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Challenges and Potentials for Development of Mobility as a Service:
Finnish Public Sector Actor Perspective

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<p>Cities are facing pressure to overcome critical challenges that force us to rethink our unsustainable mobility patterns. Therefore, the transportation sector is going through major changes. Mobility as a Service (MaaS) is one of the innovations trying to change how we travel, a concept that originates from Finland. MaaS is a concept that brings all the transport providers and modes into one platform. A distinctive feature of MaaS is the possibility to buy tickets for the entire journey, removing the need to go through multiple websites and ticket schemes. However, MaaS is still an emerging concept and therefore it lacks official definition.</p> <p>Finland has been in the forefront of this transportation reform with new legislation that supports the creation of MaaS. The public sector has traditionally had a central role in the provision of transport services where regulation and subsidies are needed. However, the new legislation strongly advocates market-based services, and thus the public sector needs to reconsider their position. Therefore, it is important to understand how the Finnish public sector and the parties actually executing the law sees MaaS, its impacts and their role in MaaS.</p> <p>The thesis is qualitative in nature and 20 public sector representatives were interviewed from 17 different organizations. The organizations consist of governmental organizations, interest groups, regional organizations and cities that vary in size. The interview analysis has been guided by concept of emerging technology. Emerging technology is characterized of being technology that can change multiply sectors at the same time but simultaneously has not yet demonstrated its value.</p> <p>The results showed that there is big variety how public sector representatives define MaaS. Additionally, the respondents felt there is a lot of challenges related to MaaS, such as working business model, lack of services, technical challenges, area of demand among others. Positive side was if MaaS would make transport more efficient and provide savings for the public sector. User wise it was clear that MaaS needs to be effortless for the user in order to compete with private cars. Overall the respondents saw more opportunities for MaaS than possible negative effects, but the lack of widespread MaaS scheme makes it hard to evaluate any effects. However, MaaS raised also suspicions among some respondents. As for the legislation, it did not gather any positive feedback outside of government officials, especially the openness of the drafting process received criticism. The results also showed that there is contradicting view on the roles among the different groups of representatives.</p> <p>In conclusion it should be taken into consideration how future policies are formed as now the experienced exclusion of drafting the legislation might have hindered the cooperation and created suspicion towards the whole concept. Additionally, it is clear there is insecurities inside the public sector caused by uncertainties related to MaaS. Implementation has been slow since public sector feels the government has told them to do something, they do not have ability to do. Nevertheless, generally the public sector is still welcoming MaaS. Especially cities hoped that MaaS would enable them to cut their service in low dense areas. However, there is still no will to financially support MaaS, it seen that it is a job for private sector to take the risks.</p>			
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1. Introduction

Cities are facing pressure to overcome critical challenges like climate change, sustainability, urbanization, demographical changes and also adapt to changing world with technological development, the emergence of sharing economy and access over ownership. These megatrends are the phenomenon that forces us but also helps us to rethink our unsustainable mobility patterns, especially our dependence on private cars that are usually occupied by one person and therefore inflicting underutilized capacity. (Atkins 2014; Banister 2008; Banister 2011; Strömberg, Rexfelt, Karlsson & Sochor 2016; Wray 2019.)

The transportation sector is going through a major revolution. Digitalization, servitization and market-based approaches are changing the system and creating new possibilities for service providers and customers. Mobility as a Service (MaaS) is one of these innovations, a concept that originates from Finland (Heikkilä 2014; Melis, Prandini, Sartori & Franco Callegati 2016). Therefore, Finland has gained publicity as the forefront of the transportation reform (Valdani Vicari & Associati 2019).

MaaS is a concept that brings all transportation providers and modes into one platform, providing services accessible on-demand (Maas Alliance, accessed 17.5.2019). A distinctive feature of MaaS is to provide a service where the customer can purchase tickets for all the available transportation services, which removes the need to go through multiple websites or services to get tickets for the entire journey (Datson 2016). MaaS tries to provide more individual services than the current public transportation sector can. Ultimately, MaaS aims to provide a notable alternative to private car ownership (Valdani Vicari & Associati 2019). MaaS could provide benefits for the user but also for the transport operators as a new way of operating can meet unmet demand, and provide more efficiency by increasing the volume of passengers per vehicle (Maas Alliance, accessed 17.5.2019).

As new technologies, services and products are adopted by customers, they are significantly changing the service sector. Media and telecommunication industries (e.g Netflix, Spotify) have already taken advantage of the situation, but due to heavy infrastructure, complex markets, regulations and large well-established businesses, the transportation sector has not. (Atkins 2014.) Therefore, Mobility as a Service has the potential to fundamentally change the way we move.

The public sector has traditionally had a central role in the provision of transport services especially where regulation and subsidies are needed. Thus, in addition to several private sector players, various governmental institutions still have a role to play in the development of MaaS as a market-based service, which creates a complex ecosystem. Public and private sector need to work closely together, and the public sector organizations need to reconsider their position in order to create a diverse ecosystem, while adhere to the core governance principles of efficiency, equity, and ethics (Pangbourne, Stead, Mladenović & Milakis 2019). Therefore, it is important to study how the public sector views the impact of MaaS and sees its role in this transformation.

The Finnish government has identified the need to reorganize the transportation sector, and in 2015 the government launched the Act on Transport Services which aims to enable the creation of transport services utilizing digitalization, servitization and market-based services. This has enabled the emergence of MaaS in Finland. This Finnish governments initiative sees it important that different parts of the transportation work better together, and the essential objective of the Act on Transportation Services is to facilitate the deployment of innovation, digitalization, automatization and implementation of Mobility as a Service-concept. The basis of the Act are market-based transport services and services that respond to the need of customers, and are high quality, affordable and efficiently produced. (HE 157/2018.)

The concept of MaaS is not yet widely researched but the number of studies is increasing. The aim of this study is to contribute to the growing research field of MaaS and therefore to investigate how the public sector sees its role in the changes MaaS might bring. As the transportation sector has traditionally been very regulated, it is interesting but also vital for the MaaS industry to understand what the role of the public sector in the MaaS revolution is from their own point of view. Thus, this thesis aims to create an outlook of the MaaS industry in the eyes of the public sector, and it is done by interviewing different public sector representatives such as ministry, agencies, public transportation officials and municipality officials. Thereby, the research questions are:

1. What is the definition of MaaS according to the public sector?
2. What is the perception of MaaS and its impacts inside the public sector?
3. What is the perceived role of the public sector in the MaaS revolution?

The structure of the thesis will go as follows: in the second chapter, the relevant background literature of MaaS is outlined from definition to impacts of MaaS as well as public sectors role in MaaS. In the third part, the methodology of this study is presented which also outlines how the interviews have been interpreted. Part four presents the findings divided in five different section based on the themes found from the interviews. In part five the findings are discussed based on recent scientific findings and in part six conclusions are drawn.

2. Background

2.1. Definition

According to Utriainen & Pöllänen (2018) the core of MaaS lies in one platform that aims to provide seamless transport services by combining different transport modes and services (Utriainen & Pöllänen 2018). Jittrapirom Caiati, Feneri, Ebrahimigharehbaghi, Alonso-González & Narayan (2017) and Kamargianni & Matyas (2017) adds that bundling different mobility modes into one service ensures a more comprehensive platform, which provides services from trip planning and reservations to payments, all in one place (Jittrapirom et al. 2017; Kamargianni & Matyas 2017). The different transportation modes can include public transport, car-sharing, ride-hailing, taxis, bicycles and walking among others (Kamargianni & Matyas 2017; Laine, Lampikoski, Rautiainen, Bröckl, Bang, Stokkendal Poulsen & Kofoed-Wiuff 2018).

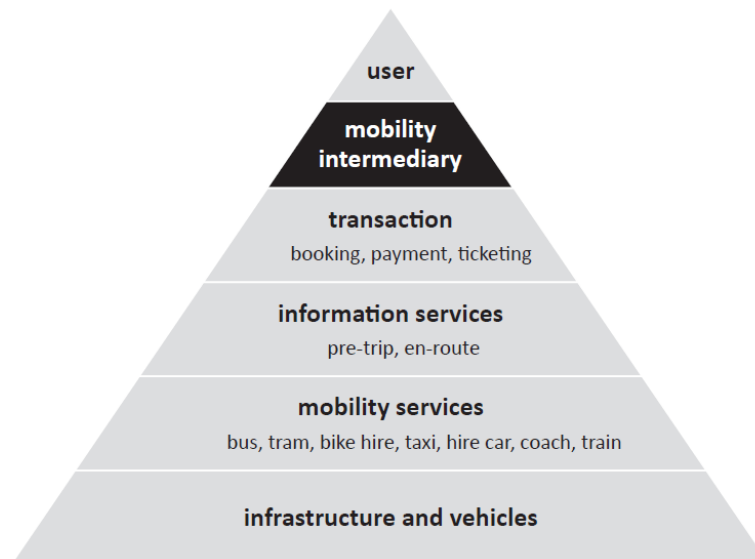
Connecting public and private transportation modes can create effortless travelling and more options for mobility providers (Melis et al. 2016). While these services are not necessarily new, until now they have been functioning on their own and not integrated. The MaaS provider has been compared to Expedia or Amazon, which do not sell their own product but provides a platform for others to sell their products. However, the role of MaaS provider is a bit different since it does not only resell but also act as an optimizer. (Kamargianni & Matyas 2017.)

MaaS aims to tackle the current situation where, in order to find information, purchase services and access different transport modes, the passenger needs to use different service provider applications. Users experience it hard to find information or plan a journey that requires the use of different transport modes. Additionally, for each of these modes, the passenger needs to pay separately through different payment methods. MaaS aims to eliminate these user-related issues and make travelling

seamless. (Kamargianni & Matyas 2017.) Ultimately, the aim is to move away from the transportation system based on ownership to access-based one which could be a real alternative to a private car (Jittrapirom et al. 2017). Therefore, the multimodality is important and core characteristic of MaaS.

Lyons, Hammond & Mackay (2019) have described the levels of mobility system showed in figure 1. The figure describes that in order for MaaS to compete with private cars, the MaaS operator needs to be between the user and all the different layers that the mobility system is required to have. These layers are infrastructure and vehicles, mobility services, information services, and transactions. The mobility intermediary offers the interface between these layers crucial for the trip to happen and the user making these trips.

