Urban Mobility

Activity Deliverable

20029
Report on the analysis of existing regulatory policies and governance models related to MaaS.

EIT Urban Mobility - Mobility for more liveable urban spaces

EIT Urban Mobility

Barcelona | 30.03.2020

eiturbanmobility.eu

Reporting year	2020
Activity code	20029
Deliverable No.	DEL03
Deliverable title	WP 2.1 - Report on the analysis of existing regulatory policies and governance models related to MaaS.

Document information

Author(s) and contributing partner(s) - if any

Name	Organisation	Contribution
Ping-Jen Kao	University College London	Chapter 1-8. 20.02.2020
Imma Ribas	Technical University of Catalonia	Chapter 4-5 21.02.2020
Joel Wolff	Aalto University	Chapter 4 & 6 22.02.2020
Marianne Catteau	Frog design (LTP: Altran)	Chapter 4 & 6 23.02.2020
Valeria Caiati	Eindhoven University of Technology	Chapter 4 & 6 24.02.2020
Laia Pagès	CARNET – CIT UPC	First submission 30.06.2020
Laia Pagès	CARNET – CIT UPC	Second submission 08.10.2020 (after EIT request on 30.09.2020)

Contents

1. Executive Summary

The objective of D2.1 is to provide comprehensive insights on mobility as a service (MaaS) regulatory schemes. To achieve this objective, the research team collected secondary data and conducted semi-structured interviews with public authorities and MaaS operators to investigate factors that influence MaaS regulatory policies and governance models. In addition, Amsterdam, Barcelona, Helsinki and Manchester were selected as 4 case studies in this deliverable to further explore the future regulatory scheme for MaaS deployment. An aggregate data analysis was performed to compare 4 case studies. These findings, together, provide 3 implications for European policy makers to design and implement more suitable regulatory policies and governance models to support the development of MaaS.

First, the findings show that there is a huge potential to leverage existing transport policies at national level and extend them to MaaS. However, from a long-term perspective, the MaaS operators expect that EU will impose concrete standards to MaaS in the future, which might gradually replace the regulations at national level. Therefore, the policy makers might be prepared for an evolving process to extend their existing national regulation to MaaS and then adapt it based on the update of EU regulations. It is critical to take this evolving process into account when designing a transport strategy and plan.

Second, the findings identify 12 factors that might potentially influence MaaS regulatory policies and governance models. These factors are further categorized into 3 groups: economic factors (i.e., market competition and market entry barrier), political factors (i.e., taxation, subsidies, incentive to consumers, data sharing and standardization, data privacy and security, use of public resources, and vulnerability) and social factors (i.e., accessibility and equity, environmental benefits, and health and well-being of citizens). For policy makers, it is important to examine these factors and evaluate how the design and implementation of MaaS regulatory schemes might be positively or negatively influenced by these factors. The design of best MaaS regulatory scheme will also largely depend on the combination of these factors.

Finally, the analysis of 4 case studies indicate that the European regulations might be the most important one for MaaS implementation in the future although there is currently no specific MaaS regulation at this level. With concrete European regulations, policy makers are able to choose the most suitable governance model and maximise the effectiveness of MaaS regulatory schemes.

2. Introduction

European policy makers have been working to enhance quality of life in the places we live and work through the development of new mobility services and technologies. MaaS is central to achieve this objective. MaaS is a new concept aiming to provide passengers with flexible, efficient, user-oriented and ecological mobility services covering multiple modes of transport on an one-stop-shop principle (Kamargianni et al., 2018). It offers multimodal route planners and different services under one fare and on the same ticket. MaaS brings together various transportation options including public transport, bike sharing, ride-hailing, on-demand options, etc. and enables citizens to plan their route, choose their preferred mode of travel and book and pay for everything via one app.

This background makes the MaaS ecosystem more complex than other new mobility services and technologies. In particular, data providers in the MaaS ecosystem play an important role to offer a superior multi-modal experience to customers because they process, repackage, and publish data to support information on routes, payment, pricing, and the real-time position of transport services. There are also many technological actors who provide different technical support to make MaaS solutions viable. Given the complexity of MaaS, policy makers and MaaS operators need to understand relevant MaaS policies and regulations in order to design actionable plans for the future.

Therefore, this deliverable reviews regulations and governance models that are relevant to MaaS to better understand the current status of MaaS policies. Then, it investigates how MaaS regulatory policies and governance models are influenced by different economic, political and social factors. Finally, 4 case studies in Amsterdam, Barcelona, Greater Manchester and Helsinki Metropolitan Area are conducted to investigate what kind of MaaS regulatory schemes are expected in the future. The results of this deliverable provide recommendations for policymakers to design MaaS regulatory schemes in order to achieve their ultimate policy goals.

This document is comprised of the following chapters:

- Chapter 1 has a succinct executive summary for D2.1.
- Chapter 2 presents an introduction to discuss the motivation and structure of D2.1.
- Chapter 3 summarises the methodology of this deliverable, including desk research, interviews with experts and case study analyses.
- Chapter 4 reviews governance models and regulations relevant to MaaS.
- Chapter 5 analyses main economic, political and social factors that influence MaaS policies and governance models.
- Chapter 6 discuss 4 case studies.
- Chapter 7 summarise key findings and provides suggestions and guidance for policy makers.

3. Methodology

There are 4 phases of data collection and analyses in D2.1. Figure 1 shows the procedure of data collection and analysis.

```
┌─────────────────────────────────────────────────────────────────────┐
│                              Phase 1                                  │
│  Preliminary review of regulatory policies and governance models      │
│                        from other projects                            │
└─────────────────────────────────────────────────────────────────────┘
                                   │
                                   ▼
┌─────────────────────────────────────────────────────────────────────┐
│                              Phase 2                                  │
│  Secondary data collection on MaaS regulations & design of interview  │
│                               guide                                    │
└─────────────────────────────────────────────────────────────────────┘
                                   │
                                   ▼
┌─────────────────────────────────────────────────────────────────────┐
│                              Phase 3                                  │
│  Secondary data collection on key factors & initial interviews with   │
│                  public authorities (See annex)                       │
└─────────────────────────────────────────────────────────────────────┘
                                   │
                                   ▼
┌─────────────────────────────────────────────────────────────────────┐
│                              Phase 4                                  │
│  In-depth interviews with public authorities and MaaS operators &     │
│  write-up of case studies, with an aggregate analysis to compare 4    │
│                            case studies.                              │
└─────────────────────────────────────────────────────────────────────┘
```
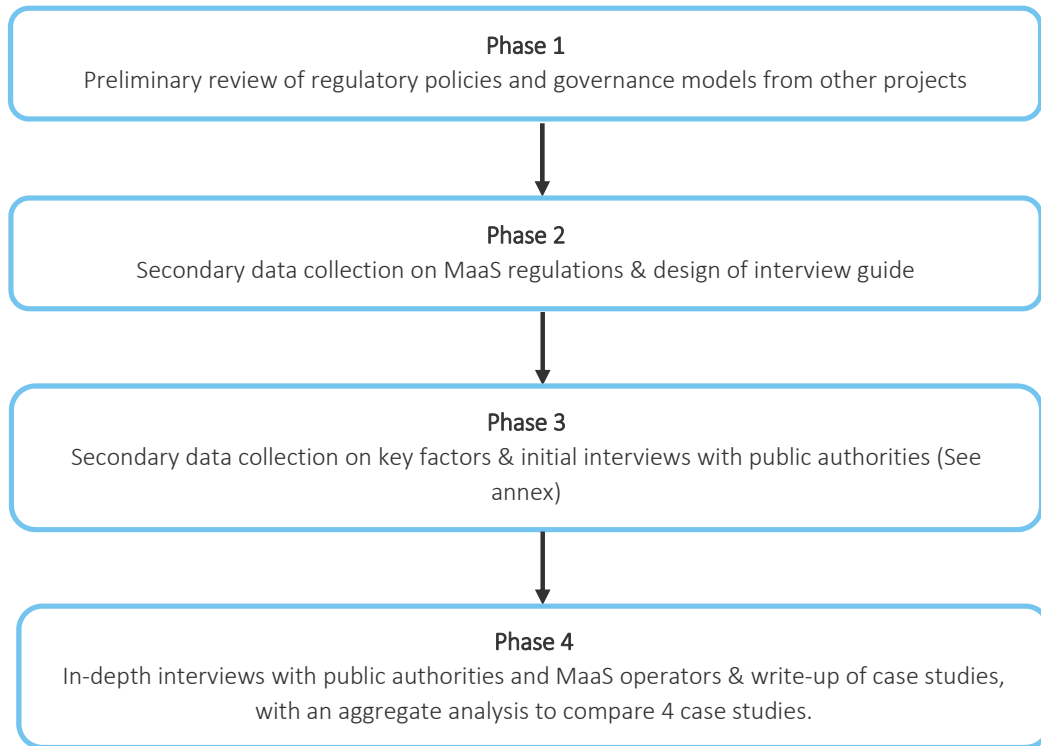
Figure 1 Data Collection and Analysis

In the phase 1, a preliminary review of regulatory policies and governance models was conducted through other projects linked to PROMaaS, such as MaaS4EU, GECKO, and IMOVE. This review serves as the foundation of D2.1 and build up the initial understanding of MaaS regulatory policies and governance models. However, the review also shows that there is a limited understanding of MaaS regulations and regulatory schemes in the existing literature and projects. Based on the result of preliminary review, a further investigation on current regulations and governance model is conducted.

In the phase 2, we collected secondary data from the literature, industry reports, newspapers, government website and other open sources to explore the latest regulations that are relevant to MaaS. Interview guides was also developed at this stage. This interview guide includes semi-structured questions that stimulates discussions between the interviewer and interviewee on the topic of MaaS regulatory schemes.

In the phase 3, factors that influence the MaaS policies and governance models were explored via further secondary data collection and initial interviews. These factors are divided into three categories: economic

factors (i.e., market competition and market entry barrier), political factors (i.e., taxation, subsidies, incentive to consumers, data sharing and standardization, data privacy and security, use of public resources, and vulnerability) and social factors (i.e., accessibility and equity, environmental benefits, and health and well-being of citizens).

In the phase 4, we selected Amsterdam, Barcelona, Helsinki and Manchester as case studies in this deliverable because they have constantly engaged in MaaS projects and have stronger connection with ProMaaS partners. Semi-structured interviews with public authorities and MaaS operators were conducted to explore the MaaS regulations and existing and future MaaS regulatory schemes. Before the interview starts, the interviewer describes the interview objective and introduces the deliverable context to interviewees. During the interviews, different types of questions were asked, such as grand tour questions, verification questions, and other questions. After the interviews, the researchers continued to collect other relevant data to triangulate results and complete the write-up of cases, with the aggregate analysis of 4 cases to find guidance for MaaS policy makers.

4. Governance Models and Regulatory Policies and for MaaS

4.1. MaaS governance models

Governance models are the fundamental of MaaS regulatory schemes. It is usually implemented with relevant policy instruments in order to achieve the objectives of particular regulatory schemes. In D2.1, MaaS governance models refer to different types of ownership models characterizing the MaaS operator. There are two extreme governance models that a MaaS system can have (Pagoni et al., 2018).

Broker model

The first includes a situation where the MaaS operator is a single entity and acts as a broker, meaning that it buys and resells capacity in MaaS packages (i.e., broker model). In this case, the MaaS operator takes on full risk and responsibility of the activities. As a principal-agent relationship, bilateral agreements are essential to ensure data exchange, interface compatibility, provision of availability of services and the related fare pricing.

Partnership model

The second situation is when the MaaS operator is a partnership of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the partnership and can be referred to as the "MaaS coordinator" (i.e., partnership model). The MaaS operator coordinates the activities of partners and form an alliance in the MaaS ecosystem. Such alliance requires multilateral agreements and encounters the challenge of revenue allocation. The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.

