaces of the regional public transport authorities in Finland. They have been reduced to a Partner role that is perhaps rather assigned to them than voluntarily chosen. The regional public transport authorities do not govern the trajectory of the development of MaaS, but use their perceived action spaces to adapt to the

development and to protect their interests. Here, HSL's generic MaaS contract can be interpreted as an attempt to pro-actively prepare for the path that the Transport Code has stuck out.

In Sweden, state-level actors have taken a more careful back-seat Enabler role thus far, primarily using soft policy instruments, such as action plans and meet-ups, in order to govern the development of MaaS. Instead, it is regional public transport authorities, and their associated organizations, which have applied policy instruments that suggest that they are trying to take charge of the development of MaaS. For instance, Samtrafiken are/were trying to establish themselves as a national MaaS Integrator, SLL are planning to fund strategic pilots and Västtrafik initiated a procurement process. Hence, they are arguably acting as Enablers and trying to present themselves as Partners so far. In light of this, the perceived action spaces of the Swedish regional public transport authorities seem to be greater in terms of governing the development process, compared to its Finnish counterparts. However, there is no clear state ambition to reform the Swedish legislation in order to cater the development of MaaS. Thus, there seems to have been a ‘window of opportunity’ in Finland that lacks a Swedish equivalence (cf. [43]). As a consequence, the regional public transport authorities in Sweden seem to have more limited perceived action spaces in terms of what operational roles they can take in the emerging MaaS ecosystems – their interpretation of the current legislation sets the limit for what they can do.

Drawing on the analysis of applied policy instruments, our second finding in this paper is that the taken roles and perceived action spaces by local and regional actors are highly dependent on the activities of public actors on state-level. Accordingly, perceived action spaces and roles need to be analyzed in a multi-level setting, where processes of enabling and promoting can vary between societal levels, and where the roles of the public sector are negotiated not only between public and private actors, but also between different public actors.

Finally, there are several limitations to the analysis reported in this paper, which also open up the need for further studies. Firstly, the analysis is limited to Finland and Sweden, two countries with similar institutional arrangements, at least from a global perspective. Secondly, MaaS is a novel phenomenon, and both Finland and Sweden have only witnessed limited pilots thus far. Accordingly, the analysis studies the use of policy instruments to govern development processes, but not operation processes. Thirdly, this paper did not focus on reviewing the applicability of the utilized policy instruments. Although some studies have discussed policy recommendations based on the public sectors use of policy instruments in Finland and Sweden (e.g. [45, 90]), there is arguably a demand for

Table 3 Policy instruments utilized by public actors in the development of MaaS in Finland and Sweden

1.1	Hard	Soft
Strategies		Public strategies and roadmaps for the development of MaaS (Finland and Sweden)
Collaboration	Procurement procedures (Sweden)	Knowledge sharing activities such as R&D programs, conferences and meet ups (Finland and Sweden)
Financing	Funding of R&D (Finland and Sweden) Investment in technology (Sweden)	
Regulation	Legislative reform (Finland) Operational contracts (Finland and Sweden)	

further analyses of the policy instruments' effects on the development of MaaS as well as on the transportation and innovation systems in general. Fourthly, the analysis has not considered technical aspects, such as how the physical infrastructure influences possibilities for MaaS developments. To complement the findings on roles and perceived action spaces reported in this paper, additional analyses that cover these four aspects, and more, are needed.

6 Additional files

Additional file 1: Appendix 1. Milestone MaaS-related measures by public actors in Finland and Sweden (DOCX 18 kb)

Additional file 2: Appendix 2. Interview guide (DOCX 14 kb)

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Availability of data and materials

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Authors' contributions

The responsibilities for planning, data collection, analysis and preparing the final manuscript were equally shared between the authors.

Competing interests

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