Figure 1. The levels of mobility system



However, there are many definitions of MaaS. Next few of these definitions will be presented.

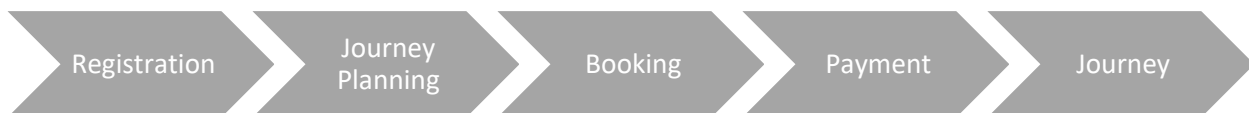
Kamargianni & Matyas (2017) define MaaS as follows:

“Mobility as a Service is a user-centric, intelligent mobility distribution model in which all mobility

service providers' offerings are aggregated by a sole mobility provider, the MaaS provider, and supplied to users through a single digital platform."

Jittrapirom et al. (2017) define that MaaS should have the following nine core characters: integration of transportation modes, different tariff options, one platform, multiple actors, use of technologies, demand orientation, registration requirement, personalization and customization. MaaS consists of three components; shared mobility, booking/ticketing and multimodal travel information (König, Eckhardt, Aapaoja, Sochor & Karlsson 2016). Chronologically the process of using MaaS services for the customer goes as depicted in figure 2:

Figure 2. MaaS process (MaaS Alliance 2017).



Registration assures that the services are customized, and the customer can receive individual offers. The journey planning offers the best solutions for the customer taking into consideration the individual preferences and combining different transport modes. The booking part ensures that the customer gets all the required travel documents for the journeys every mode. All the above-mentioned tickets can be purchased from the MaaS application, that being the fourth part. In the last part MaaS provider makes sure that the customer has all the relevant information of route changes, delays etc. making the service seamless. (MaaS Alliance 2017.)

Jittrapirom et al. (2017) add that it is typical for MaaS providers to offer different tariff options. This means that the customer can either choose to pay as they go or if the travel need is greater, they can choose a package that includes different travel modes. The tariffs should, however, be designed so that they nudge the customers to make sustainable choices (Holmberg et al. 2016).

Even though the purpose of MaaS is to increase the service level of transportation, public transportation remains as the backbone of the system as its capability to transport a large number of people at the same time remains, and therefore its use is encouraged. (Atkins 2014; Holmberg, Collado, Sarasini & Williander 2016; Jitrapriom et al. 2017; MaaS Alliance 2017; Pangbourne, et al. 2019.) Thus, it is important to find a solution between public transport and MaaS provider so that both parties benefit, and the customers really use public transport. (MaaS Alliance 2017.) The new services aim to add the service level of public transport by providing services at each end of the public transport trip integrating the whole journey, making it easier and effortless to travel between destinations, which is hoped to increase the attractiveness of public transport. (Atkins 2014.)

The concept of MaaS is yet unestablished and it is still finding its place. Thus far the concept lacks one simple definition. There are different interpretations which might conflict one another. (Giesecke, Surakka & Hakonen 2016; Jitrapriom et al. 2017.) However, interviews done for Romanyuks (2018) master thesis revealed that different MaaS players in Finland, mainly from private sector, shared the same perception of the definition of MaaS. Only the details of the business models such as pricing and customer segments differed between the interviewees (Romanyuks 2018).

2.2. Impacts of MaaS

Right design, structure and pricing of MaaS have the potential to impact the transport sector by reducing dependency on private cars, increasing the usage of public transport and creating a more sustainable transport sector. In addition, MaaS has the possibility to also impact the economy and society as a whole. (Kamargianni, Matyas, Li & Muscat 2018.) Potential negative impacts include rebound effect, increase in emissions and decrease in public transport usage (Datson 2016;

Pangbourne et al. 2019). However, there are very little knowledge of the true impacts of MaaS (Utriainen & Pöllänen 2018). Here some of these impacts are explored more closely.

2.2.1. User behavior and systemic effects

The primary aim of MaaS is to provide a feasible alternative to the ownership of the private car (Sochor, Arby, Karlsson & Sarasini 2018). Easily accessible car-sharing will probably be one attractive service that can attract the current and former car owners to be MaaS customers. Therefore, MaaS might not decrease the use of cars if car owners just shift from a private car to a shared car. However, there is an assumption that when a person does not have a private car, the threshold for using other modes decreases partly because the cost of car-share is more visible than the cost of ownership. Additionally, good car-sharing opportunities might prevent people from buying private car, since there is service that can serve the need public transport cannot. Furthermore, for public transport this means retention of customers. It is even argued that car-sharing can attract new passengers for public transport. (Huwer 2004.) Change in car use will guide the transportation sector towards a more sustainable direction (Giesecke et al. 2016).

However, real-life experience on the effects of MaaS regarding car use is scarce. UbiGo trial done in Sweden revealed that people might have a false perception on their own car use. The participants of the trial used the available car-sharing services less than they expected and they were also positively surprised by the local public transport. (Sochor, Strömberg & Karlson 2015.) It can be summarized that the trial affected people's attitudes on private cars negatively and on other modes positively (Karlson, Sochor, Aapaoja, Eckhardt & König 2016a). A study done in Manchester UK on the local MaaS trial revealed that as much as a third of study participants was ready to give up their car after the trial which lasted for 6 months. 20 % of participants had incorporated active travel such as walking and biking into their daily commute. Therefore, MaaS can have health beneficial effects. (Wray

2019.) Some additional lessons can be learned from trials of urban demand-responsive services (Jokinen, Sihvola & Mladenovic 2019; Weckström, Mladenović, Ullah, Givoni, & Bussman 2018).

People's mobility habits can, therefore, be changed by MaaS-trials. Especially giving up one's car for good can be a too big change, in consequence, the mobility habits maintain unchanged. Thus, MaaS-trials can provide a low threshold experiment how life without a car would be like. (Strömberg et al. 2016.) Owning a car might make people feel that they are "forced" to use it since it is already there creating expenses anyway (Karlson et al. 2016a). Trials conducted thus far have demonstrated that people's attitudes can be changed if the trials are well designed and long enough (Strömberg et al. 2016).

It is anticipated that MaaS will cut down emissions and create more sustainable mobility. This will happen due to the assumption that use of private cars will decrease, (Giesecke 2016; Hoadley 2017; Laine et al. 2018) but also because MaaS provides the opportunity to decarbonize the transport sector by encouraging the wider use of electric vehicles (Gould, Wehrmeyer & Leach 2015). However, there is a need to steer people to make more sustainable choices as habits are hard to change. There have been different ways to influence the decisions of the customer like providing information about the CO₂ emissions of the customer's choice to promote public transport and giving points for preferable choices. (Jittrapirom et al. 2017.) In the UbiGo trial, the customer received points from sustainable choices which could have been used to purchase services and products such as museum and swimming hall tickets, audiobooks and renting e-bikes. (Sochor et al. 2015). The MaaS app can also promote a healthier lifestyle by suggesting walking or cycling, thus making the mobility more sustainable (Melis et al. 2016.)

As the expectation is that the use of private cars will decrease, in consequence, public transport could have more users which might result in the reduction of the need for subsidies (MaaS Alliance 2017).

The increase in public transport usage is also supported by a study done by Kamargianni et al. (2018). The study revealed that 35 % of people in London would replace car trips by public transport, 34% by walking or biking and only 7 % would replace car trips by car sharing. 13 % stated that they would not replace their car use because of MaaS. However, 22 % of regular public transport users stated that they would replace some of their trips by taxis. Overall, the research showed that the number of people increasing their public transport usage is higher than the number of people decreasing their usage of public transport. Therefore, the total number of public transport users would increase. (Kamargianni et al. 2018.)

In addition to better mobility services, the aspiration of MaaS for the citizens is more livable cities where we have fewer vehicles (Goodall, Fishman, Bornstein & Bonthron 2017). The decreased use of private cars will reduce the space needed for parking and therefore release space for something more enjoyable (Rantsila 2015). This will ultimately contribute to the vision of a better city, which is imagined having fewer cars (Huer 2004). As MaaS aims to increase the efficiency of transportation, big infrastructure investments are not as necessary as they have been so far. However, MaaS needs to be designed so that it will not increase traffic volumes as more people will have access to mobility services.

A negative effect of MaaS is the possible rebound effect. Especially the monthly package, which provides an unlimited number of trips, is feared to induce the number of total trips per person if the customers feel they have not got value for their money, as a consequence people can make unnecessary extra trips. (Pangbourne et al. 2019.) Also increased service level might attract people to use the services more (Rantsila 2015). Therefore, new governance structure and processes are needed in order to avoid the realization of the rebound effect (Audouin & Finger 2018; Pangbourne et al. 2019.).

2.3. Ecosystem

However MaaS is defined, it is not only an app but a set of different players which together create an ecosystem (Kamargianni & Matyas 2017). Openness and inclusivity are the key characteristics of MaaS, and the ecosystem works as a catalyzer creating more open and dynamic market which provides user-centric mobility services (MaaS Alliance 2017). In the ecosystems, the boundaries of different transport modes will eventually fade away, creating seamless transportation. (Köning et al. 2016.)

The ecosystem should allow all willing operators to be part of the ecosystem and all transportation operators should offer the same pricing schemes to all MaaS operators. This will create fair competition and market-based transportation services. Data is a crucial element in the digital ecosystem and who has access to the data, dominates the market. Therefore, to truly have a functioning ecosystem with multiple players, open data is necessary. Thus, service providers should grant access to their data about routes, stops, timetables, and prices to other actors. Moreover, opening the retail of tickets is another crucial aspect. (MaaS Alliance 2017.) Therefore, one aim of the Finnish Act on Transportation Services is to provide open data of transportation for customers, service providers and officials, (HE 157/2018) and the open data policy is seen as the MaaS enabler in Helsinki, Finland (Li & Voegelé 2017).

Köning et al (2016) argue that MaaS ecosystem consists from four different levels: 1) public and regulatory level; 2) transport and logistics service providers' level i.e., supply-side; 3) mobility service level i.e., MaaS provider and 4) end-user level. As for Kamargianni and Matyas (2017), they describe that in addition to MaaS provider, the ecosystem consists of core businesses and extended enterprises which together create the whole ecosystem as seen in figure 3. As for Utriainen and

Pöllänen (2018), they describe MaaS ecosystems to include MaaS provider, data providers, transport operators, customer and technical solutions, journey planners and ICT infrastructure. The role of MaaS provider is seen as an organizer that cooperates, uses data and manages the ecosystem (Utriainen & Pöllänen 2018).