Other models

There are other governance models that have different characteristics and are more appropriate in certain situations. First, a mixed model that combines different characteristics of broker and partnership models. Second, a model that the MaaS operator uses in-house resources to provide MaaS solutions. Third, a model that the MaaS operator outsources all of its responsibilities except certain key function (e.g., financial transactions).

9

There is no absolutely best governance model in terms of MaaS. Different cities/regions usually need to customize their governance model based on the availability and reliability of existing transport system, the local transport policies, and the market status. Moreover, they need to see whether the existing transport regulations are compatible with specific MaaS governance models.

4.2. Existing regulations that are relevant to MaaS

This section reviews regulations that are relevant to MaaS from other projects (e.g., MaaS4EU and GECKO) and secondary resources. Overall, 25 relevant regulations are identified and included in this deliverable. These regulations come from the areas of data, MaaS, micromobility, shared mobility and other categories. This review shows that there are very limited regulations for MaaS. To accelerate the development and implementation of MaaS, it is important to refer to regulations in other categories which might be applied to MaaS. Table 1 summarizes these regulations in terms of their categories, types of regulations, implementation status, country and city.

Table 1 Summary of Regulations Relevant to MaaS

Regulation Category	Regulation Name	Type of Regulation	Implementation Status	Country level	City	Description
Data	Directive EU 2019/1024	EU Directive / Regulation	Implemented	EU level	N.A.	Open data and re-use of public sector information The Commission considered that action at Union level was necessary in order to address the remaining and emerging barriers to a wide re-use of public sector and publicly funded information across the Union, in order to bring the legislative framework up to date with the advances in digital technologies and to further stimulate digital innovation, especially with regard to artificial intelligence.
Data	Regulation 886/2013	EU Directive / Regulation	Implemented	EU level	N.A.	Commission Delegated Regulation (EU) No 886/2013 of 15 May 2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to data and procedures for

						the provision, where possible, of road safety-related minimum universal traffic information free of charge to users.
Data	Regulation 2015/962	EU Directive / Regulation	Implemented	EU level	N.A.	Commission Delegated Regulation (EU) 2015/962 of 18 December 2014 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide real-time traffic information services
Data	Regulation 2017/1926	EU Directive / Regulation	Implemented	EU level	N.A.	Commission Delegated Regulation (EU) 2017/1926 of 31 May 2017 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services.
Data	Directive EU 2019/1024	EU Directive / Regulation	Implemented	EU level	N.A.	The Directive on open data and the re-use of public sector information provides a common legal framework for a European market for government-held data.
Data	Regulation (EU) 2019/1150	EU Directive / Regulation	Implemented	EU level	N.A.	Regulation (EU) 2019/1150 of the European Parliament and of the Council of 20 June 2019 on promoting fairness and transparency for business users of online intermediation services. Online intermediation services can be crucial for the commercial success of undertakings who use such services to reach consumers. To fully exploit the benefits of the online platform economy, it is therefore important that undertakings can trust online intermediation services with

							which they enter into commercial relationships.
Data	The Re-use of Public Sector Information Regulations 2015	National / Regional / Local law	Implemented	United Kingdom	N.A.		This regulation allows the re-use of information from public sector entities
Data	Federal Open Data Act of 18 May 2017	National / Regional / Local law	Implemented	Germany	N.A.		This regulation establishes a central support agency for open data. German Government has their open data publicly available.
Data	Personal Data Protection Act 2012	National / Regional / Local law	Implemented	Singapore	N.A.		This regulation governs the collection, use and disclosure of personal data by organisations.
Data	Digital Government Agenda	Agenda	Implemented	Netherlands	N.A.		This agenda is part of the Dutch Digitalisation strategy and contains rules on how governments deals digitally with citizens, the application of which may be desirable for the MaaS programme.
MaaS	Shared Mobility, MaaS and the Regulatory Challenges	Recommendation	Implemented	EU level	N.A.		MaaS has the potential to provide a platform that will allow users to combine traditional and new mobility services. In doing so, it can reduce the disutility users would face from simply switching from the private car to public and/or active transport (i.e. walking and cycling). A number of issues emerge in this respect. Those are linked to the role of data, platforms and apps, as well as to the regulation of traditional and new modes of transport. This report attempts to frame those questions and proposes a number of answers and policy recommendations.

MaaS	Mobility as a Service and Sustainable Urban Mobility Planning	Recommendation	Implemented	EU level	N.A.	MaaS might be a valuable ally for decision-makers and planners in cities to reach their mobility goals. Multimodal and user-centric by nature, MaaS may have the potential to provide an attractive and efficient alternative or addition to private car use and to promote a shift towards sustainable transport modes and a more efficient use of transport networks.
MaaS	MaaS Services and Business Opportunities	Recommendation	Implemented	Finland	N.A.	This recommendation evaluates the emerging traffic service markets and analyses the impacts and business opportunities of MaaS for Finland. A key element in the development of MaaS are the organizing and platform services, as these facilitate innovations and services for efficient and sustainable mobility.
MaaS	Framework Agreement for the Implementation of 7 regional, Nationally Scalable MaaS Pilots	Agreement	Implemented	Netherlands	N.A.	Framework agreement for the implementation of 7 regional, nationally scalable MaaS pilots, issued by the Ministry of Infrastructure and Water Management, Directorate General Mobility. The aim of the Framework Agreement is for the public authorities to create scope for experimentation and remove obstacles, and for the Service Providers and Transport Providers to cooperate and share data with each other and with the Public Authorities.
MaaS	Programme of Requirements as part of the	Programme of Requirements	Implemented	Netherlands	N.A.	This Programme of Requirements is part of the tender dossier and the MaaS Framework Agreement (Framework Agreement) for the implementation of 7 regional,

	Framework Agreement for the Implementation of 7 Regional, Nationally Scalable MaaS Pilots					nationally scalable MaaS Pilots.It consists of the following parts: Chapter 1: Introduction. In addition to the reason for the pilots, the objectives of the Framework Agreement are described here, as well as the relevant data flows for this and the context for the functional requirements included in chapter 2. Chapter 2: Functional requirements and requirements regarding data input for the MaaS learning environment. This chapter describes the requirements imposed on the MaaS services and the MaaS service providers.
Micromobility	Road Traffic Act 1988	National / Regional / Local law	Implemented	United Kingdom	N.A.	The inability to use e-scooters in the UK. This is typical of the need to have more pro-active and flexible means of addressing the rapidly evolving challenge of new mobility in cities around the world.
Micromobility	Car-sharing Policy	National / Regional / Local law	Implemented	Australia	Sydney	The objectives of this car sharing policy are to increase use of car sharing, and to ensure that the city's car sharing program is well-governed and transparent.
Shared Mobility	Deregulation Act 2015	National / Regional / Local law	Implemented	United Kingdom	N.A.	Private hire vehicle regulation: subcontracting by operators and criminal liability in the case of subcontracting.
Shared Mobility	Greater London Dockless Vehicle Hire Byelaws	National / Regional / Local law	Will be implemented	United Kingdom	London	1. This is a proposed legal text – a guidance document. 2. These areas will include (but may not be limited to):

						a. Proposed approaches to enforcement;
						b. Principles for identifying appropriate places to park;
						c. Processes for demarcating them;
						d. Standards for communicating their whereabouts; and
						e. Charges associated with parking in them.
Shared Mobility	Ordinance on the Operation of Motor Vehicles in Passenger Transport	National / Regional / Local law	Implemented	Germany	N.A.	Regulation is common for taxis and private hire vehicle. The only difference lies in the obligation of private hire vehicle drivers to return to their company's headquarters after each trip.
Shared Mobility	Act on the Priority of Carsharing	National / Regional / Local law	Implemented	Germany	N.A.	This Act enables measures to give priority to car-sharing in order to promote the use of car-sharing vehicles within the framework of station-independent or station-based service models in order to reduce the effects of motorised private transport on the climate and the environment.
Shared Mobility	Subsidy Scheme for One-way Electric Shared Vehicles	Subsidies and incentives	Implemented	Netherlands	N.A.	Subsidy for parking permits for 100% electric shared cars that can be used throughout the city. Valid from 1 October 2017 to 1 June 2021.
Shared Mobility	Parking Permit for Car Sharing without a Stand with	Subsidies and Incentives	Implemented	Netherlands	N.A.	Car sharing organizations can apply for a parking permit for the entire city for their free floating sharing service with 100% electric vehicles. A maximum of 750 permits are available for this and a

	100% electric vehicles					maximum of 350 units are granted per provider. From March 31, 2020. The experiment for the city-wide parking permit for shared cars ends on 31 March 2020. If the organization wants to use the city-wide parking permit for shared cars after 31 March 2020, then it must request the permit (s) again.
Other	170/2017. (VI. 29.): Government Decree on Electric Car Charging Services	National / Regional / Local law	Implemented	Hungary	Budapest	Government Decree on certain public tasks related to the dissemination of electromobility in Hungary (for example electric charging). Also alternative fuel labelling and greenhouse gas emissions regulations. This instrument also amends the 2012 Regulations to allow certain transport fuel suppliers to claim credits relating to the reduction of greenhouse gas emissions resulting from the production of transport fuels, known as upstream emissions, in meeting emissions reduction targets in 2019. These credits incentivise producers of
Other	243/2019. (X. 22.): Government Decree on Electromobility Services: Electric Charging Devices and Stations, Tasks of the Electromobility Provider, Pricing	National / Regional / Local law	Implemented	Hungary	Budapest	Similar to above one.

5. Analysis of Main Economic, Political, and Social Factors

As Table 1 indicates, there are very limited regulations directly relevant to MaaS. Therefore, this chapter investigates the economic, political and social factors that influence MaaS regulatory policies and governance models.

5.1. Economic factors

Market competition

Competition between MaaS and other mobility solution and between MaaS platforms

The growth of one mobility service operator could lead this operator to a monopolistic situation that blocks the entry of other operators and take advantage of its position to control the market and up fares. The same could happen if there is only one MaaS operator, which could dictate the terms under which the transport provider sells tickets to the operator. However, a multi-player MaaS environment could become confusing for the user (Hoadley, 2017).

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
MaaS market competition drives public authorities to design innovative policies with the consideration of diversified mobility solutions. However, fierce competition and dynamic market conditions increase the difficulties for public authorities to develop concrete and long-term policies related to MaaS. In particular, public authorities often need to make a balance between new and old policies to find harmony between innovative and traditional mobility services.	Although market competition will enhance service quality, provide diversified offerings, and increase supply, it will hamper the partnership model's adoption in the market. The fierce competition might destroy the trust between mobility service providers and MaaS operators, making cooperation even more complicated than the non-competitive market. Moreover, single MaaS operator could always raise mobility prices to the end-users, with the possibility of the increased income being taken as profit by the MaaS brokers rather than distributed amongst the transport operators.

Market entry barrier

Factors that prevent or make it difficult for new MaaS firms to enter a market

High market entry barriers can block some operators' market access, which could reduce the offer of services into the MaaS. Data can be one potential entry barrier if MaaS operators use the data generated to block new mobility providers from entering the marketplace through developing some mechanism related to data ownership (Pangbourne et al., 2020). Some infrastructure could be another entry barrier. For instance, in electric vehicle carsharing, the development of the charging infrastructure can be a market barrier. In Paris and Copenhagen, the local authority invested in the event of this infrastructure, facilitating the introduction of carsharing services. In contrast, in Madrid, each service provider must install their charging points (Lagadic et al., 2019). Finally, regulation can block the entry of some mobility services. In some European countries, the launch of ride-hailing has met massive opposition from taxi associations because they consider them unfair competition. In Spain taxi drivers, protested since ride-hailing are not paying enough taxes and have a cheaper cost of VTC licenses compared to that of taxis. In Hungary, regulators expelled Uber from the country. Conversely, Finland opted to deregulated taxis to secure a fair competition between both services.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
The new mobility services lead to new regulations, both for each business model (e.g., UBER) and the general transport regulation. These regulations must allow the coexistence of current and future business models related to the transport market and their role in the MaaS platform.	In the MaaS broker model, the leading entity can block the entry of some services or impose its criteria to fix the play rules among the service companies.

5.2. Political and legal factors

Taxation

The existing taxes and tax reliefs

It is important to reflect on how 'smart mobility' will be taxed. On the one hand, the use of electric vehicles will reduce the tax revenues because they are more efficient than the internal combustion vehicles and because the tax on electricity is much lower than the fossil fuel tax (Lindberg and Fridstrøm, 2015). On the other hand, taxation could help the efficient usage of mobility services. According to Docherty et al. (2018, p.120) "Congestion charging or time-varying per mile tariffs remain at the forefront of options which would

address usage effectively, but there could be alternative or additional approaches which for example address the liveability impacts of pick up and drop off in environmentally sensitive areas."

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
Taxing vehicles, fuels, and road use will significantly influence MaaS regulatory policies. The public authorities should avoid conflicts between taxation policies and new MaaS policies. The strategic consistency between them is critical to the long-term planning of MaaS implementation.	In the broker model, the aggregator can use time-varying price structures and provide both the technology platform and the political cover to support a change in how the network is charged (Docherty et al., 2018).

Subsidies

Sum of money conceded by the state or a public body to provide mobility service with a low price

Operators of shared services are increasingly being used as a substitute for public transport in some areas. This fact can help to provide transport services in areas where public transportation does not exist or is not efficient. For instance, in Pinellas Park, Florida, in August 2016, the agency responsible for the area's public transportation stopped running two bus lines. It started paying for a portion of Uber rides instead (Brustein, 2016). However, building the business using aggressive subsidies leads to a risk of leaving car-less residents without mobility options (Pangbourne, 2018).

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
Public subsidies could be an option when mobility services permit reaching areas that are poorly served by public transport or the elderly, disabled or weak, or provides a first or last-mile connection with public transport the subsidies (Cerre, 2019). However, there are some examples that the service could not survive without the subsidy (e.g., Kutsuplus, in Finland), which could leave an area without mobility options.	The governance styles and transportation subsidies in different independent municipalities do not allow market players to compete and establish business models that bring demand and supply into a natural balance (Surakka et al., 2018).

Incentive to consumers

Economic measures used by governments to stimulate the economy

Governments, in an economic crisis environment, have been using different incentives to stimulate the economy. One of the most used is the incentive to buy a new car to help the automotive industry in its countries. This industry represents a significant part of its Gross Domestic Product (GDP), and it generates a lot of work directly and indirectly. Due to the coronavirus pandemic, some countries have announced a new incentive to stimulate this sector. Germany has raised the incentives to buy electric cars and has cut the sales tax on more fuel-efficient internal combustion engines (Winton, 2020). The Spanish government has announced direct aid to buy a new car. The assistance will depend on the vehicle's emissions: the more polluting ones will receive the lowest subsidies, while zero-emission vehicles will attract the maximum amount. To be eligible for the subsidies, it will also be necessary first to scrap a more than 10 years old car. The amount of the aid will depend on the vehicle's emissions: the more polluting ones will receive the lowest subsidies, while zero-emission cars will attract the maximum amount (Urra, 2020). Perhaps, new incentives have to be considered, which are more aligned with the sustainable mobility strategies driven by cities.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
The incentive to buy a new car helps neither the use of alternative mobility services nor the deployment of MaaS. However, in an economic crisis, governments need to launch some measures to stimulate the economy. Therefore, it could be recommended to find new formulae coherent with the mobility strategies followed by the cities. For instance, incentives to use shared mobility services could drive to their deployment, which, at the same time, could lead them to invest in increase their fleet of vehicles and renewing the existing ones.	In a public-private governance model, governments could be less reluctant to give the incentive to increase the use of shared mobility services.

Data sharing and standardization

Clarity regarding who will own data as part of a MaaS solution (traffic, payment, personal, etc.) will be shared

MaaS needs public and private mobility operators to share data to offer its customers the most convenient door-to-door travel. But some mobility operators have some concerns about to whom the customer belongs to because they do not want to lose control over the customers' data to do marketing campaigns or send them personalized offers. On the other hand, it is necessary to establish standards for data exchange between mobility services. The Act on Transport Services, in Finland, obliges passenger transport

service providers to ensure that essential up-to-date data on its services are freely available from an information system (open interface) in a standard, easy to edit, and computer-readable format.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
In the provision of MaaS, data needs to flow between the different actors so that the right services can be offered at the right time. The success of MaaS policy implementation will largely depend on data-related policies, such as data standards, data sharing, data integration, and data ownership. The state needs to exert some control over data generated by the mobility services to avoid anti-competitive practices and other negative externalities (Docherty et al., 2018). Finally, MaaS need the interoperability of tickets—one ticket for several services from different providers. Some regulations about the procurement and the criteria to satisfy everyone and simplify the work of customers are needed.	MaaS aggregates different services in just one place. Therefore, it is necessary to define some prevalent criteria related to support services, terms, and conditions of use, software, and licenses. These interfaces need to offer fair, reasonable, and non-discriminatory terms.

Data privacy and security

Clarity of what data will be used and the use that will be given

Shared mobility operators maintain sensitive personal data of their users and employees. Some operators have suffered from cyber-attacks, which has obliged them to implement measures to ensure data security (Shaheen et al., 2016). Moreover, data leakage draws more attention from public agencies since Uber exposed the personal information of around 57 million users around the world (Jin, 2018).

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
Data shared between the different actors raises a question of how data can be shared in a way that respects the user's privacy and does not breach their permissions. Some regulations about cybersecurity and privacy should be provided when introducing new MaaS regulatory policies.	MaaS aggregators and their associate mobility services operators have to take measures to protect sensitive data.

Use of public resources

Privilege access to public resources

In some cities, the mobility operators have privilege access to public space for free or for a small fare. In the case of car-sharing, the service's deployment depends on the availability of car park spaces. In Copenhagen, the city council gives reserved parking space at the cost of a 30 euro car/year to the round-trip schemes. In Madrid, fully electric vehicles and plug-in hybrids can park everywhere free of charge and without time limit (Lagadic et al. 2019). Besides, in some cities, shared bicycles, scooters, or kick-scoter services have a dedicated space on the road to park the vehicles by paying a reduced tax by car and providing the geolocalization to control where they are stationed. On the other hand, in some cities such as Barcelona, taxi services are allowed to use the fast lines dedicated to buses, which could also be used by ride-hailing operators.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
The allocation of public space to the different mobility services or the use of fast lines can help deploy the shared vehicle services and provide charge points for electric share services. However, some cities (and citizens) are concerned with the proliferation of shared vehicle services because they fill the city with their vehicles, occupying a space that is also used for parking private cars.	The public space is a scarce resource that has to be shared between the different partners.

Vulnerability

Vulnerability in relation to MaaS's dependence on ICT

Relying only on MaaS systems to provide mobility services implies a substantial disruption potential due to power failure, ICT failure, or cyberattacks (Pangbourne, 2018).

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
If access to transport is through MaaS platforms, these must be included in critical infrastructure protection strategies (Pangbourne, 2018).	Each mobility operator has to analyse its vulnerability and establish contingency plans.

5.3. Social factors

Accessibility and Equity

MaaS entails various level of accessibility and their use can be challenging for certain groups of people due to physical, economic or technological limitations

The access to the new mobility services and to MaaS in particular, requires the use of mobile application which can exclude part of the population due to difficulties in handling new technologies or having access to banking (Paangbourne et al, 2020). This question is more concerned if these services substitutes public transit which is accessible to all community members (Jin et al., 2018). In Polis (2017) it is suggested to avoid a situation where MaaS offer only addressed the most profitable part of the market with some areas with better transport provision than others.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
The choice of MaaS solution over another is usually guided by the benefits of that part of the population that travels more often. These people typically have higher incomes, which means that the interests of the lower-income part of the population that cannot bear high travel costs are overlooked. It has been argued that accessibility (both financial and physical) should be an essential factor in designing and implementing new MaaS policies and regulations. Moreover, such equity and accessibility issues will need to be considered for governance models.	The public-private partnership model could better guaranty accessibility and equity since the public transport operator focusses on enriching its services by integrating additional services. However, in the broker models, these characteristics should also be guaranteed.

Environmental benefits

Maas could lead to a reduction in car use and/or car ownership, which would reduce congestion and improve urban air quality

If there are a convenience offer of mobility options and the car's use is less attractive, customers may be more disposed to use public transport and to walk or use a bicycle that the private car (Hoadley, 2017). Hence, MaaS can remove a significant number of cars from the network, with drivers switching mainly to public transport (Kamargianni et al., 2018). However, the pre-paid models of MaaS could imply a rebound effect because MaaS users could make more trips to take advantage of the unlimited modes in their packages (Pangbourne et al., 2018). Besides, public transport use could be reduced by the shared vehicles available through MaaS, which would not reduce congestion (Pangbourne et al., 2020). Therefore, governance actors need to decide which modes should be prioritized according to the social and

environmental needs of their jurisdiction and specify MaaS packages accordingly (Pangbourne et al., 2018, p.13). Cerre (2019) recommends continuing and enhance policies aimed at increasing the share trips made by public transport, walking, and cycling and implement policies that discourage the use of private cars.

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
MaaS has the potential to achieve environmental benefits but also could feed unsustainable individual practices. Hoadley (2017) suggests that if a subscriber does not use all the trips, notably the taxi or car-sharing trips, that are part of a monthly package, these are carried over to the next month. Besides, the author also suggests transport authorities to ensure that public transport fares remain low to keep them affordable and make it an attractive travel option.	In the public-private partnership model, public transport could have a central role in the MaaS offer, helping to reach the environmental benefits. In contrast, in the broker model, the use of more sustainable practices (walking or cycling) or the role of public transport is in the aggregator's hands.

Health and well-being of citizens

The transportation modes included in the MaaS packages will affect users' physical health and subjective well-being

Key active travel sharing options have to be integrated into MaaS packages. For many people, the efficient way to achieve minimum recommended levels of physical activity is to switch some shorter journeys to active travel (walking or cycling). Having a MaaS package might result in a neglect of these minimum amounts of active travel through its door-to-door promise (Pangbourne et al., 2020, p.43).

Influences on regulatory policies (positive/negative)	Influences on governance models (positive/negative)
Walking or cycling has to be incentivized. By subsidizing actives modes, local authorities can drive citizens to use this option on short trips.	Active travel modes such as walking or cycling have to be included in the point-to-point route in the Broker and Public-private model.

6. Regulatory Schemes for Future MaaS Deployment

This chapter presents 4 case studies to investigate what MaaS regulatory scheme is expected in the future. Four cities (i.e., Amsterdam, Barcelona, Helsinki and Manchester) are selected as case studies because they have engaged in MaaS projects. To complete case studies, researchers collected secondary data and conducted semi-structured interviews with public authorities and MaaS operators. Each case study follows the structure of case background, international and European regulations, national regulations and regulatory scheme for MaaS deployment.

6.1. Case 1: MaaS Regulation Scheme in Amsterdam

Case background

Four virtual interviews were conducted to collect data and information of the impacts of current regulations on MaaS implementation and MaaS governance models and regulatory scheme in Amsterdam. Specifically, the interviews involved two representatives from the public sector and two representatives from the private sector, directly involved in MaaS-related initiatives at different levels. The collected information were also integrated with data derived from desk research, to have a more comprehensive overview of the ongoing development in the field.