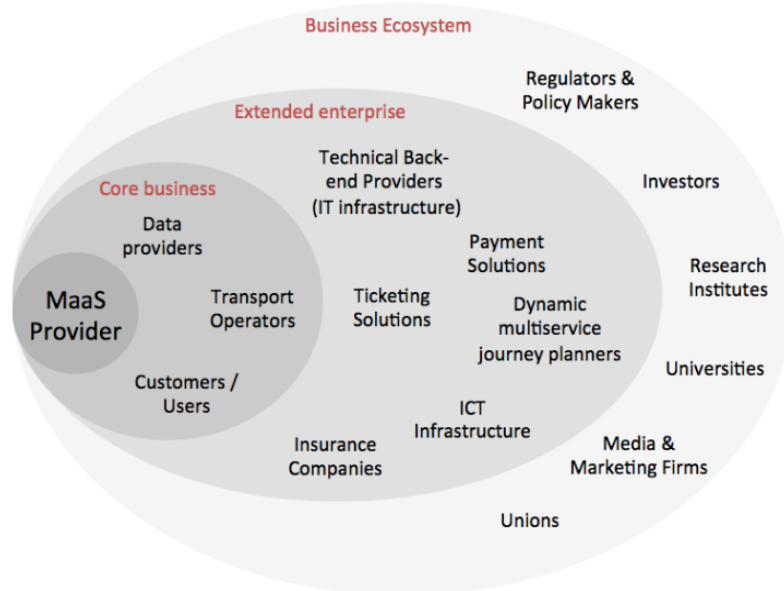


Figure 3. Mobility as a Service Ecosystem (Kamargianni & Matyas 2017).

2.4. MaaS and the public sector

One relevant question is that in what role should the public sector be involved (Jittrapirom, Marchau, Heijden & Meurs 2018). Important question is that should the public sector rethink its position because the sector is changing. Too much regulation can make innovating too hard but on the other hand too little regulation may not fulfil the public interests (Goodall et al. 2017; Utriainen & Pöllänen 2018). For MaaS to succeed, too heavy regulation can be fatal and therefore the regulation should be supporting MaaS. Thus, the support from public sector is important. Additionally, different levels of public sector can create difficulties as local authorities want to focus on local issues such as

congestion and government level is keener to solve more generic transport challenges such as promoting more sustainable transport modes (Jittrapirom et al. 2018).

Regulatory ambivalences create uncertainties since it is risky to invest in an unstable sector where regulations are layered possibly to a multiply different layers between local, national and international levels (MaaS Alliance 2017). Thus, MaaS is dependent on actions done by public sector to achieve its goal as service-oriented transport system (Ozaki 2018). However the service is designed or governed, the public sector should serve as a guiding factor for the private sector to ensure the services are developed toward a sustainable way (Goodall 2017; Pangbourne et al. 2019). Regulations and policies will define the development trajectory of MaaS and therefore determine will MaaS meet the needs of society (Datson 2016).

A clear consensus on who should be the MaaS provider is also missing. The public sector is seen to be more stable and push the societal goals more than the private sector but private sector, on the other hand, has technological advances, is more capable to integrate a wider set of services, has business drive and can make the services more efficient (Holmberg et al. 2016, Jittrapirom et al. 2018). Kamargianni and Matyas (2017) added to this list that in public MaaS model all modes of public transport would be easier to integrate, as a regulator would probably take less time to create MaaS favorable regulation. However, political and admirative guidelines might slow down the process and public sector must follow fair competition standards and authority restrictions between cities. In private model the benefits would be fast development, other service providers would probably get involved easier, incentive to create the best service for profit maximation and no restriction to create inter-city services. The difficulty would be getting public transport authorities to join as they might fear to lose their position. (Kamargianni & Matyas 2017; Smith, Sochor & Karlsson 2019.)

Smith, Sochor & Karlsson (2018a) identified there to be three different scenarios of how to design the role of MaaS provider; market-driven development, public controlled development and public-private development. The level of public sector involvement differs from absolute control to basically non-involvement (Smith et al. 2018a). However, more trials are needed in order to find the best solution that serves both the customers and stakeholders (MaaS Alliance 2017).

Experts interviewed by Jittrapirom et al. (2018) believed that public sector representatives might fear to lose their position and hold on to their monopoly status and is therefore reluctant towards MaaS. The same experts stated that cooperation between the different actors is crucial element for the success of MaaS. The public sector might be reluctant to cooperate as they fear the early adopter of MaaS will be public transport users and that they lose influence and control (Jittrapirom et al. 2018).

2.4.1. MaaS and the public sector in Finland

The political atmosphere in Finland have been oriented towards deregulation and increased market orientation (Smith, Sochor & Sarasini 2017a). The Finnish government has been very supportive of MaaS hence the Act on Transport Services which is aimed to facilitate the creation and implementation of MaaS (HE 157/2018). The aim of the act has been to improve transport services and increase freedom of choice (UITP 2019). This was completed by three actions. The first one was done by removing the quota of taxi-like services which had until then limited the taxi licenses. Secondly, it was required by all transport providers to open their data such as routes, timetables and stops. Lastly, the act forced transport providers to open their APIs, application programming interfaces, that allows MaaS operators to sell tickets of other mobility services. (Audouin & Finger 2018.) This has led to a situation where market-driven MaaS is most likely model in Finland (Smith, Sochor & Karlsson 2017b). And it seems that decision-makers and stakeholders have mostly accepted the concept (Surakka, Härrä, Haahtela, Horila & Michl 2018).

Juniper Research has ranked Helsinki as the best city for MaaS. The argument is that Helsinki has succeeded in creating critical cooperation between government and MaaS providers (Wray 2019). Li & Voegelé (2017) suggests that the situation in Helsinki has been facilitated by the open data policy. However, there are divergent opinions on the situation in Helsinki. There has been a problem with the public transport agency as it has been unwilling to allow third parties to resell their tickets (Smith et al. 2017a).

Audouin and Finger (2018) interviewed different members of the transport sector in Helsinki, which revealed that the respondents stated cooperation with HSL (Helsinki Region Transport) has been “challenging” and “reluctant”. According to Surakka’s (et al. 2018) study, cooperation with Finnish transport monopolies have not been fluent enough. The respondents experienced that HSL has slowed the MaaS process. One reason for the statements was the fact that HSL only opened their API for single ticket but not their seasonal tickets. The reason for this was recognized to be the fear of losing direct link to the customers, HSL brand fading away and HSL’s willingness to publish their own mobile app first. However, the API is nowadays open also for seasonal tickets. This led to the situation where the minister for transport at that time repeatedly expressed her support to MaaS and pressured public transport authorities not to act against her will. (Audouin & Finger 2018). Mukhtar-Landgren & Smith (2019) and Surakka et al. (2018) concludes that there is no shared understanding of the roles inside the different parties in Finnish public sector. Therefore, it is important to study the different parties how they see their role.

3. Methodology

MaaS and public sector has been studied using various methods so far, even though the number of researches on MaaS, in general, is still quite scarce. Adouin & Finger (2018) studied the state of MaaS governance in Helsinki by interviewing different public and private stakeholders. Smith, Sochor & Sarasini (2018) used the same method to compare the situation between Finland and Sweden. In both studies' close cooperation between different stakeholder in Finland was established important. Jittrapirom et al. (2018) used Delphi method surveys to recognize uncertainties in implementing MaaS. As for Surakka et al. (2018), they used surveys to examine how regional governance have different approaches supporting MaaS.

This thesis is qualitative in nature as qualitative research helps to understand the world from the participants perspective (Corbin & Strauss 2008: 12-16) and it is a good option when the phenomena is not understood by counting (Moore 2006). Qualitative research is used to understand structures and its details along with cause and effect relationships (Metsämuuronen 2011: 92) and patterns rather than asses old knowledge (Taylor, Bogdan & DeVault 2016: 19). The most used method within qualitative research, interviews, are used to gain information of interviewees experiences, what meanings these experiences have and furthermore find rather than test variables. (Corbin & Strauss 2008: 12-16.)

The aim of this study is to get a comprehensive understanding how the public sector representatives understand MaaS and its implications. Thus, interviews were chosen to be the best method for this study as there was no prior knowledge and quantitative data would not have provided deep enough knowledge. More accurately, the data was gathered by conducting semi-structured interviews which aimed to understand what MaaS is, what are the perceived impacts but also current and future roles

and collaboration (see Appendix 1). The interviews were done with different public sector employees in transport sector, as it offers more flexibility to allow to embrace emerging themes (Jackson, Drummond & Camara 2007). In total 20 experts were interviewed from 17 organizations which were gathered to represent the whole public transport sector in Finland. Table 1. illustrates all the interviewed organizations. Majority of the interviews were conducted in person, three of the organization were interviewed by phone due to long distances. The interviews lasted from 30 minutes to 60 minutes. All the interviews were conducted in Finnish. The interviewees were guaranteed to have anonymity in order to avoid foreseeable and unforeseeable harm, as a core principle of research ethics. Therefore, interviewee names or positions are not published, and the quotations in this thesis are anonymous.

Table 1. List of interviewed organizations.

Type	Organisation
National/governmental	Ministry of Transport and Communications
	Traficom
Intrest groups	TVV lippu- ja maksujärjestelmä Oy (LMJ) (National payment and ticket system)
	Finnish Public Transport Association
	Local Finland
Regional	Helsinki Regional Transport Authority (HSL)
	Centre for Economic Development, Transport and the Environment of Uusimaa (ELY Uusimaa)
	Centre for Economic Development, Transport and the Environment of Lapland (ELY Lapland)
Cities	City of Espoo
	City of Helsinki
	City of Vantaa
	City of Tampere
	City of Turku
	City of Jyväskylä
	City of Lahti
	City of Loviisa
	City of Mikkeli

3.1. Analytical framework

The interviews analysis has been guided by the concept of emerging technologies. According to Cozzens et al. (2010) emerging technology is: *“a technology that shows high potential but hasn’t demonstrated its value or settled down into any kind of consensus.”* Einsiedel (2009:3) adds that emerging technology is something that has the potential to change multiply sectors at the same time. Emerging technology could be characterized by five traits; radical novelty, relatively fast growth, coherence, prominent impact and uncertainty & ambiguity (Li, Porter & Suominen 2018). Radical novelty can either take form in the use of the technology or the function of the technology. In new function trait the basic principles need to change, such as from combustion engine to electric engine. Emerging technology does not have to be entirely new to be emerging, it can just be used to completely new purpose. Relative fast growth can be measured with funding, the actor involved, research, products and services. (Rotolo, Hicks & Martin 2015.)