Amsterdam, the Dutch capital city, is one of the first European cities to have officially adopted a smart city strategy. Initiated in 2009 and organized in the form of a public-private collaboration between municipalities, knowledge institutions, businesses, and citizens, the Amsterdam Smart City Programme aims to implement a multidimensional approach to develop innovative and sustainable solutions to common global challenges and specific urban planning challenges (Amsterdam Smart City, 2020). The results achieved through its strategic approach to smart cities and its holistic vision in city innovation related to key areas of urban life have also been internationally recognized. As an example, in 2016 Amsterdam won the European Capital of Innovation award (iCapital) from the European Commission (European Commission, 2016).

Transport and mobility represents one of the thematic area of the Smart City Programme. A plenty of initiatives and measures have already been implemented and have been planned for the coming years to overcome the complex challenges related to the increase in mobility demand. By 2030, it is estimated that the population density in Amsterdam will increase from 5,100 inhabitants per square kilometre to 5,700 (City of Amsterdam, 2020a) with consequent rising pressure on public spaces and impacts on accessibility and liveability. Public transport currently connecting the various city's areas by metro, tram, bus, train and ferry and relying on the smart ticketing infrastructure valid at national level (i.e. OV-chipkaart), is expected

to continue playing an important role to ensure that the densely populated city functions properly. For this purpose, the Amsterdam Metropolitan Area and the Dutch government have made huge investments to improve regional accessibility, aimed at realizing new metro routes, fast-connecting tram-lines, and at giving priority to bus and trams over cars on the streets in specific parts of the city (Gemeente Amsterdam, 2013). Although the private car use in Amsterdam (31%) is considerably lower compared to other Dutch cities and the "active modes" (walking and cycling) have a high share (46%) (KiM, 2019), the city still strives to reduce traffic congestion, especially in the city centre and surrounding neighbourhoods. Along with the new developments in public transport network, to discourage car traffic and ownership, the city government has taken a variety of measures to: (i) improve its cycling network; (ii) improve bicycle parking through new regulations and the stimulation of new bike parking habits; (iii) reduce on-street parking; (iv) adopt new mobility concepts, such as shared mobility schemes, smartphone-driven traffic management, and water-based goods transport. For instance, electric car sharing and scooter sharing services and on-demand transit systems are successfully diffusing in Amsterdam, serving as an extension of the city's public transport network. This is also demonstrated by the huge increase in car sharing usage of 376% since 2008 (Amsterdam Smart City, 2017). However, the use of shared-cars is less than 1% of the total car usage. The increase in car sharing usage has also been stimulated by the Green carsharing Deal, formed by leasing and insurance companies, municipalities such as Amsterdam, mobility start-ups and environmental group (Green Deal, 2018). Taxis were also included in the Amsterdam's policy framework for traffic and transport. In fact, in 2013 Amsterdam introduced a new policy to regulate taxis that are engaged at a licensed taxi rank or hailed on the street (City of Amsterdam, 2020b), with the aim to improve service quality and consumer protection, reduce traffic disruption caused by taxis, and increase the number of cleaner taxis.

Apart from multiple platforms each offering shared-mobility services, ride-hailing service, ride sharing services, journey planner applications, a concrete shift to a MaaS model of transportation has not taken place in Amsterdam. However, the city is actively involved in a MaaS initiative, the MaaS Zuidas pilot project. This is one of the seven nationally scalable MaaS regional pilots that have been initiated in 2017 by the national government, specifically by the Ministry of Infrastructure and Water Management, to gain experience on MaaS and understand how MaaS can contribute to the different policy goals related to sustainability, accessibility, liveability, and inclusion. After a tender for framework agreement, the Ministry selected 24 consortia consisting of parties already involved in shared-mobility concepts or with MaaS for certain degree, such as IT and platform companies, bank and insurance companies, public transport providers, automobile companies and start-ups (Ministry of Infrastructure and Water Management, 2019). Specifically, consortium responsible to run the MaaS pilot in Amsterdam is made up of four parties, namely Radiuz, Amber, Over Morgen and Trandev. Together they have developed the Amaze app expected to be publicly launched for the first time in September 2020, while the full operational launch in the app store is expected for December 2020, as indicated by the four interviewees. The app is primarily created for business travellers and commuters, with the aim to ease their trips to and from the business district of Zuidas in Amsterdam. The accessibility of this area is under risk due to the increasing traffic and the large-scale roadworks which might reduce main roads capacity for the next ten years. The app will be then scaled up to other users groups, to then serve the entire Amsterdam Metropolitan Region and ultimately the whole country. The app has been developed to allow the end-users to plan, reserve, pay and receive personalised recommendations for their trips, and combine public transport with car sharing, bike and ride hailing, as an attractive alternative to the private cars. The launch of the app follows a trial called Zuidas Mobility Experience. During this project, a group of workers who currently drive to the area received a

mobility budget to spend for their trips and were challenged to give up their cars and change their mobility patterns for a month.

Overall, as pointed out by the four interviewees, the nationwide MaaS initiative and the MaaS Zuidas pilot projects offer valuable opportunities to stimulate healthy competition and collaborations. These were facilitated and steered by the Ministry of Infrastructure and Water Management and the local governments, which initially worked on bringing together all the different parties and frequently doing consultations with MaaS service providers, to ensure an effective link with the defined policy goals and the creation of the right (legal) conditions for a successful open working environment in which data and knowledge are shared between all stakeholders. It's interesting to note also that for example, in Amsterdam the tender has been designed in co-creation between national and local governments and prominent employers in the area. The co-creation process involved also future users, which actively participate in project experiments and an in-depth study aimed at delineating different target groups and underlying motivations (Ministry of Infrastructure and Water Management, 2019). This information together with all the data collected during the MaaS pilot by the selected parties and the involved transport operators have to be shared among each other and with the governmental organizations, while ensuring the end user's privacy. This is a requirement of the framework agreement. In this way a MaaS Learning Environment (Ministry of Infrastructure and Water Management 2018a) is set up, to monitor MaaS development and come up with data driven and adaptive policy and regulation.

From the interviews it emerged that barriers are mainly related to the system of public obligations and concessions given to public transport operators, which might position them in an advantage position compared to smaller transport operators, which therefore may experiencing some difficulties in gaining market share. Other barriers are related to the opening of the ticketing systems of transport operators, with public transport operators that need to make available their travel products to different MaaS providers, and to the presence of different regulations, requirements and permits procedure for shared mobility services. For instance, car sharing companies need to follow different procedures to obtain the parking permits in different cities, such as Amsterdam and Den Haag. A harmonized and uniform system of regulations and requirements is needed especially for small companies or start up that strive to adapt their business to each city in which they operate.

International/European regulations

A first aspect for which international and European regulatory frameworks could affect MaaS implementation in the Netherlands, and subsequently in Amsterdam, concerns the development of an integrated ticketing schemes and payment services, which currently are not homogeneous across the various countries of the European Union. As underlined by two of the interviewees, this is especially important in case of cross-border scalable platforms. To gain knowledge on how to successfully address this issue, the Ministry of Infrastructure and Water Management together with the Province of Limburg have initiated a pilot project focused on multimodal cross-border mobility as part of the nationwide MaaS initiative (Ministry of Infrastructure and Water Management, 2019). This is particularly challenging especially when it comes to public transport considering that the ticketing systems of the neighbouring countries are heterogenous, thus requiring an efficient cooperation with partners from abroad (Belgium). So European regulations on the provision of EU-wide multimodal travel information services are expected

to influence the implementation and development of a MaaS initiative with a cross-border scope also for the city of Amsterdam.

Another important aspect to consider for the implementation of a MaaS service based on ticketing and payment integration relates to the facilitation of open exchange of data and information. Apart from EU Directives and Regulations on open data, also non-legislative initiatives are expected to positively influence MaaS implementation in Amsterdam, and in general in The Netherlands. For instance, one of the interviewees pointed out that the MaaS Alliance is putting particular efforts to facilitate a single, open market and to develop a common standard and harmonized API for digital mobility services. These standards can be adapted at national and local level, instead of inventing new ones. Currently, the Transport Operator to Mobility Provider API (TOMP-APIs) aimed at create a standardize interface for data exchange and service interoperability are being developed by an open working group with public and private stakeholders, in consultation with the MaaS Alliance Technology and Standardization working group.

Lastly, Amsterdam and the Netherlands can also make use of the developments made by the EU ITS Platform, considered as the technical European ITS Knowledge Management Centre. This platform aims to contribute to the use of ITS standards and specifications. One of the element of the platform concerns with data quality, and is looking with particular interest towards multimodal transport (Ministry of Infrastructure and Water Management, 2018c).

National regulations

A first set of regulations is related to public transport, widely considered as the backbone of MaaS. Specifically, one of the interviewees explained that in the Netherlands the concessions for public transport are regulated at two levels: the national level, which sets out the rules for the national rail system; and the regional level, which set out the concession rules for the local regional public transport operators. Therefore, the implementation of a MaaS scheme aimed at including public transport in its portfolio of offer will be inevitably influenced by those regulations. However, currently there is no regulatory scheme within the concession systems either at national and regional level that define the rules for opening up the ticketing system of public transport providers and to set out the environment for a smooth collaboration between public transport operators and MaaS providers. This might imply that there could be the possibility that public transport is not offered with a MaaS service, if the public transport operators do not agree to open its ticketing system and to collaborate with a MaaS provider, with potential negative consequences on MaaS implementation. To start to overcome this regulatory gap, at national level it has been defined a sort of agreement involving all the regional bodies in charge of public transport concessions (Ministry of Infrastructure and Water Management, 2018a). According to this agreement, they are requested to put in a set of rules within their concessions, to ensure that the parties that win the concessions will open up their systems to MaaS providers.

A second set of regulations relates to all the other transport modalities essential for MaaS implementation, such as taxi service, shared bike service, shared car service, etc. Specifically, three of the interviewees specified that it concerns the requirement for data sharing and the standardization of the communication system. One regulation that is coming into play aims to include a regulatory measure according to which the willingness of a service provider to adopt the established standard for the communication system becomes a key element for the release of the permit requirement, which depend on the city regulatory

framework. This means that it's up to the local government to adopt this standard within its own regulatory framework. On the other hand, at the national level and for the purpose of the seven MaaS regional pilots, the Ministry of Infrastructure and Water Management is facilitating the development of standards/APIs (Ministry of Infrastructure and Water Management, 2018b). An open working group (formed by on-demand car operators involved in deploying interoperable services to support MaaS-development in the Netherlands, the consortia that have signed the framework agreement and the participants in the precompetitive dialogue phase of the MaaS-Programme) have been established and is currently working to develop and specify the TOMP-API for use by Transport Operators and Mobility-as-a-service Providers (Ministry of Infrastructure and Water Management, 2020). In the Framework Agreement, one of the responsibilities of the service provider is, in fact, the acceptance and the adoption of standards and APIs established by the Ministry and in the context of the Pre-competitive dialogue.

Among the open standards and regulations in force in the government and applicable to MaaS, there is also the Digital Government Agenda (Rijksoverheid 2018), containing the rules on how the governments deal digitally with citizens (Ministry of Infrastructure and Water Management, 2018c).

MaaS governance model

According to one of the interviewees, the Amsterdam MaaS pilot initiative can be seen as a market initiative following a kind of commercial approach. This means that the provider of the Amaze app (the MaaS service developed by the consortium in Amsterdam) takes all the risks. For instance, the responsibility of the customer-supplier relationship is up to the MaaS operator. Within this context, the role of the local government is to support the consortium formed to provide MaaS as it is a sort of start-up and ensure that the provided service is designed to effectively fulfil certain policies goals within the Amsterdam region. In other words, the City of Amsterdam and the Amsterdam Transport Authority (Vervoerregio Amsterdam) helped the consortium to set up the business, by encouraging the successful development of the service and removing possible barriers to MaaS development. This is done through funding provision, as an incentive to initiate the business and get the system running, and data and information provision, concerning for instance commuters travel patterns and trips origins and destinations. However, the public authorities do not share any risk with the MaaS provider, neither are responsible of the commercial agreements with transport operators.

Another interviewee pointed out that considering that the MaaS provider takes on the risks of the activity, such as missed payments, frauds, thefts, there might be some fragility in the system that the MaaS operator need to cope with. On the other hand, the governance model put in place for the MaaS pilot in Amsterdam overcomes some drawbacks that might come with a model in which the public transport operators are the MaaS providers. These are related for example to the duration of the concession period and the renewal probability of the concessions and to the possible disturbances in the open market regime, as stated during one interview.

Overall, in Amsterdam the MaaS market acts as a free market aimed at opening up mobility in a more holistic way. An open system in which mobility options are linked not only to a single MaaS operator but to all MaaS providers operating in the city is highly encouraged. To make the governance model really successful, public transport companies are also highly encouraged to participate actively and cooperatively in the development of the MaaS. This will allow the MaaS operators to provide the customers with a more

comprehensive service, including bundles based on two-part or three part pricing schemes (e.g. discounts on standard fares, flat rates, etc.), similarly to the model adopted in Helsinki or Antwerp. Within this context, the Netherlands Authority for Consumers and Markets (ACM) is also looking at all the different types of MaaS initiatives, in order to protect consumer interests, making sure for instance, that the consumers at least are offered with fair prices, and that there's no market obstruction.

Regulatory scheme for MaaS deployment

All interviewees agreed that currently in Amsterdam there is not an actual MaaS regulatory scheme, yet. This is expected to be in place in two years. However, the central and regional governments are both working to establish such scheme, whereby the service providers and transport operators are required to collaborate. Moreover, there is no exclusion, which means that every MaaS provider can act on the Dutch market.

At the city level, current regulatory schemes on public space and shared mobility services are influencing MaaS deployment. The city of Amsterdam is responsible of regulating how the public space is used. As explained by one of the interviewees, this means that it controls for instance the organization of the design of the streets to incentivize the usage of certain transport modes such as bicycles or public transport over others or it controls the usage of parking spaces. Specifically, by regulating parking spaces for shared mobility services, the city of Amsterdam can set up one of the key elements of MaaS regulatory scheme, which concerns the permits release for certain services. Currently, when shared mobility operators apply for these permits via a tender procedure, they will accept a number of rules and requirements, which are related for example to the need to use specific data and communication standards (i.e. TOMP-APIs) to connect with MaaS providers. Same rules are applied in a similar way to the permits release for other shared mobility operational schemes, which do not require the allotment of specific parking spaces but needed to be allowed to operate with a maximum number of free floating vehicles in the public space. Specific national and regional regulatory-requirements involving public transport operators (such as the national railway company, the municipal public transport operator) will be also taken into account in the transport concessions, so that these services are included in the MaaS ecosystem.

According to one interviewee, one of the key elements to include in the MaaS regulatory scheme to improve it is related to the introduction of a sort of steering measures that will allow the government in evaluating the provided services and ensuring the successful achievement of policy goals. For example, according to these measures, the government may intervene when some negative effects might occur and may help to steer the MaaS development in the right direction. Encouraging and enabling the data sharing is an important aspect to realize these measures. A first step in this direction has been already taken through the set-up of the MaaS learning environment. This represents an essential part of the entire MaaS ecosystem, since it helps the governments in understanding the underlying cooperation structures between transport operators and MaaS providers, in evaluating the provided service and thus developing well-informed policies.

Another element concerns the conditions that need to be put in place for guaranteeing an open and free market and to avoid monopoly situations, by realizing an open ecosystem so that everybody can join. Examples of measures to regulate this system provided by one of the interviewees might be related to certain technical and financial mechanisms for the design of well-balanced contracts, to some kind of

financial rewards for those who demonstrate to successfully deliver the service and to quality labels so that both MaaS providers and transport operators are encouraged to deliver efficient and reliable services.

Overall, for MaaS future deployment a complete top-down approach is not considered as the best one. A desirable MaaS regulatory scheme for the future is one designed to enable and ensure that all the involved stakeholders that are part of the ecosystem had to offer something of value for a successful MaaS deployment (e.g. information, data, resources) in exchange of something which is valuable and beneficial for them.

6.2. Case 2: MaaS Regulation Scheme in Barcelona

Case background

Barcelona is the second largest city in Spain with about 1.6 million living in the urban area and 3 million people in the metropolitan area (Barcelona Travel Guide, 2020). The area covers 636 km2, 46,5% of this surface is occupied, mainly around the central agglomeration. The rest of the area is mainly agricultural.

The city host either traditional transportation mode like metro, city buses, tram and suburban railways. They also have modern transportation mode, such as micro-mobility, car sharing and ride sharing. Figure 2 summarises transport modes in Barcelona.
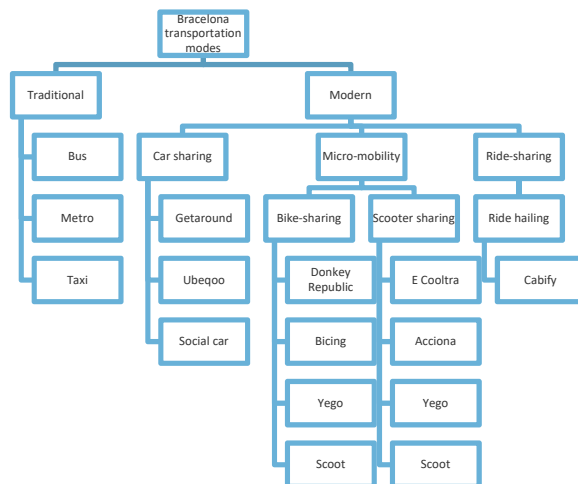

Figure 2 Barcelona Transportation Modes

This transport system is managed by different entities. Table 2 captures the role of each entity involved in the governance model.

Table 2 Entities Involved in Governance Model

AMB (Metropolitan Area of Barcelona)	It's a public entity that manage public transport in metropolitan area, including metro and bus of the city of Barcelona. They are also responsible of urban or suburban bus services connecting the 36 municipalities in the area.
ATM (Metropolitan Transport Authority)	It's a public entity formed by the consortium of Catalan Government, the AMB, the Barcelona City Council and the ATMU. Roles: • Manage suburban tramway • Manage and cooperate all planning instruments in the RMB (Regió Metropolitana de Barcelona) • Decide on public transport tariffs, establishing financial agreements, developing mobility plans • Develop public transport infrastructure They published in July 2020 the mobility master plan (2020-2025), where they describe governance, planning and digitalization of mobility directives
Ajuntament de Barcelona	It's the local government of Barcelona City Council. It regulates the modern transport in the city of Barcelona.
ATMU	It's a non-profit association of city councils that manage urban transport in Catalonia.
Generalitat of Catalunya	It owns exclusive competencies in the matter of land-use planning and management of transport services that operate completely within the Catalan region. It delegates the development of transport services in the metropolitan area of Barcelona to the ATM and AMB. Note that the Department of Territory and Sustainability of the regional government of Catalonia manage the concessions with the transport operators that are not managed by the AMB.
Other municipalities	Each municipality can regulate modern transportation mode in its area. Rules can differ from one to another.
MaaS related institution	Some other organizations are deeply involved in MaaS deployment in Barcelona like Carnet, Factual and Renfe.

For 10 years, Barcelona is undergoing a smart city transformation. Barcelona is investigating several opportunities for the development of MaaS. To illustrate this development, Table 3 lists several private and public Maas initiatives.

Table 3 Initiatives around MaaS in Barcelona

Initiatives	Creation date	Description
Iomob	2017	White label MaaS solution that combines proprietary algorithms enabling multimodal combinations of public and private services, and an application that allows end users to discover mobility services, receive multimodal combinations for their journeys, book and pay for a range of mobility services (Frost, 2019).
Smou app	January 2019	Barcelona app that provide information on street and below-ground parking services as well as electric charging points and the shared bicycles' network.
City trips	2018	Offer a multimodal door-to-door experience that is as seamless as possible in the current fragmented offer of our cities. Bike sharing, moto-sharing, car sharing, public transport, taxi and VTC are gathered in this application.
Maas Catalonia	2018	They developed a manifesto with 7 principles advocating the idea of a new mobility paradigm. The intention is to generate awareness and exposure for all formats of Mobility as a Service platforms over the world (Chadwick, 2019).
Galileo 4 mobility	2019-2020	Galileo 4 mobility has two pilots in BCN: one MAAS aggregator AND another one public transport on demand.
T-Mobilitat	2013	Project to create a card-based smart ticketing system which will enable and reinforce the MaaS eco-system (Palasi, 2019)
Virtual Mobility Lab	2018	CARNET implemented a cutting-edge simulation environment for the Barcelona Metropolitan Area. One of the first tests, of the Virtual Mobility Lab, showed that a fleet of 4,000 shared vehicles could serve 10% of daily car trip demand. This would lead to a considerable improvement in traffic in the city as well as a reduction of pollution levels.

With the development of MaaS, there is a challenge around the use of technology by citizens. According to a study done by Mobile World Capital Barcelona in 2016, 'The digital divide in the city of Barcelona'. Indeed, Barcelona is a well-connected city with high Internet usage and access rates. But it remains gaps regarding access, use, and quality of ICT usage. We explain it by variables such as age, profession, education level and income. Another difficulty is link to the density of people in Barcelona. Adding new transportation modes leads to an increasing risk of accidents. Each addition of service new to be study carefully, that is why they are very regulated in the city.

Today, a lot of services are not integrated into the public channel, the user has to use private platforms to make reservations and payment. The T-Mobilitat project will give some tools to reduce the problem. This topic raises up also economic, indeed there is implications around cost and revenue issues. The last difficulty that they face is the information management to ensure consistency. There are some questions to be solved, such as how agents must be trained to diffuse it and how it's shared around different partners.

For our public authority interviewees there is here a difference of vision between public authority who are looking at citizen who must have access to transport as a human right and private company who are more looking for clients and revenues. To encourage the development of MaaS regulation must be set to coordinates the different entities.

International/European regulations

There's no international or European level regulation of the MaaS as now. This type of regulation is complex, as it must consider country specificities. Main discussions at this level are around data access and General Data Protection Regulation (GDPR). They are discussing on how to regulate and open the right to access operational from transport operator and make it easier for digitalization services to make it accessible.

Today, the right of accessing any transport data is regulated by the ITS directive (2010) but this directive is from many years ago and at that time the mobility services didn't exist as the value proposition. It's said the transport data should be accessible to third parties. But it's not going into details, which kind of data, operational data etc, it doesn't include critical information beyond shadows and static data which are easily accessible from data.

National regulations

Currently regional regulations are the one that impact the most the current development of MaaS as it answers concrete questions on the field. Regulation of services are quite mature, as an example there is a decree to regulate shared vehicle services in Barcelona. It establishes the number of permits in the city and per company, it also defines terms and conditions of use. It was updated in February 2020 [10]. Also, after strikes from the city's taxis, they create a regulation in January 2019 that set some rules for ridesharing app. This regulation set different rules like a minimum booking time of 15min for those app.

There is also some work around share and access to data. As there is no national or EU regulation around it, the regional and local administration have had to regulate themselves to some extent. For example, administrations such as the AMB are allowing the user to access the service of some private operator on

the platform but the user can't make reservations or payments yet. At the national level, there isn't regulation in place yet, only best practices and pilots.