Coherence refers to a fact that this emerging technology is coherently understood and accepted in the expert group of practice. The fourth trait, prominent impact suggest that emerging technology can affect the society in several levels such as organizations, knowledge production and technological regimes. The last trait refers to the fact that the technology is not ready, thus there are uncertainties and the effects of the technology are hard to predict. In addition, it is ambiguous because the concept is still changing or even contradictory. Further, people have different values and meanings which might alter over time. (Rotolo et al. 2015.)

Emerging technology is considered to be distinctive from the existing technology. The concept is characterized to have new features and bring uncertainties in society. (Li, Munan, & Suominen 2018.) As a result, emerging technology has the possibility to be socially disruptive or alternatively create

coherency by generating new institutional rules or arrangements. (Einsiedel 2009: 3.) There is evidence that regulators are sensitive towards risks linked to emerging technologies (Torriti 2009: 303).

In many cases, technology has gone through a social construction process, which results in coherent definition of the technology in question and it is not therefore questioned by anyone. However, in the case of emerging technology, where commonly agreed definition has not been formed yet researcher use the term “interpretative flexibility”. Since there is no socially accepted definition available, empirical observations and the purpose of technology can very well be interpreted differently among people, hence they are interpretatively flexible. This creates a circle where everything is questioned. First empirical observations are sensitive to interpretative flexibility and therefore scientific facts are questioned. This goes also then the other way around, scientific facts are subject to interpretative flexibility and thus empirical observations are questioned. The debate becomes circular which results in endless regress. (Meyer & Schulz-Schaeffer 2006.) In conclusion technology can mean different things to different people which can influence the conversation regarding the technology in question.

MaaS is identified to be radically novel technology in a sense that it will change how technology is used if all necessary information is gathered to one place rather than in multiple separate places. MaaS might not have grown fast in practice yet, but there is even more interest in the topic. However, there is no clear coherence among the experts what MaaS actually is. Nonetheless, the vision is that MaaS will have huge impacts such as decreased car use and more sustainable transport. Lastly, MaaS is far from ready and its effects are very hard to predict. Docherty et al. (2018) state that MaaS will definitely change the society and new technologies are already changing how transport is governed. Therefore, it can be argued that MaaS mostly meets the definition of emerging technology (Liimatainen & Mladenovic 2018). Similarly, the concept of emerging technology has been applied

to other mobility technologies, such as self-driving vehicles (Mladenovic 2019; Mladenovic, Lehtinen & Martens 2019). In addition, MaaS can very well be identified as a technology which has not been through this social construction process. Therefore, it faces interpretative flexibility when people associate different meanings to the topic. The purpose of MaaS has definitely been interpreted differently which has in turn harmed the conversation.

3.2. Interview analysis

The reduction of data starts by asking the research question from the data to find the essential parts. (Alasuutari 2011: 29-32.) Therefore, the interview records were set in ATLAS.ti software and the important and interesting statements were separated from data, translated to English and finally coded. In the second phase, similar findings were grouped together by looking for related characteristics. The aim is to find examples of phenomena's and establish patterns. (Alasuutari 2011: 29–32.) The codes were reconsidered iteratively before settling with them. Finally, 64 different codes were formed from the data, which were categorized under six different themes showed in table 2.

Table 2. Codes from the interviews

<p>Definition</p> <ul style="list-style-type: none"> • Comprehensive platform • User-centric • Servitization • Public transport • Packages • Multimodality • Shared resources • Beyond mobility • Mobility application 	<p>Operational and business aspects</p> <ul style="list-style-type: none"> • Efficiency • Implementation • Lack of mobility services • Open data • Peak/slow hours • Pilots • Procurement • PT is foundation • Public transport • Technical challenges • Trunk lines • Business model • Business model challenges • Commissions • Effects on the economy 	<p>User perspectives</p> <ul style="list-style-type: none"> • The importance of user perspective • General aims • Service aspects • More specific aims
<p>Systemic Effects</p> <ul style="list-style-type: none"> • Congestion • Daily travel distance • Health • Uberisation • Walking and cycling • Sustainability • Effects on car use • Effects on the environment • Effects on PT • Effects on selling • Effects on the transport system 	<p>Regulation & Governance</p> <ul style="list-style-type: none"> • Cooperation important • Cooperation • Cooperation challenging • Expectations • Evidence based decision making • Mutual understanding • Silo effect • Roles • Bureaucracy • Criticism • A lot of talks but no actions • Future vision • Impression on MaaS • Proof of value • Regulation 	

The first theme is definitions which is divided into nine different codes. Next, the respondents identified operational and business aspects which refer to the preconditions there are that can affect MaaS, preconditions there should be in order to implement MaaS as well as benefits and challenges MaaS brings. The third set of codes has been used to analyze how MaaS should be designed in order to truly meet the needs of people. The fourth theme describes the possible effects MaaS might have and lastly the fifth theme identifies the roles of different parties involved in the process as well as cooperation and values associated with MaaS.

4. Results

4.1. Definition

As stated earlier, MaaS lacks an official definition. Therefore, the first question asked from the respondents was to describe what MaaS is in their opinion. The most popular answer was the same used by many researchers where MaaS is defined as a single interface or a platform offering all the necessary information for all possible mobility options, including payment, multimodal options and timetables among others. (see Kamargianni & Matyas 2017; Li & Voege 2017; Hirschhorn et al. 2019). However, there was also a lot of variation in further aspects of the definition. Thus, the answers were categorized based on the definition given, and eventually nine categories were formed, classifying the different definitions. The categories are comprehensive platform (popularly used by researchers), user-centric, servitization, public transport, packages, multimodality, shared resources, beyond mobility, and mobility application.

Respondents who considered MaaS to be a comprehensive platform, described it to be one interface that provides information to passengers about routes, has the capability to combine different services needed to complete the whole journey, and enables to pay all the needed services the platform combined for your trip. Therefore, MaaS is an app that is capable to provide everything from one place. Such an understanding of MaaS focuses on making life of the passengers easier when one does not have to find or be aware of all available transport modes.

Rest of the categories can be seen as partial sections of the above definition, but the respondents did not combine all the elements of a comprehensive platform, which is why they are categorized separately. Therefore, they are cut apart as their own definitions, as not all the respondents considered the ambitious comprehensive platform to be the definition of MaaS.

One of the simplest definitions given was that MaaS is a mobility application. All mobile applications providing some sort of mobility services were considered to be MaaS. Uber was given as an example of this definition as stated by one respondent: *“all the apps which include mobility are MaaS”*, (Finnish Public Transport Association). On the other end the broadest thinking was that MaaS is something beyond mobility. In particular, this was explained to mean other services that could be bought along mobility services like concert tickets or restaurant evenings. One respondent described it as follows: *“looking forward when this is looked from bigger picture that mobility services are only small portion that you get when for example paying in restaurant”*, (Traficom). Therefore, MaaS was seen as new way of thinking, a concept beyond mobility, not only as new technology.

Between the simplest and the broadest definition, there was a variety of MaaS definitions. First of these categories is user-centric. It was seen that in MaaS the customer is put in the center of the service or at least it should be. For the respondents this would mean that the customers could buy the exact services they need so there would be no need to pay from anything extra. MaaS was seen as a user-centric way to implement transport.

Another category was servitization. In this category, all mobility executed as a service was considered as MaaS. Description used for this category was MaaS as *“Mobility as a Service”*, as where the abbreviation comes from. Therefore, it is justified to include the category of public transport into this. It was seen that public transport agencies have been doing MaaS for years already, as it is not something people own, but a service. One respondent from the city of Tampere stated that *“in a way we have been doing MaaS for years in public transport”* (City of Tampere).

Others saw MaaS being multimodal transport where one app would provide a travel chain, a trip which is made by combining different modes of transport. MaaS was also characterized as service

packages, which are often understood as monthly packages defined by the different needs of customers. All of this is stated to be executed with shared resources by the interviewees.

4.2. Operational and business aspects

Business model concerned many of the respondents. It was commonly agreed that a well-functioning business model will be hard to find, and such have not yet existed. Pilots were seen as a tool to find out which are good models, and which are not. Nevertheless, the different fundamentals and expectations of public and private sectors were seen as a challenge and concern for the respondents. The public sector is budget-based and private sector profit-based. Therefore, it was questioned if there is any possibility to make money with MaaS. While, private sector expects to make more profit, public sector expects to save costs, and customers expects their expenses to decrease. This worried the respondents and one of them stated that *“customers think that their mobility expenses should decrease, how to do business with that?”* (City of Lahti). It was seen very hard to match all these expectations.

Along with the issue of business model, revenue share and commissions raised discussion. The question was how to share revenues when public sector wants to maintain the same amount of revenue and possible MaaS operator would want something as well. Cities and public transport agencies were quite definite of the fact that there will not be commissions distributed to MaaS operators as stated by one respondent *“no commissions for MaaS providers, it is their job to figure out how to make business out of it.”* (City of Tampere). However, it was considered, that if the MaaS operators would be able to prove a significant increase in service level, decrease in car use, and big volumes, cities could reconsider their position. The cities were quite definite that it would need to be a big change

for the current situation for them to change their stand. It was not seen a valuable situation for public sector if MaaS operators would just resell their public transport tickets.

Despite the above difficulties with business model, the respondents saw some positive economic effects as well. Even though the implementation of MaaS was seen difficult, MaaS is believed to generate business opportunities and expand the industry. Good connections were also seen to improve competitiveness, as especially good connections for the smaller cities can help to attract new inhabitants. Furthermore, it was stated that the car industry spills a lot of money abroad in the form of manufacturing, fuel and spare parts, and that MaaS would bring some of this money to Finland which would then affect the national economy. Respondent from city of Espoo saw that “*servitization can bring some of the millions we use on private cars to Finland*” (City of Espoo).