MaaS governance model

For now, Barcelona is developing their MaaS scheme with partnerships especially with private operators and then include public transport information. It seems that at the beginning of a MaaS project, cities must develop the best appropriate partnership to grow confidence between partners and increase knowledge on each activity. From the private stakeholder interview, the broker model can appear as an ideal, as it offer a clear unique point of contact for all services. But it seems not feasible today due to the lack of confidence between actors." But as it was said per one person I'm not sure it can be written here.

Regulatory scheme for MaaS deployment

The MaaS regulation model should inspire itself from the Scandinavian one as observed in Finland because it's an urban market where competition can evolve in the benefit of user. Based on our interviewees, Helsinki figure out how to implement the MaaS platform combining public and private services. It's interesting to observe the legal issues they have and what regulations they applied.

Today, Barcelona evolves according a partnership model. In the evolvement of MaaS regulatory scheme, the economic issue to make sure all the parties have a benefit must be taken carefully. There is also further work around the regulation of information to ensure a consistency between all user point of contact. Finally, it's also the role of administrations to make sure that the service stays open with public participation. Indeed, it's important to make sure that there's no company that manages several departments on its own and has thousands of licenses or permits. Step by step, MaaS become more and more structured in Barcelona. The Mobility master plan (2020-2025) clarify the vision of MaaS to make it viable from technical, economical and legal point view, but also attractive from a user point of view.

6.3. Case 3 MaaS Regulation Scheme in Helsinki Metropolitan Area

Case background

This case is based on four interviews conducted with individuals working on different aspects of MaaS in the Helsinki Metropolitan Area (HMA), and Finland. Three of them conducted with people working in different levels of the public sector and one conducted with an individual from the private sector. This case intends to give a general overview of the current situation of MaaS in the HMA and a glimpse into the opinions held by some of the stakeholders.

There are several sources that explain different parts of the history of MaaS in Finland at greater depth (e.g. Audouin and Finger, 2018; MaaS Global, 2019; Hirschhorn et al, 2019). Although, the concept of MaaS can trace its origins back to at least 2006 according to MaaS Global (2019), the interviewees highlighted

Finland's strategy for intelligent transport (Ministry of Transport and Communications, 2009), as an important step towards current regulation. According to Audouin and Finger (2018), this was only the first in a line of incremental reports and strategies relevant for the national support for MaaS in Finland.

In 2013, the City of Helsinki collaborated with Hietanen on supervising a master's thesis at Aalto University during which time the regulatory needs posed by MaaS (Heikkilä, 2014). In 2015, MaaS Finland Oy (which is now MaaS Global) was founded following a business meeting and funding from the Finnish Funding Agency for Technology and Innovation (Auduoin and Finger, 2018). As Hirschhorn et al. (2019) pointed out, public transportation in the HMA is coordinated by the Helsinki Regional Transport Authority (HSL), which is funded by the municipalities in the area. They further indicated that HSL has played an important part in enabling MaaS. Although there has clearly been difficulties along the way, they have slowly opened up their APIs starting in 2017. This enabled MaaS Global to launch what they call a full MaaS service in the HMA at same year .

The interviewees unilaterally agree that the most important step towards MaaS in Finland was the Act on Transport Services (2017), which demands that public transport providers openly share service information and open APIs. Since then Ministry of Transport and Communications (LVM) has been working to establish codes of conduct which enables service providers to achieve the state that was intended by the Act on Transportation Services, including necessary aspects of bilateral contracts and how to ensure efficient services (Traficom, 2019).

International/European regulations

The interviewees agree that international regulation with significant relevance for MaaS in Finland, is limited to the EU level. Most of them named the EU directive on package travel and linked travel arrangements, which regulates package travel covering a period longer than 24 hours and sets rules on consumer rights, including information requirements and the liability of service providers (Directive 2015/2302). Another relevant aspect is the Commission delegated regulation supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services (Regulation 2017/1926), which one interviewee said will slowly replace the Finnish national regulation concerning MaaS.

Other regulation that they mentioned related to data protection and emerging technical standards which may play an important role in the future. One interviewee wanted to stress that the Finnish Act on Transportation Service has refrained from establishing standards (such as which form an open API must take), but that it seems like the EU will impose those in the near future, which will then require Finnish legislation to adapt to such a situation. They further pointed out that LVM may have chosen to leave out standards in order to leave enough room for flexibility as the legislation was defined before the actual services had been established, which may have resulted in unexpected redundancies in the standardisation.

National regulations

As presented before, the current Act on Transport Services (2017) regulates MaaS nationally. Its main point from the perspective of MaaS is that it requires service providers to open their APIs and bilaterally decide on the practicalities. According to the interviewees, it is currently quite sufficient as far as legislation goes.

Although they agreed that it lacks in detail (e.g. technical standards or more exact definitions of the shared data), they found that such level of detail could easily be created through other forms of agreements or codes of conduct. These could be set locally in a specific urban region or nationally, like the work initiated by LVM in 2017 (Traficom, 2019).

All the interviewees pointed out that regulation in the HMA functions differently to several other urban regions in Europe because Finnish cities' power to impose local regulation is mostly restricted to land use. Hence, MaaS in the HMA is regulated in mostly the same manner as the rest of the country. However, one interviewee considered land use to be of great importance, since all mobility services depend on the infrastructure that is governed by the cities; the example being that multimodal travel may require transportation hubs, and any travel modes require sufficient infrastructure to be desirable to the consumer.

MaaS governance model

When presented with the two distinct governance models for MaaS presented in chapter 4, the interviewees concluded that it seems overly simple. They all agreed on the reality most often being some sort of a mix between those two, but that the broker model is the one which is closer to what will happen in the HMA. One interviewee said that the current legislation demands it, referring not only to the Act on Transport Service, but also indicating that when it comes to travel chains, there are several regulations that the providers have to abide by, such as the liability of transport providers, which may regulate by different directives depending on the situation and, therefore, liability can never truly be equally shared between all actors in the partnership. However, all interviewees pointed out that in the HMA they are working towards reaching a situation where you have multiple brokers. One interviewee considered multiple equal brokers to be necessary to ensure a good service for end user.

One interviewee said that it is impossible to objectively know which one of the mentioned models is better, because the current evidence is insufficient to draw any conclusions. However, they could not recall any partnership-like model that would work well. It was also pointed out that the broker model would look different if the broker and the public transport provider is one and the same. These models were also stated to lack the situation where the MaaS operator, public transport provider and operator is one single entity.

Regulatory scheme for MaaS deployment

Finally, all interviewees agreed that forcing providers to open their APIs in order to resell tickets and make services available to all is needed, but they also mentioned that the scheme should focus on enabling, not restricting operations and development.

The aim of the regulation can be achieved in several ways depending on the circumstances, such as local business culture. One suggested that the current situation in the HMA could have been achieved through agreed upon codes of conduct, but that national legislation enables fair and equal treatment and perhaps is more typical for Finland. Furthermore, one interviewee highlighted the importance of a space that enables continuous dialogue and collective development of the MaaS system.

The biggest concern that the interviewees collectively raised, is the importance of a holistic planning of the regulation and the effect of adjacent areas of regulation that need to be acknowledged. In Finland for

instance, they found taxation to cause concern, because the question of how to tax resold tickets had not been considered, which needed to be settled before they legally could be resell these tickets. Lastly, the interviewees agreed that MaaS regulation has to be customized to the region where it is imposed, be it national or local and that the step up from pilot to actual implementation brings unimagined complexity to the issue of regulating MaaS.

6.4. MaaS Regulation Scheme in Greater Manchester

Case background

Greater Manchester is a large city region with 2.79 million residents. It is one of the UK's combined authorities, representing 10 local authorities working together. This combined authority has been working on various areas of urban policies, including growth, environmental sustainability, technology and innovation, and quality of life (Mourey, 2019). Greater Manchester has encountered several urban mobility challenges that are shared by many urban areas, including over-dependence on car, traffic jams caused by high number of individual car trip, fragmented public transport system of highly uneven provision, air pollution hotspots, and investment on infrastructure that focused on the city centre.

Transport for Greater Manchester (TfGM) is the public body responsible for coordinating transport networks throughout Greater Manchester and deciding where to invest transport funding. It delivers the transport policies set by the Greater Manchester Mayor and the Greater Manchester Combined Authority. TfGM owns the Metrolink network, manages walking and cycling infrastructure investment, and strategically plan the key route network. It subsidises the socially necessary bus routes and coordinates the city region requirements to secure national funding for investment. TfGM oversees the 2.1 billion journeys that are made across the region each year; 59% of these journeys are made by car (Wray, 2019). The objectives of TfGM is to enhance the availability, reliability and affordability of public transport, improve air quality, and decrease traffic congestion.

TfGM initiated 2040 Greater Manchester Transport Strategy on behalf of the Greater Manchester Combined Authority and the Greater Manchester Local Enterprise Partnership. Its vision is the "world class connections that support long-term, sustainable economic growth and access to opportunity for all" (see Figure 3). The strategy focuses on creating an integrated, sustainable, and well-coordinated transport system that supports a variety of travel needs. The core principles of 2040 Transport Strategy are : (1) Integrated – allow customers to move seamlessly between modes and services, (2) Inclusive – provide accessible and affordable transport, (3) Healthy – promote walking and cycling for local trips, (4) Environmentally responsible – deliver lower emissions, better quality environment, (5) Reliable – give customers confidence in journey times, (6) Safe and secure – reduce road accidents and deaths, and (7) Well maintained and resilient – able to withstand unexpected events and weather conditions (TfGM, 2017). Overall, 2040 Greater Manchester Transport Strategy will deliver a viable transport system which make residents, business and visitors in Greater Manchester to travel to wide range of different destinations easily.
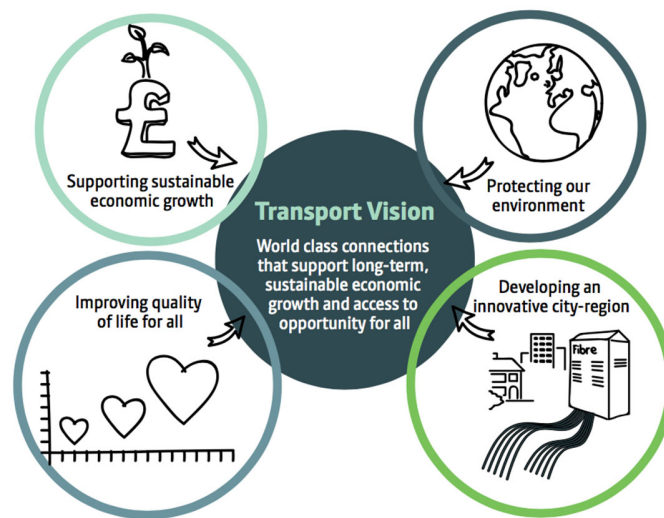
Figure 3 Vision of Greater Manchester Transport Strategy 2040

To achieve above objectives, TfGM has also been engaged in a wide range of MaaS pilots, such as IMOVE and MaaS4EU. In the IMOVE project, TfGM worked in partnership with Fleetondemand's award-winning MaaS platform Mobilleo to create an integrated travel solution for the people of Manchester. It consolidates multiple modes of transport for the project into a single IMOVE branded app, with instant access to TfGM's Local Link Service, Metrolink trams, car hire , trains and buses This app allows passengers to plan, book and pay for each journey conveniently using any iOS or Android device (de Prez, 2019). In the MaaS4EU project, TfGM acts as the MaaS operator in the pilot to provide a testbed for door-to-door urban and intercity, multimodal and intermodal trips and offer the opportunity to identify and test the B2B as well as B2C models.

International/European regulations

The EU regulations are important for MaaS implementation in Greater Manchester as it will set standards for integration. More concrete EU regulations would provide constructive guidance for cities which plan to implement MaaS. For example, regulations on integrated ticketing and payment would increase the efficiency of cross-border mobility. With the support of unified standards, MaaS operators are able to set out a long-term business strategy and make a commercialisation plan across Europe. Other regulations in the areas of data exchange, data standardisation and harmonised APIs are critical to the development of MaaS. As one interviewee mentioned, "data and other technical standards at the EU level would partially determine the MaaS market readiness level and therefore influence the demand side and supply side of MaaS".

The analysis also indicates that current regulations on passenger rights are largely differ across modes, due to a unimodal approach in the EU legislative framework. How to protect passenger rights in the context of MaaS is another direction for future EU regulations. Finally, one of the interviewees pointed out that "Brexit

might also be a potential concern for the application of European regulations in the UK". As the result, there is an uncertainty for future MaaS deployment though the standards at EU level should still be referred by policy makers.

National regulations

Based on the interviewees' best understanding, there is currently no MaaS regulations in the UK. Most regulations are still fragmented and focused on specific transport mode such as rail, tram and bus. There is no mandatory requirement for MaaS; only MaaS guidance is available in the UK. The Transport Act 2000 which outlines regulations for local transport in the UK might be one of the most relevant regulations. It includes information such as transport plans, bus services, ticketing and partnership schemes. Transport Act 2000 is the main regulatory framework for Greater Manchester which includes following key implications (Galli et al., 2019):

• 114 - Quality partnership schemes "A local transport authority, or two or more such authorities acting jointly, may make a quality partnership scheme if they are satisfied that the scheme will to any extent implement the policies set out in their bus strategy or strategies."

• 135 - Joint and through ticketing schemes "A local transport authority, or two or more such authorities acting jointly, may make a ticketing scheme covering the whole or any part of their area, or combined area, if they consider that the proposed scheme (a) would be in the interests of the public, and (b) would to any extent implement the policies set out in their bus strategy."

• 139 - Information about bus services "Each local transport authority must from time to time determine, having regard to their local transport plan (a) what local bus information should be made available to the public ("the required information"), and (b) the way in which it should be made available ("the appropriate way")." In this section "local bus information", in relation to a local transport authority, means: (a) information about routes and timetabling of local services to, from and within the authority's area, (b) information about fares for journeys on such local services, and (c) such other information about facilities for disabled persons, travel concessions, connections with other public passenger transport services or other matters of value to the public as the authority consider appropriate in relation to their area."

Although Transport Act 2000 provides some implications for MaaS, it is not sufficient enough for successful MaaS implementation. Policy makers need to provide concrete technical standards for MaaS. The emergence of MaaS platforms and other new mobility services should be better regulated nationally though these regulations should not significantly influence the market. The national regulations should also consider the customer rights and avoid unintended consequences.

MaaS governance model

TfGM has conceptualised 6 models that could be potentially adopted:

1.   TfGM is the MaaS operator and uses in-house resources.

2. TfGM is the MaaS operator but outsources all of its responsibilities (becomes commissioning authority) .
3. TfGM is the MaaS operator but outsources all of its responsibilities except financial transactions.
4. TfGM is part of a MaaS joint venture formed to manage and operate the system.
5. TfGM is the MaaS operator but shares platform/resources with other providers to make financial savings and bring efficiency.
6. Private sector is the MaaS operator and has its full control on its operation.

Each model has own strength and weakness. As one interviewee said, "TfGM currently considers themselves as adopting model 3, which is the MaaS operator but outsources all of its responsibilities except financial transactions". This governance model has an open and regulated back-end platform to manage both mobility demand and supply sides. It has greater flexibility and can integrate other new types of data (e.g., smart city data) into the platform. Standardised data is the key for this model to implement successfully. One of the disadvantages of this model is that it might slow down innovations because the MaaS operator needs to collect and analyse various data than other models before making strategic decisions.

Regulatory scheme for MaaS deployment

As mentioned above, there is currently no MaaS regulatory scheme in Greater Manchester. In fact, one of key challenges for MaaS implementation in Greater Manchester is the deregulated and multi-operator market environment. There is a very complex transport system in this area, with two dominant bus companies, several small bus companies, multiple train companies, a light-rail company, and other mobility service providers. This complexity is detrimental to the MaaS deployment because it leads to several problems, such as inefficient data sharing, inconsistent fares, and different standards in transport services. Although the interviewee mentioned that other national regulations might to some extent be applicable to MaaS, they are still too focused on specific transport mode.

To address these issues, TfGM has initiated 2040 Greater Manchester Transport Strategy and implemented a series of plans. For example, TfGM has worked in partnership with the different public transport providers to create a multimodal and multi-operator ticketing structure, called "System One", which was further enhanced by TfGM's multimodal smart ticketing platform "Get Me There" (Mourey, 2019). This integration allows customers to purchase travel tickets in one application and travel seamlessly across operators.

As one interviewee noted at the end of the interview, "the regulations in terms of data sharing and standardisation, ticketing and APIs might be the most important things for future MaaS regulatory scheme because the unregulated market opens up wider challenges for cooperation". It is therefore critical for policy makers to address these issues when designing MaaS regulatory scheme in the future. Policy makers need to design the consistent standards in order to facilitate data sharing and maximize the benefits of real-time data application. It is also important for policy makers to commit to establish a system of APIs which covers a range of mobility services that are typically not managed by local authorities.

Finally, the results of interview shows that public authorities might use MaaS to influence right transport mix in a city. For example, based on big data analytics, the city can manage and optimise the number of

bike sharing, ride hailing and other forms of new mobility services, with support of appropriate MaaS regulatory scheme. However, this needs to find a balance and avoid market distortion.

7. Conclusion and Implications for Policy Makers

This chapter synthesizes the aforementioned analyses and offer 3 key implications for policy makers. First of all, the review in Chapter 4 shows that there is a limited understanding of MaaS regulations and regulatory schemes in the existing literature and projects. Although there are many recommendations or reports on MaaS, the concrete standard of MaaS implementation is still not obvious, which create uncertainties for current MaaS operators and other mobility service providers. Most of interviewees mentioned that they are not aware of concrete MaaS regulations at international, European or even national level, which supports this conclusion. However, our further analyses show that there is a huge potential to leverage existing transport policies at national level and extend them to MaaS, given the integrated nature of MaaS. For example, Transport Act 2000 in the UK might offer insights on the ticketing solution and cooperation model between public and private sectors. From a long-term perspective, the MaaS operators expect that EU will impose concrete standards relevant to MaaS in the near future, which might gradually replace the regulations at national level. Therefore, the policy makers might experience an evolving process to extend their existing national regulation to MaaS and then adapt it based on the update of EU regulations. It is critical to take this evolving process into account when designing a city transport plan.

Second, the findings in chapter 5 identify 12 factors that might potentially influence MaaS regulatory policies and governance models. These factors are further categorized into 3 groups: economic factors (i.e., market competition and market entry barrier), political factors (i.e., taxation, subsidies, incentive to consumers, data sharing and standardization, data privacy and security, use of public resources, and vulnerability) and social factors (i.e., accessibility and equity, environmental benefits, and health and well-being of citizens). For policy makers, it is important to examine these factors and evaluate how the design and implementation of MaaS regulatory schemes might be positively or negatively influenced by these factors. The design of best MaaS regulatory scheme will largely depend on the status of these factors.

Finally, the aggregate analysis of 4 case studies suggest that the European regulations might be the most important one for MaaS implementation although there is currently no specific MaaS regulation at this level. The findings suggest that policy makers need to pay more attention on the standard of data sharing, APIs, multimodal travel information and ticketing integration. With the concrete European regulations on MaaS, this innovation will be diffused quickly and adopted by cities across regions. Moreover, the case study analysis also shows different preferences of governance model in each city. When choosing the governance model, policy makers must consider the fit between specific governance model and exiting regulations in order to maximise the effectiveness of MaaS regulatory schemes. The future MaaS regulation scheme is likely to be a flexible one because these case studies demonstrate that the success of MaaS regulatory schemes might be determined by the attributes of cities. It is therefore critical for policy makers to regulate MaaS in a flexible way and leverage the existing advantages of their cities.

8. References

Amsterdam Smart City, 2020. [online] Available at: https://amsterdamsmartcity.com/network/amsterdam-smart-city [Accessed 10 July 2020].

Brustein, J., 2016. Uber and Lyft want to replace public buses. Bloomberg. [online] Available at: https://www.bloomberg.com/news/articles/2016-08-15/uber-and-lyft-want-to-replace-public-buses. [Accessed 2 July 2020].

Cerre., 2019. Shared Mobility & MaaS. The regulatory Chanllenges of urban mobility. Centre on regulation in Europe.

Chadwick N., 2019. Mobility as a Service Companies to Watch in Spain [online] <https://www.mobilleo.com/news/mobility-as-a-service-companies-to-watch-in-spain/> [Accessed 2 July 2020].

City of Amsterdam, G., 2020a. Policy: Traffic And Transport. [online] English site. Available at: <https://www.amsterdam.nl/en/policy/policy-traffic/> [Accessed 10 July 2020].

City of Amsterdam, G., 2020b. Policy: Traffic And Transport. [online] English site. Available at: <https://www.amsterdam.nl/en/policy/policy-traffic/policy-taxis/> [Accessed 10 July 2020].

Datson, J., 2017. The Importance Of Data In Maas. [online] Available at: <https://www.intelligenttransport.com/transport-articles/69051/the-importance-of-data-in-maas/> [Accessed 8 July 2020].

de Prez, M., 2019. Greater Manchester Introduces IMOVE Maas Pilot. [online] Fleetnews.co.uk. Available at: <https://www.fleetnews.co.uk/news/car-industry-news/2019/12/02/greater-manchester-to-introduce-imove-maas-pilot> [Accessed 8 July 2020].

Docherty, I., Marsden, G. and Anable, J., 2018. The governance of smart mobility. Transportation Research Part A: Policy and Practice, 115, pp.114-125.

Ec.europa.eu. 2016. Amsterdam Is The European Capital Of Innovation 2016 - News Alert - Research & Innovation - European Commission. [online] Available at: <https://ec.europa.eu/research/index.cfm?pg=newsalert&year=2016&na=na-080416> [Accessed 9 July 2020].

Frost A., 2019. Expansion of integrated MaaS offerings across Europe mooted [online] Available at: https://www.traffictechnologytoday.com/news/mobility-as-a-service/expansion-of-integrated-maas-offerings-across-europe-mooted.html [Accessed 10 July 2020].

Gemeente Amsterdam, 2013. Volg Het Beleid: Verkeer En Vervoer. [online] Amsterdam.nl. Available at: <https://www.amsterdam.nl/bestuur-organisatie/volg-beleid/verkeer-vervoer/> [Accessed 8 July 2020].

Green Deal, 2018. Green Deal Autodelen IIAvailable. [online] Available at: <https://www.greendeals.nl/green-deals/green-deal-autodelen-ii> [Accessed 12 July 2020].

Heikkilä, S. 2014. Mobility as a Service – A Proposal for Action for the Public Administration: Case Helsinki. [Master's dissertation]. Retrieved from https://aaltodoc.aalto.fi/handle/123456789/13133 [Accessed 10 July 2020].

Hirschhorn, F., Paulsson, A., Sørensen, C. and Veeneman, W., 2019. Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. Transportation Research Part A: Policy and Practice, 130, pp.178-191.

Hoadley, S. (Ed.). 2017. Mobility as a service: Implications for urban and regional transport. Discussion paper. POLIS, Brussels, Belgium.

Jin, S., Kong, H., Wu, R. and Sui, D., 2018. Ridesourcing, the sharing economy, and the future of cities. Cities, 76, pp.96-104.

Kamargianni, M., and Melinda M., 2017. The business ecosystem of mobility-as-a-service. Transportation Research Board, vol. 96.