Efficiency was a factor that was definitely a good side MaaS was seen to provide. It was mentioned as a good thing that MaaS would enable to replace the empty buses with for example on-demand micro-transit. MaaS was seen to be a better solution for areas where volumes are too low to build a decent public transport service. In addition, it was mentioned that routes can also be optimized better with data MaaS provides. The public sector was looking forward to the possibility to combine statutory transport of kids, senior etc., while opening up the trips to paying customers as well.

There was also a lot of debate where MaaS is suitable and where not. One of the biggest cities in Finland was very definite that there is no need for MaaS in city centers where distances are either walkable or easily travelled by public transport. But then again smaller cities were sure that MaaS serves big cities where there is volume which shared services require, and bigger variety of services to combine multimodality from. The smaller cities were worried there is no business model for scattered areas. The new law pushes for market-based services, but there was strong concern among

the smaller and even midsize cities if there is any interest for the private sector to operate where demand is low. So far, there has not been interest, thus the respondents did not see any reason why that would have changed now. One respondent stated that *“there aren't many areas in Finland where market-based service could succeed without public support”* (ELY Lapland).

But there is concern among the public sector on how to attract mobility services. Many cities would want to have new mobility services, but they do not have the tools to attract them. The hope is that MaaS could bring these services but as one respondent stated, *“there are no mobility services in here but is this the chicken-egg situation?”* (City of Tampere). Respondents were wondering if the reason for lacking services is the facts that there is no MaaS or is it the other way around.

This is linked directly to procurement as it is the means for the public sector to acquire services. It was noted that procurement can be used as a tool to promote the birth of new services. However, this is not trouble-free since the public sector needs to be neutral and not favor anyone. Additionally, many stated that currently many cities make procurement very traditionally without thinking would there be more innovative solutions available. Respondent from the ministry noted that *“local authorities could think that would it be possible to organize public transport in a different way”* (Ministry of Transport and Communications).

In addition to the lack of services, technical challenges raised some concern among the respondents. For MaaS to really function, the mobility service providers need to open up their APIs. The private sector was described to be frustrated since the APIs have not been opened properly as the law requires, and public sector on the other hand feels there is no technological know-how. There have been complaints from the private side and public sector has felt it has been difficult to open the APIs. The public sector felt that the schedule for opening up the API, which is required by the new law, was too

strict and therefore the public sector should get some understanding. Regardless, the respondents felt that open data is important, but it should work both ways so that the public sector would have access to the data MaaS operator gathers. Interesting speculation was that would people be more willing to hand over personal data of themselves, if in return they would get more personalized services.

Public transport was considered the most important part and the foundation of MaaS. It was seen important that public transport has a crucial role in MaaS, and some respondents stated that MaaS is no threat to public transport. Actually, MaaS was believed to have positive effect on public transport and it is also a question of sustainability. It was even stated that *“the saturation point for public transport is close, we need new ways to get people from cars to public transport”* (City of Espoo). Therefore, it is important for public and private to cooperate to ensure public transport will actually be the foundation of MaaS.

However, this not a united opinion, as there are parties that suspect MaaS could shift customers from public transport to other services and are therefore not willing to open up their APIs. Especially HSL received some criticism from the cities of being challenging to work with regarding opening their API. Nevertheless, it was noted that the same MaaS model will not work everywhere as even though public transport is considered to be the foundation of MaaS, in some areas will still need MaaS that is based on cars. One solution was hoped to be automation, which could eventually solve this problem of rural areas. It was believed that MaaS will take off when automated vehicles develop.

The respondents seemed to have a clear vision, that MaaS would allow the public transport agencies to limit the services they offer only to trunk lines or the more popular dense areas. Therefore, the task for MaaS was explained to be to fill in the low-density areas. This is described to be the ideal situation and it would result in savings for the public sector. *“In the ideal situation city could only focus on the*

trunk lines and no longer the low inhabitant areas in the era of MaaS” (Ministry of Transport and Communications). Some respondents stated, however, that there could be subsidies for low-density areas for the private services.

The problem with MaaS and mobility services, in general, was pointed out to be the contrast between slow and peak hours. The main issue was described to be the fact that society has been built on the idea that people work during office hours which creates challenges for mobility as most people are trying to use the services the same time. Therefore, it was stated that there will always be capacity problem during peak hours and overcapacity problem during slow hours and MaaS does not solve this problem.

4.3. User perspective

The respondents saw that it is important to make MaaS happen since it provides good benefits for the customers. However, the difficulty is believed to be attitudinal change, which is seen to be slow and hard. Therefore, it was stated that officials cannot just decide how they want MaaS to be, it truly needs to be designed user-centric. Thus, to make people use MaaS, it should make peoples life easier as *“people will not change their attitudes in things that make their life harder”* (City of Vantaa), and even more, make mobility easier by making the services easy to use. Examples that were given were MaaS to provide services from door to door, but also as a newer idea, MaaS could tell what the safest route for kids is to go.

The real challenge for MaaS, or any other mobility service, is to be as easy and effortless or even more than private cars are in order to compete with them. It was described that owning a car requires a lot of efforts such as vehicle inspections and maintenance. In order to attract users, MaaS needs to

offer easier life. It was noted that as public transport does not always suit everyone in every situation, we need services like MaaS to compete with private cars. However, it was pointed out that this might be hard since especially people with family must transport kids to hobbies and buy groceries and these usually require one to have a car. Therefore, it was stated that we need to find a way to coach people to use these new mobility services and MaaS was seen as a tool to get people to use them as noted by one city *“we need to change people’s attitudes towards private cars and to more positive to mobility services”* (City of Mikkeli).

It was stated that one reason people keep using cars might be the investment trap cars create. The biggest expenses car causes are buying and maintaining, after that the costs for using is a lot lower. Therefore, it was highlighted that cars create an investment trap that does not encourage anyone to use other modes once the investment to the private car has been made. The principle of MaaS was explained to be the opposite since you are not tied to one vehicle and can always just purchase the service needed. Thus, MaaS was believed to provide flexibility. One respondent noted how *“customer can use money only for those services they actually need, and funds are not tied to private cars”* (City of Lahti).

There are fundamental aspects of MaaS that were seen to be the key elements to attract users from private cars. Accessible information was one of these key factors to help people to use MaaS. It was believed that easier access to information about routes and tickets will make people use public transport more and that MaaS would give information on all the different options to travel, as stated by one respondent *“we have places that have public transport, but people just don't know how to use it or where to find information”* (ELY Lapland). MaaS is also more convenient and was believed to be cheaper in many cases. Price is also a tool to guide people to more sustainable choices. However, it was argued that effortlessness is better tool to manage mobility behavior than price. Multimodal

integration was hoped to make services more attractive. It was highlighted that the possibility of individual choices gets more diverse which is good for mobility behavior. MaaS was seen to bring flexibility with on-demand services that are not dependent on timetables. Nevertheless, the problem with MaaS was stated to be the fact that even if the app is good the experience is dependent on the journey and therefore it will be hard for MaaS operator to fully control the whole service and travel chain and manage customer expectations.

4.4. Systematic effects

The respondents did not have a clear vision on what effects MaaS will have. That is understandable as there have not been widespread MaaS schemes available yet. Therefore, the effects are rather aspirations and concerns the respondents had. It was stated that *“for now, we don't have proof of any kind of impacts”* (Ministry of Transport and Communications), everything is just theoretical. Thus, it was noted that it would be important to clarify what are we trying to achieve in the big picture as impacts will depend on the policies done. It would also be important to decide what is we want to monitor and then monitor those factors.

One big question that concerns the whole transport system is a daily travel distance. Some respondents were quite certain that MaaS will not affect daily travel distance and number of trips will remain constant as stated by one respondent *“I don't believe MaaS will effect on the amount of travel”* (City of Tampere). This is due to the fact that MaaS is expected to make transport more efficient. Others recognized that there is a risk daily travel distance will increase but it did not seem to be a significant risk. This relates to the issue of car use. The biggest hope was that MaaS would decrease car use, make it more efficient by providing plausible alternative to private cars and to provide an opportunity to give away your car.

MaaS was hoped to be the tool to free people from car dependency. Therefore, MaaS should be cheaper than private cars to get people to use it. A more diverse selection of services and information was also seen to be the tool to shift people from private cars to more sustainable services. Although the decrease in car use is depended on the location, in many places there have not been other options than to use your own car, MaaS was hoped to change that. Others feared that MaaS could also increase car use when prices are low, and usage is made easy. However, it was noted that *“people have wrong images what is this about, it is not victory for car use”* (City of Helsinki). Nevertheless, it was believed that cars will be important part of people’s lives in the future as well.

Congestion was believed to decrease as people would start using other means of transport. MaaS was believed to bring more customers to public transport, and therefore MaaS was considered to be beneficial for public transport. Others believed that MaaS will be a threat or an opportunity for public transport depending on how it is designed. It was pointed out that we need to be careful that public transport users will not change to shared cars and therefore increase congestion. It was believed that the attractiveness of public transport should be done by adding supplementing services like first and last-mile services.

However, there is also a risk of increased congestion if MaaS will attract people to use taxis or such, phenomena so-called “uberisation”. There was a fear among the respondents that people would shift from public transport to taxis if it is made easy. Especially if the services are designed to be monthly packages where public transport and taxis are combined into same service as described by one interviewee *“I am skeptical of combining taxi services with monthly tickets to public transport, we shouldn't increase the use of cars”* (ELY Lapland). The problem in user-centric design was highlighted to be the fact that customers should have the possibility to choose best service for their needs, but will they then choose taxis? Although, there were respondents who saw this unrealistic or

even an opportunity as there are many places in Finland where public transport is not profitable by any measure and shared taxi services could then replace this inefficient system. It was also stated that if MaaS does not fix the basic problems of traffic and generally to mobility, MaaS has small additional value.

MaaS will also expand the selling channel of public transport which would bring more customers. This raised question that whose brand will the tickets then be sold under and will public transport agencies sell their tickets by themselves at all anymore, a question asked by one interviewee *“eventually will public transport authorities sell their services only to MaaS-operators or will public transport agencies sell directly still to customer with their own brand?”* (City of Lahti). Although it was seen that this would take advertising pressure away from the agencies. One city stated that in this situation they would not sell their tickets themselves any longer. However, one respondent noted that small startups do not have the resources for marketing, and they could be supported by the public sector at first.

Environmental effects were considered to be smaller due to MaaS. There was one respondent who had even research to back up the statement: *“there are results that MaaS has a lot of potential to increase the share of sustainable modes”* (Traficom). This respondent had also research to back up the claim that shared resources increase walking and cycling. Other believed that walking and cycling will increase due to increased use of public transport. However, it was pointed out too easily accessible services might even decrease walking. It was also noted that walking and cycling have an ideological background and will not, therefore, be affected by MaaS. MaaS should not contradict healthy mobility but support it therefore some fear that last mile services contradict goals of active mobility. Other health effects were wished to be decreased dust and noise.

As for the spatial factors, it was stated that there has not been a lot of discussion on how MaaS will affect urban planning, but certainly, the hope was that MaaS would decrease car use, which would free valuable urban environment for better use. Furthermore, this would increase the attractiveness of cities. One respondent stated that *“hopefully MaaS makes mobility smarter so that the city space can be used otherwise”* (City of Lahti). On the other hand, it was stated that the biggest problem in cities is lack of space and MaaS will not solve this. The respondents could not agree will MaaS affect the city infrastructure or not, but it was clear that MaaS’ effects on parking made the respondents have questions which they did not have the answers to.

4.5. Regulation & Governance

All things considered, the respondents were hoping for MaaS to prosper in the future. It was stated that there are mostly good things in MaaS along with limitless opportunities. It was considered a problem that there is a lot of talk of MaaS, but no actions. Service providers need to prove the value of MaaS, and it should have some extra value mobility does not currently have. Cities can find money for services that can prove useful for citizens. However, there are some obstacles to overcome before MaaS could realize, and it was therefore believed MaaS is vision for the future. As one respondent stated, *“it will probably take years for an actual MaaS service to come”* (City of Tampere).

The new legislation raised a lot of opinions. In public debate, the Finnish law has been identified as one of the best in the world among many countries. This view was agreed within the respondents who represent the Finnish government. However, the legislation collected a lot of criticism among cities and interest groups who actually must execute it in their daily work. Indeed, the law did not gather any positive acknowledgement outside of government officials.

First of all, the law was seen to be drafted behind closed doors, and the opinion of parties executing the law was not taken into account as described by one interviewee *“Local Finland feels like decisions has been done with closed doors”* (Local Finland). Therefore, the law was not considered to reflect reality as the government was not seen to have knowledge of actual everyday transport planning in cities. Furthermore, the law is same for everyone while cities differ tremendously. It was also considered that the market-based approach was pushed too hard in a low-density country where market-based transport solutions are not viable. This was found to create confrontation between public and private sector.

All the respondents agreed that cooperation between the public and private sector is important and even crucial in order to implement MaaS. Therefore, it was strongly believed that the public sector will continue to have a role, and both public and private sector would need to find a way to cooperate. Dialogue and sharing information were seen important as both parties need to be aware of the latest trends. At its best MaaS can connect different fields that have worked on their own for now. Thus far cooperation has been in silos and there is a lot of travel mode-specific thinking, like one interviewee noted that *“different transport modes are considered individual, could MaaS help with that?”* (ELY Uusimaa). This was described to be a challenge for cooperation as the historical working culture done in silos might resist change. There have been challenges to connect public and private services and transport sector was considered to have a lot of juxtaposition. Obligation and laws were not seen as the best starting point for cooperation which is also one cause for juxtaposition. Additionally, cooperation is challenging since there are different definitions of MaaS.

Contradicting expectation does not make the situation easier. It was noted that in many situations' expectations have been higher than the reality which creates friction between the parties when everyone waits for something to happen, but development is slow. Therefore, it was seen as important

to have a mutual understanding between the parties. Several respondents stated that it would be important to have a conversation between the parties to figure out common goals and how to reach these goals before starting a business. Respondents from Traficom added that “*public and private are allowed to have their own interests but everyone should have the same shared objectives*” (Traficom). Additionally, administrative challenges create obstacles. The respondents described that on the one hand municipalities are not allowed to organize public transport outside their borders which might make it harder to enhance the preconditions for MaaS. And on the other hand, there is a lot of work when MaaS operators need to make individual contracts with all the municipalities separately.

Roles of different parties raised a lot of dissenting opinions. The roles are definitely not clear and therefore there was hope for national discussion on them. At the same time, it was considered that the roles should form by themselves, discussion on them just generates juxtaposition. There were a lot of insecurities about responsibilities and what should be done. Like how the responsibilities are divided between travel chains. However, a respondent from 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. Nevertheless, a respondent from the same group of respondents stated that the purpose of the law has not been to tell exactly what different parties should do. But a respondent representing cities stated that as there are so few services yet that it is hard to define any roles.

Cities themselves stated that their role is to be an enabler by creating attractive public transport and having open APIs. Some cities specifically underlined that they will never be MaaS operators that it is the job for a private sector and that it would be too stiff if the public sector would be a MaaS operator. However, cities want to be innovation platforms and help MaaS operators to operate. One city stated that it should not even operate city bikes in the future. Nonetheless, the respondents from interest groups saw cities to have more of a role. They envisioned that cities could function as MaaS

operators, or that they should be able to choose if they want market-based model or something else. Although the governmental organizations stated that “*publicly owned MaaS model is not something we are doing*” (Ministry of Transport and Communications). Interest groups also criticized that cities must open up their API’s with no restrictions even if someone is taking advantage of them. They saw that as investors to infrastructure they should have means to influence marketing, selling and development, however cities themselves did not state this. One city specified that public transport is a tool to guide urban development and that should stay in public hands. For themselves the interest groups saw the role of an observer and supervising municipalities interests.

The governmental organizations saw that their role is to legislate and make sure there are no legislature obstacles that would prevent MaaS and make sure the law is abided. It was stated that the purpose of the law was to enable and never to tell how to implement. The governmental organizations also saw their role to maintain dialogue with different parties through different networks and forums. Respondents from other groups did not have or share their vision on the role of governmental organizations which could indicate that their role is pretty much clear to all parties. Regional organizations (excluding HSL) did not really see a role for themselves as they are not planning the whole transport system, just supplementing the areas where there is no service.

In other words, there is a pretty clear consensus among governmental organizations and cities that the task of MaaS operator is for the private companies even though the respondents from interest groups had another perception. City of Lahti considered that “*the role of the city is to make integrable API's and give space for private operators*” (City of Lahti). It was stated that public organizations are local, and therefore unable to build regional MaaS service. For private sector the role was to generate market-based services to supplement public transport. Private companies were hoped to be more

brave, innovative and patient. Patience is required since markets are not established quickly. Thus, private companies should also be the ones taking the risks and solving problems.

As there are dissenting opinions on the roles of different actors, the respondents were asked if they would feel regulation would be in order to clarify the roles. All the respondents felt that there is no need for regulation or that it would be harmful or a threat even to the sector. Regulation was seen to be too stiff, and already outdated when it would be done as stated by one respondent “*strong national guidance is difficult since situations change so quickly*” (Traficom). Guidelines from above were never seen to be a good idea and it is not the current political atmosphere to have strong regulation. Now it is just the time to start actually implementing the new law and find ways to cooperate together with different actors.

As the law makes the role of the private sector stronger than it has been before, it raised concerns inside the public sector, especially the interest group. It was feared that since the transport sector is no longer in the hand of public sector, it will not be designed to answer public goals anymore. The biggest concern was sustainability if MaaS would increase use of private cars and decrease use of public transport. It was also feared inside interest groups that MaaS would not be designed to answer societal goals, which is something the public sector have been aiming to achieve through public transport. Currently the situation, as stated by Local Finland, is that “*public sector needs to take care of societal goals and private only of their own economic goals*” (Local Finland).

Therefore, respondents especially from interest group felt that the public sector should have some tools to govern the development which is something the new law has taken away from them. Governing tool was believed to control the attractiveness of the non-desired services so as a result the use of public transport would increase. “*The bad effects will happen if there is no possibility to*

regulate the attractiveness of the non-desired services” (City of Helsinki). Interestingly enough, respondents supporting governance tools were from the interest group, not from the cities themselves, which would indicate different opinion among these two different groups.

5. Discussions

This thesis sought to examine what is the outlook Finnish transport public sector has on Mobility as a Service. Especially, the research focus was on the definition, impacts, and roles. The Finnish government has highlighted the importance of MaaS and therefore it is important to understand how MaaS is actually perceived inside the public sector, among them who essentially have to enforce it. Previous research has also raised the questions on public sectors role for example from regulatory perspective and the contradictory objectives of different levels of public sector. This thesis also aims to contribute to the ongoing scientific discussion.

5.1. Definition

The results indicate that there is a big variety on how public sector representatives define MaaS, everything from a comprehensive platform to public transport. This could be considered that it is not so much the actual definition that vary, but rather the level of integration. Some see MaaS as a comprehensive platform providing all possible mobility services with seamless pay and travel, being the highest integration, when others consider public transport to be MaaS, being the lowest level of integration. Nevertheless, the respondents did not share a common understanding what MaaS is. A similar pattern of results regarding the different levels of integration was obtained by Sochor et al. (2018) who categorized the different levels to be multimodal travel information, integrated ticketing, integrated payment, organizational integration and bundling. The results showed, that some respondents want to see MaaS beyond mobility, a service you can perhaps get when paying for a restaurant evening. Einsiedel (2009: 3) points out that emerging technology has the potential to change multiply sector at the same time, and it seems that it is something MaaS is doing.

Even though there is no officially agreed definition yet, the view of respondents contradicts the idea many researchers share of relatively similar definition, where MaaS is considered to be rather high integration mobile application of several mobility providers with one payment (Kamargianni & Matyas 2017, Utriainen & Pöllänen 2018, Jittrapirom et al. 2017; Mukhtar-Landgren & Smith 2019). Nonetheless, Jittrapirom et al. (2017) notes that the concept is still surrounded by ambiguity, which is one characteristic of emerging technology (Cozzens et al. 2010). Romanyuk (2018) however found that different MaaS players in Finland, mainly from private sector, shared the same definition of MaaS. Therefore, it seems, the Finnish public sector might need to create a common understanding for the benefit of the industry as cooperation with different definitions might be challenging. Additionally, Sochor et al. (2018) stated that bundling different mobility services under one loosely defined concept is damaging for MaaS as it would indicate it only to be the latest buzzword. For emerging technology, it is typical to have different interpretations of definitions and essential characteristics of the technology at this stage of the process. This makes cooperation challenging since parties involved interpret the concept differently and therefore, they are not necessarily having a discussion of the same interpretation. (Meyer & Schulz-Schaeffer 2006.)

5.2. Operational and business aspects

The results showed that the respondents saw mostly challenges in operational and business aspect, from business model, area of demand, lack of services, technical challenges to variation between slow and peak hours. Additionally, there was no agreement if MaaS a desirable concept for public transport or does it just shift users to other modes of transport. Nonetheless, the respondents still foresaw MaaS to induce business opportunities but above all efficiency for public transport.

According to the respondents, working business model will be hard to find for MaaS. This is directly in line with previous findings by Smith, Sochor & Kalsson (2018b) where the interviewees stated that the difficulty comes from the fact that the business model needs to be designed so that it is acceptable for all actors involved. But the result suggested that pilots were seen as a good tool to search for good business model which is supported by previous research which indicate that pilots are a good facilitator of MaaS (Mukhtar-Landgren & Smith 2019). Additionally, the respondents were quite definite that they are not intending to offer commission for MaaS operator for selling public transport tickets even though MaaS was seen valuable concept and the respondents were waiting it to realize. Even though public transport was considered to be the foundation of MaaS, it seems there is no support from public sector to actually execute this since there is no willingness to support the use of public transport by offering commissions or easy use of APIs.

However, a report done by Valdani Vicari & Associati (2019) notes that according to EU competition laws, public transport operators are obligated to price their tickets lower to MaaS operator than end-users in order to enable MaaS operators to function. This is in line with Smith et al. (2018b) results which found that Swedish public and private actors think that reasonable margins should be paid. However, after the interviews done in this study, HSL decided to withdraw the commission they used to pay for physical resale partners, like kiosks, for reselling their tickets. This was justified by the argument of impartiality since MaaS operators were not getting commission either. This of course assured that now MaaS operators do not have any leverage to ask for commissions. (HSL executive board 17.09.2019)

According to Day & Schoemaker (2000), emerging technology compounded with high uncertainty, entice incumbent establishments to just wait and see if the emerging technology, in this situation MaaS, will gain any foothold. The same establishment might also be reluctant to fully commit, which

could be noted in this situation as well, which might explain why the public sector are not willing to provide monetary investment. Additionally, it is common with emerging technology that it shows high potential but has not yet demonstrated its value (Cozzenz et al. 2010). It seems the respondents saw potential with MaaS, and they were intrigued with the concept, however, MaaS has not yet proved its value since there is a reluctance to participate financially. The public sector probably does not see a reason to invest in something they don't fully believe in. MaaS still needs to prove its value but it seems it needs to do it without the public sector. The positive financial aspects of MaaS have not convinced the value of MaaS to the public sector as it was stated that something would need to change drastically for the public sector to reconsider their position.

The respondents could not agree if MaaS is better suitable for urban, suburban or rural areas. Even though there was a representative from a big Finnish city who considered that urban areas do not need MaaS, result by Smith et al. (2018b) pointed out that MaaS is likely in urban areas where there are services to combine from. Additionally, it was stated in Smith et al. (2018b) results that urban areas also have the needed volume for MaaS to function. Furthermore, the respondents from more low-density areas were concerned how to attract mobility services, which makes it harder to build MaaS. One solution was stated to be procurement. However, Mukhtar-Landgren & Smith (2019) noted that there are risks with procurement in situation with high uncertainties and actors who have no knowledge of MaaS. A similar conclusion was reached by Smith et al. (2018b) which stated that public procurement is not suitable for collaborative innovation. Procurement is rather a tool for operating, not for innovating (Smith et al. 2018b).

The results showed that public sector is concerned of the technical challenges MaaS generates. The same concern was raised by Smith et al. (2018) and Jittrapirom et al. (2018). The biggest public transport operator in Finland, HSL was named couple of times related to this for their reluctance to

open up their APIs. HSL did also receive some critical feedback of being hard to cooperate with. The same results of difficult cooperation have been obtained also by Audouin & Finger (2018), Surakka et al. (2018) and Hirschhorn, et al. (2019). Jittrapriom et al. (2017) found out public transport authorities want to hold on to current models and are afraid of losing control, which might be the reason for difficult cooperation. The assumption is that regular public transport user might be the early adopters of MaaS, which in turn might decrease the willingness of public transport authorities to be involved (Jittrapriom et al. 2017; Smith et al. 2018b). Additionally, Mukhtar-Landgren & Smith (2019) suggest that difference in perceived roles between national and regional level might indicate a tension towards HSL. Smith et al. (2018a) points out that Sweden have had the same difficulties but also that public transport authorities organizational culture has a negative influence on MaaS.

In addition to topics covered above, the respondents brought up operational issues. The interviewees from cities stated that MaaS provides an opportunity for them to focus on trunk lines as additional services would cover the quieter areas. There is no research to support or contradicts this. However, it would seem unlikely business model for the MaaS operator to focus on low density areas especially without commissions from selling public transport tickets. In addition, the results in this study are align with results of Smith et al. (2018b) concerning the selling channels. It was unclear for the interviewees in both studies that who's brand will be visible for the end user and who is responsible when there are challenges in the system.

5.3. User perspective

The respondents stated multiply times that it is crucial, for the success of MaaS, to be effortless and easy for the user, possibly even easier than a private car in order to attract users to sift from cars to mobility services. This was stated to be due to the fact that attitudinal change is slow and hard. One

of the most important factors was access to information since the respondents stated that there are still many people that are just not aware of public transport and therefore it is important that MaaS would make information more accessible. Indeed, Giesecke et al. (2016) along with Lyons et al. (2019) points out the importance of convenience in MaaS services is important in order to attract users which was also stated by the respondents of this study.

Furthermore, Lyons et al. (2019) built an MaaS integration taxonomy of the level of user effort. This taxonomy is based on Maslow's "hierarchy of needs". There are six different levels starting from no integration with "no operational, informational or transactional integration across modes" to full integration under all conditions with "full operational, informational and transactional integration across modes for all journeys." They state that it is typical for users to choose the option of low cognitive effort which in reality indicate door-to-door solutions meaning the highest level of integration. Therefore, Lyons et al. (2019) results support the fact that MaaS indeed needs to be as effortless as it can be for the user. However, there is a question of responsibility related to MaaS stated by the respondents. Lyons et al. (2019) and Pangbourne et al. (2019) also highlight this aspect, focusing on the division between different mobility service providers and MaaS operator, and consequent effects on the user experience.

The respondents considered easiness and accessible information to be the key elements to get people to use MaaS. Lyons et al. (2019) supports this by pointing out that better access to mobility services or information might prompt the use of the services. However, if someone is already satisfied with their mobility behavior, they might not have the motivation to change their behavior consisting mainly from private car. Although, as stated by the respondents of this study, which are consistent with the understanding of Lyons et al. (2019), MaaS has the potential to break the investment trap of car

ownership. All in all, there is no extensive knowledge yet of attitudinal change MaaS can create which is something that would need further research. (Lyons et al. 2019.)

5.4. Systematic effects

As there have not been any widespread MaaS schemes available yet, the availability of research studying the effects of MaaS is very scarce (Utriainen & Pöllänen 2018). The respondents were quite certain that MaaS won't increase the daily travel distance partly because they believed MaaS to make transport more efficient. Nevertheless, there is no research to support or contradict this. However, there is some indication that small scale MaaS experiment UbiGo have indeed shown some signs of decreased car use where 48 % of the user reported to use less car due to the experiment and only 4 % reported to use more cars. Karlsson, Sochor & Strömberg (2016) argues that when a car is not always ready waiting to be used, the threshold to use more sustainable mode is lower. The same experiment managed to also change people attitude towards car more negatively, which according to Lyons et al. (2019) might very well be the hardest step of changing behavior (Karlsson et al. 2016b). Therefore, it seems that the early adopter of MaaS are not reluctant to decrease their car use.

The respondents noted that there have not been a lot of discussion how MaaS will affect urban planning but certainly the hope was that decreased car use would free public space for better use. This is in line with the ideas of Rantsila (2015) who believes that MaaS can reduce parking spaces needed and change land use. Decreased car use was also believed to decrease congestion, but the respondents had a slight fear of uberisation if MaaS will attract user to use Taxis. In UbiGo trial 20 % of users reported using more taxis and 12 % user reported using less taxis. In conclusion the overall use of cars and taxis was lesser (Karlsson et al. 2016b). Therefore, it would seem that even though the use of cars and taxis might increase with some users, the overall use decreases. This of course also contributes to the environmental aspects. All in all, even though the respondents were not certain of

the effects of MaaS, it is clear that they still saw more opportunities that MaaS could generate than possible bad effects.

5.5. Regulation & Governance

The results showed that even though MaaS was stated to have mostly good things, although also in the study made by Surakka et al. (2018), it has not yet proved its value to the Finnish public sector which is usual for emerging technology. Cooperation between all parties were seen very crucial. Jittrapirom et al. (2018) results adds that in addition multi-stakeholder cooperation being important, it is very hard. Additionally, König et al. (2016) identified that lack of cooperation might be a barrier for development of MaaS. Nevertheless, Surakka et al. (2018) found that the experience of stakeholder cooperation in Finland has been positive.

Also identified in this study is that contradicting expectations might harm the cooperation. The results indicated that the respondents felt there is a lot of words but no actions, suggesting that the public sector would assume faster results. When comparing our results to those of older studies, it must be pointed out that Smith et al. (2018b) have very different results with public sector interviewees which stated that it was the private sector who has unrealistic expectations of the pace of development.

The process of drafting the new law got a lot of criticism of being exclusive among the respondents. Adouin & Finger (2018) argued that the local government representatives should be included more in the process in order to create more of an accepting atmosphere. However, the key MaaS stakeholder interviews done by Mukhtar-Landgren & Smith (2019) notes that many own their success to Ministry of Transport and Communications and the work they have done for MaaS. Until now, the process has been too slow, and the local governments could have done more to promote MaaS (Adouin & Finger

2018). However, Surakka et al. (2018) found out that from 52 survey answers from administrative side, over half actively supports MaaS.

The results showed that some respondents were worried if the private sector would enforce societal goals when they have a stronger position than they used to have. Docherty et al. (2018) argues that smart mobility solutions will diminish the role of the public sector but Smith et al. (2018b) results reveal that the public sector is concerned of societal goals and argue for the need of governance. An example of the tool to guide the societal goals that was given in Smith et al. (2018b) results, was public funding as it was seen to moderate the difference in societal and business goals. Pangbourne et al. (2019) stated that public sector needs to monitor the development in order to ensure that mobility behavior is transforming into more sustainable direction.

There were some contradicting views on the roles of different parties in the results. Surakka et al. (2018) found similar results concluding that there are various opinions and ideologies of public sectors role in Finland. The results are also supported by Mukhtar-Landgren & Smith (2019). The results in this study revealed that Finnish cities saw the role of an enabler for themselves and stated that public transport authorities' role is to create attractive public transport services. However, Ambrosino, Nelsin, Boero & Pettinelli (2016) notes that it is the role of public transport authorities to lead the MaaS initiatives which differs from the results of this study.

Mukhtar-Landgren & Smith (2019) argues that the new legislation done by the government and active the role of the private sector has forced HSL to take a partner role instead of promoter role. However, Hirschhorn, et al. (2019) concluded HSL to have the role of provider arguing that due to the recent legislative changes, HSL have been directly involved in the development of MaaS by recruiting resources and creating OpenMaaS API. Nevertheless, Hirschhorn, et al. (2019) adds that HSL

reluctance to cooperate in the beginning might be for the fear of losing direct link to the customers, something they have been building for so long. Additionally HSL have had very strong position which is now possible threatened. In Sweden there have been two strong views who should take the lead in MaaS. Others argue that it should be the public transport authority, yet others believe that the public transport authority should just remain in their current position and just take care of public transport. This caused the Swedish transport authority to be indecisive on what role they should take in the emerging ecosystem. (Smith et al. 2018b.)

Additionally, Surakka et al. (2018) added that the interests of different size cities are not aligned, which is supported by the results in this study. The central government stated to have a clear vision on the roles, but cities on the other hand felt that it has been difficult to execute this vision when the supply of services have been so low, so therefore there are no private players to take an active role. Mukhtar-Landgren & Smith (2019) noted that the distinctive perceived roles between different levels public sector might create pressure between different parties. They also concluded that one characteristic of MaaS might very well be public sector that is indecisive of their own role (Mukhtar-Landgren & Smith 2019).

Nonetheless, the respondents were very clear that they wish no regulation to clarify the roles as regulation is usually very stiff, same regulation is unsuited for different cities and fast outdated. It was seen that regulation could very well damage the industry which is still finding its place. The reluctance of regulation might also be due to the lack of trust towards governmental organizations that is formed after the unopen legislation process. Ambrosino et al. (2016) noted that public sector has a key role to enable MaaS with supportive regulation, which has already been done in Finland with the Act on Transportation services.

6. Concluding remarks

Part of this study was to find out what is the definition of MaaS according to the public sector. The results showed that the Finnish public sector lacks a commonly shared definition for MaaS, or more precisely the respondents did not share mutual understanding of what level of integration can already be considered MaaS. Some considered only the highest integration of a comprehensive platform to be MaaS and others considered low integration such as public transport already to be MaaS. However, it is clear that the industry should try to form a common understanding of MaaS, as multiply definitions and ideas might harm the conversation.

Additionally, the purpose was to identify what is the perception of MaaS and its impacts inside the public sector. Apart from the difficulties, it seems that the public sector sees MaaS as a concept generally from positive perspective, something that could possibly ease people's lives. However, the difficulty lies in the business model which was believed to be hard to find. In addition, even though the public sector is welcoming MaaS, they are not prepared to offer funding support in the form of commissions. This might be due to the fact that commonly emerging technology has not yet proven its value which might deteriorate the willingness to offer economical investments. In fact, the public sector was waiting for reduced costs for themselves if MaaS was able to make transport more efficient. Thus, in conclusion the public sector is concerned that there is no business model for MaaS especially in scattered areas and at the same time they are not willing to offer commission for selling public transport tickets, and simultaneously hoping that MaaS would allow the public sector to withdraw their services from scattered unprofitable areas, areas that would then be private sectors responsibility. This can indeed be a hard combination to build a working business model from.

The resistance to fully invest, economically or otherwise, might as well be due to insecurities caused by lack of services, implementation of market-based model in low-density country and lack of technical knowledge, in addition to the economic aspects, all issues that have risen in the interviews. The public sector does not have answers for the previously mentioned questions which might create insecurity and slow down the development. Furthermore, as a market-based model is being pressured, it might also impair the willingness of public sector to act, as it not in a sense their worry anymore.

Regarding the impacts of MaaS, as they are really just speculation, they can be interpreted as reflecting wishes, fears and values. Therefore, an impact that was hoped the most was reduced use of car use, which would lead to better land-use and diminished congestion. There is a slight fear of losing public transport users or people preferring car services when there is better access. Issue that should be addressed in order to smooth the cooperation, however there are preliminary results that the effect is more the opposite. Nevertheless, it was pointed out that now would be time to consider what are the effects we want to observe and act accordingly. Altogether the respondents saw more possibilities than possible bad effects in MaaS.

The last research question was how the public sector see their own role in MaaS. The results showed that generally the public sector considers private sector to have significant role as the MaaS provider. However, there were some conflicting perspectives. Biggest of them was cities role from the point of view of cities themselves and interest groups. Cities mostly saw themselves as enablers, however interest groups saw that cities should have more power and control. In fact, cities were hoping MaaS could actually diminish their role if they could discontinue costly services in low dense areas. Additionally, there was no mutual understanding of the role of MaaS providers, should it serve the dense or more low inhabitant areas.

The biggest local transport authority in Finland received some criticism of not accepting the role given to them and therefore being hard to cooperate with. It seems that the regulating parties have had a clear vision on roles of different parties even though the purpose of the law has never been to exactly tell what different parties should do. However, this vision has not been as transparent to other parties as it seems to have been for the government. In conclusion it appears that there would be a need to develop a shared understanding of the role of public sector. Furthermore, it should be taken into consideration how future policies and legislations are formed as now the public sector outside of the government felt they had been excluded which might have hindered the cooperation. The Finnish legislation have been recognized around the world but the reluctance of executing parties might impede the development. Legislation effort disconnected from the complexity of emerging technology has potentially resulted in a conflicting situation, as opposed to a collaborative one

In conclusion, the Finnish public sector has a positive perspective towards MaaS and believes it to bring a lot of opportunities in many fronts, especially to the end-users. Although only when some issues of implementation have been solved, those mainly being the business model. However, MaaS has not yet proven its value and therefore there is reluctancy to fully invest in MaaS inside the public sector. The public sector is waiting for the benefits to realize which might in the end change their position if they see MaaS to bring great additional value. The process of implementing MaaS have faced some slowness as the public sector feel they have been told to do something by the government they do not have ability currently to do.

This thesis has left open questions that would need future research. As the scope of the study needed to be defined, the private sector was intentionally left out. However, to fully understand the industry, it would be important to do a similar study from the private sectors perspective. Additionally, as a working business model raised concern among the respondents, it would be beneficial to research

what would be working business models and what not and which kind of area are they suitable for. Furthermore, this study raised the question what the actual motivations for people to use MaaS are. Easiness, price and flexibility were offered but this study only raised some of the possible motivations and did not examine their relations to each other.

This thesis has provided some insight of Finnish public sectors view on MaaS. However, it has some limitations. Firstly, it should be acknowledged that interview as a method is exploratory and therefore does not provide definite answers. Thus, interviews are not suitable for testing hypothesis, rather it is descriptive method. Furthermore, the results obtain in this thesis cannot be generalized beyond the data gathered for this thesis. Secondly, there is no large scale MaaS scheme available yet, therefore some of the opinions might be based on impression on MaaS rather than actual facts, since there are no facts available.

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Appendix 1.

Interview protocol

I am urban studies and planning student of the joint master's program of Helsinki University and Aalto University. As part of my Masters thesis, I am inviting you to participate in research which aims to understand perspective of your organization of MaaS and the changes it brings. The aim is to understand the understanding of MaaS, implications caused by MaaS and implications for your organization. You have been selected for this research for your important position, and I am really thankful for your efforts and time for this research.

The interview will take approximately 1 hour. The interviews will be recorded for later analysis, but the interview records will be confidential. The interview records won't be distributed forward. They are only for my analysis of the research.

Do you have any questions at this point?

Let's move on to the interview questions.

- 1) Would you tell a bit about your background and tasks in the organisation?
- 2) DEFINITION. What is MaaS in your opinion?
 - a) What problems your organisation sees in MaaS?
 - b) What positive your organisation sees in MaaS?
- 3) IMPACTS. What is your impression on the impacts of MaaS to ...?
 - a) Generally to mobility
 - b) Public transport
 - c) Private cars
 - d) Bicycle and pedestrian traffic_
 - e) Environment and emissions
 - f) Congestion
 - g) Customers
 - h) Other
- 4) CURRENT ROLES AND COLLABORATION (incl. Challenges): How has your organisation been involved in MaaS so far?
 - a) In which way has the collaboration between your organization and other organizations in relation to MaaS been going on so far?
 - b) What kind of challenges are there in collaboration with various organizations?
- 5) FUTURE ROLES AND COLLABORATION:
 - a) How do you see the role of your organization change in ... due to MaaS?
 - i) Infrastructure (physical and data)
 - ii) Production of the service
 - iii) Selling/Marketing
 - iv) Developing and planning the whole system
 - v) Regulation
 - b) How does your organisation plan to take part in MaaS development in the future?
 - c) How would you describe the role division between public and private to be in the future regarding MaaS?
 - d) How should pricing model be designed between public operators and private operators regarding commissions for selling tickets?

- e) What kind of challenges do you see there to be between different organisations in the future?
- f) Should the roles of different organisations be clarified in, for example, national or EU level?
- 6) Have you changed your definition of MaaS during this interview?

All the questions are now gone over. Do you have something you would like to add or say?

Thank you again for your time and answers. They are very important to me and my research. If you still have something you would like to add or comment, you can contact me via email.