Kamargianni, M., Matyas, M., Li, W. and Muscat, J., 2018. Londoners' attitudes towards car-ownership and Mobility-as-a-Service: impact assessment and opportunities that lie ahead, University College London.

Kamargianni, M., Matyas, M., Li, W.,Muscat, J. and Yfantis, L., 2018. The MaaS Dictionary. MaaSLab, Energy Institute, University College London.

Kennisinstituut voor Mobiliteitsbeleid 2019. [online] Available at: <https://www.rijksoverheid.nl/documenten/rapporten/2019/11/11/bijlage-1-mobiliteitsbeeld-2019> [Accessed 12 July 2020].

Lagadic, M., Verloes, A. and Louvet, N., 2019. Can carsharing services be profitable? A critical review of established and developing business models. Transport Policy, 77, pp. 68-78

Leeflang, S., 2020. Amsterdam Smart City. [online] Dutch Mobility Innovations. Available at: <https://dutchmobilityinnovations.com/spaces/86/dutch-mobility-innovations/wiki/view/11795/amsterdam-smart-city> [Accessed 10 July 2020].

Lindberg, G. and Fridstrøm, L., 2015. Policy Strategies for Vehicle Electrification. ITF/OECD Discussion Paper 2015:16. ITF/OECD, Paris.

MaaS4EU, 2018. D3.2 – Legal/Regulatory barriers and Passenger Rights for MaaS.

MaaS4EU, 2018. D3.3 – Prototype business models for MaaS.

Ministry of Infrastructure and Water Management, 2018a. Framework Agreement for the implementation of 7 regional, nationally scalable MaaS pilots.

Ministry of Infrastructure and Water Management, 2018b. Programme of requirements pertaining to the pre-competitive dialogue in order to form a consortium for the framework agreement for the implementation of 7 regional, nationally scalable MaaS Pilots.

Ministry of Infrastructure and Water Management 2018c. Document open standards and architecture. Informative appendix to the Descriptive Document for the public procurement Framework Agreement MaaS Pilots.

Ministry of Infrastructure and Water Management 2019. MaaS Pilot Projects Optimising mobility.

Ministry of Infrastructure and Water Management 2020. Blueprint for an Application Programming Interface (API) from Transport Operator to MaaS Provider.

Ministry of Transport and Communications. 2009. Finland's Strategy For Intelligent Transport. [online] Available at: <http://julkaisut.valtioneuvosto.fi/handle/10024/78222> [Accessed 14 July 2020].

Ministry of Transport and Communications. 2017. Act on Transport Services [online] Available at: <https://www.finlex.fi/fi/laki/kaannokset/2017/en20170320_20180731.pdf> [Accessed 14 July 2020].

Mourey, T., 2019. Greater Manchester: Using SUMP To Make Urban Mobility Multimodal | Eltis. [online] Eltis.org. Available at: <https://www.eltis.org/discover/case-studies/greater-manchester-using-sump-make-urban-mobility-multimodal> [Accessed 8 July 2020].

Pangbourne, K., Stead, D., Mladenović, M. and Milakis, D., 2018. The Case of Mobility as a Service: A Critical Reflection on Challenges for Urban Transport and Mobility Governance. Marsden, G. and Reardon, L. (Ed.) Governance of the Smart Mobility Transition, Emerald Publishing Limited, pp. 33-48.

Palasi, M., 2019. T-Mobilitat Project. Available at: <https://www.wsbi-esbg.org/Events/Barcelona2015/Documents/T-Mobilitat%20project.pdf> [Accessed 10 July 2020].

Polis Network. 2017. Mobility As A Service: Implications For Urban And Regional Transport - Polis Network. [online] Available at: <https://www.polisnetwork.eu/document/mobility-as-a-service-implications-for-urban-and-regional-transport/> [Accessed 11 July 2020].

Rijksoverheid 2018. NL DIGIbeter Agenda Digitale Overheid. [online] Available at: <https://www.digitaleoverheid.nl/wp-content/uploads/sites/8/2018/07/nl-digibeter-agenda-digitale-overheid.pdf> [Accessed 12 July 2020].

Shaheen, S., Cohen, A., and Zohdy, I. 2016. Shared mobility: Current practices and guiding principles. Report, U.S. Department of Transportation, Federal Highway Administration. <https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf> [Accessed 2 July 2020].

Traficom., 2019. Mobility services interface information. [online] Available at: <https://www.traficom.fi/en/transport/liikennejarjestelma/mobility-services-interface-information> [Accessed 12 July 2020].

El País., 2020. Spain to provide up to €4,000 in subsidies for purchase of a new car. [online] Available at: <https://english.elpais.com/economy_and_business/2020-06-16/spain-to-provide-up-to-4000-in-subsidies-for-purchasing-a-new-car.html.> [Accessed 2 July 2020].

Whim. 2020. A Brief History Of Maas Global, The Company Behind The Whim App - Whim. [online] Available at: <https://whimapp.com/history-of-maas-global/> [Accessed 7 July 2020].

Winton, N. 2020. Germany boosts electric car sales incentives but penalizes gas guzzlers. Forbes. [online] Available at: <https://www.forbes.com/sites/neilwinton/2020/06/04/germany-boosts-electric-car-sales-incentives-but-penalizes-gas-guzzlers/#c9681f01c4b5. > [Accessed 2 July 2020].

Wray, S., 2019. Manchester Road Tests Maas. [online] Smart Cities World. Available at: <https://www.smartcitiesworld.net/special-reports/special-reports/manchester-road-tests-maas#:~:text=Mobility%2Das%2Da%2DService,on%2Ddemand%20options%2C%20etc.&text=One%20of%20these%20is%20Manchester,project%20to%20gain%20citizen%20feedback.> [Accessed 8 July 2020].

Annex I Interview Guide A

Thank you for participating the interview.

1. To get started, we would like to ask some short questions about you and your organisation:
   1.1. Could you briefly describe your role within your organisation?
   1.2. Has your organization participated in a MaaS scheme in the past?

2. Now we will move on to the core part of the interview. The next couple of questions will focus on the regulations and policies related to MaaS:
   2.1. Could you provide 1 MaaS regulation/policy that are most relevant to your business?
       2.1.1. Does this regulations/policy have been implemented?
               a.   Was already implemented   b.   Will be implemented in the future
       2.1.2. What is the level of these regulations/policies?
               a.   Local   b. Regional   c. National   d. EU
       2.1.3.   In the case of national/regional/local level, in which country does the regulations/policies apply?
   2.2. Could you provide other MaaS regulation/policy that are relevant to you?
   2.3. Do you think there are any regulatory/policy related issues that would make it difficult for mobility service providers to join a MaaS scheme?
   2.4. Will the implementation of MaaS in your area require changes to existing regulatory frameworks related to the operation of individual services? (public transport, taxi, transport on-demand, bike sharing, etc.)

3. There are distinct governance models that a MaaS system can have. The first includes a situation where the MaaS operator is a single entity and acts as a **broker**, meaning that it buys and resells capacity in MaaS packages. In this case, the MaaS operator takes on the full risk of the activities. The second situation is when the MaaS operator is a **partnership** of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the "partnership" and can be referred to as the "MaaS coordinator". The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.
   3.1. Which of these two models (broker vs. partnership model) would your organisation be more comfortable with and why?

4. Thank you for your answers, they are very useful. Now we will move on to talk about the economic, political and social factors that influence the regulatory policies and governance models of MaaS. There could be one or several factors positively or negatively influence the MaaS regulatory policies and governance models.

4.1. What are key economic, political and social factors that influence the design and implementation of MaaS regulatory policies and how?

4.2. What are key economic, political and social factors that influence the adoption of broker or partnership governance models and how?

5. Moving on to our final group of questions, these focus on the best practices of MaaS regulatory schemes. MaaS regulatory scheme is the plan implemented to regulate MaaS, with a set of regulatory measures, using different policy instruments in the framework of given governance models, in order to achieve policy goals.

5.1. Can you give us an example of MaaS regulatory scheme and In which city?

5.2. What are key elements that a MaaS regulatory scheme should include and why?

5.3. What is the best MaaS regulatory scheme in your mind and why?

Thank you very much for your patience and openness during this interview. Is there anything else you would like to add that you think would be useful for us to better understand the MaaS regulatory scheme?

Annex II Interview Guide B

Thank you for participating the interview.

1. To get started, we would like to ask some short questions about you and your organisation:
   1.1. Could you briefly describe your role within your organisation?
   1.2. Has your organization participated in a MaaS scheme in the past?

2. Now we will move on to the core part of the interview. The next couple of questions will focus on the initial thoughts on regulations/policies related to MaaS:
   2.1. Regulations can be at international, EU, national, and reginal level…
       2.1.1. How does current regulations <u>at international level</u> influence the MaaS implementation?
       2.1.2. How does current regulations <u>at EU level</u> influence the MaaS implementation?
       2.1.3. How does current regulations <u>at national level</u> influence the MaaS implementation?
       2.1.4. How does current regulations <u>at regional level</u> influence the MaaS implementation?

3. There are distinct governance models that a MaaS system can have. The first includes a situation where the MaaS operator is a single entity and acts as a **broker**, meaning that it buys and resells capacity in MaaS packages. In this case, the MaaS operator takes on the full risk of the activities. The second situation is when the MaaS operator is a **partnership** of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the "partnership" and can be referred to as the "MaaS coordinator". The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.
   3.1. Which of these two models (broker vs. partnership model) does your city adopt or are more comfortable with and why?
       3.1.1. What are the strengths of your preferable model?
       3.1.2. What are the weaknesses of your preferable model?

4. Thank you for your answers, they are very useful. Now we are moving on to our final group of questions, these focus on the best practices of MaaS regulatory schemes, with a set of regulatory measures, using different policy instruments in the framework of given governance models, in order to achieve policy goals.
   4.1. Can you describe the current MaaS or other relevant regulatory scheme in your city?
   4.2. What are key elements that a MaaS regulatory scheme should include from your point of view and why?
   4.3. Will the current MaaS regulatory scheme require changes to make MaaS implementation more successful in the future?

4.3.1. What aspects need to be changed and how?

4.4. What is the best MaaS regulatory scheme in your mind and why?

Thank you very much for your patience and openness during this interview. Is there anything else you would like to add that you think would be useful for us to better understand the MaaS regulatory scheme?

Annex III Samples of Interview Transcripts (Anonymous)

Interview transcript: sample 1

1. So, thank you for your time and for this interview. As I said, this interview is to help us to improve our knowledge on the best practices and leading initiatives in MaaS regulatory schemes and governance models. This study belongs to an European project, ProMaaS project. So, I'm following an interview guide. To get started, we would like to ask some short questions about you and your organisation:

    1.1. Could you briefly describe your role within your organisation?

    My name is [anonymous], I work within the [anonymous], at the [anonymous] and within the directorate I work in the Unit for [anonymous], and then part of that unit is MaaS program. Within the team I currently work as a policy advisor for the part that is about (we call it) "the learning environment", so the environment where the data from the pilots will come in, and which we will use to learn about the effects of MaaS.

    1.2. Ok, thank you. Then, has your organization participated in a MaaS initiative in the past?

    Yes. Well, about three years ago we started with this research on what is the concept of MaaS. There was a lot of talk about it, about how it contributes to different policy goals, but there was no real evidence that it would have actually positively contribute. So we decided we wanted to do some more researches, gain experience with the concept of MaaS by initiating pilot projects, and not just small regional pilot projects, as what we have seen until now, but on a larger scale, so that we can really say a bit more about the effects in terms of different people using it in different areas, well and simply put it on a large scale. We started work together with the regional governments, that were also facing some specific challenges, and they wanted to find out if MaaS could offer solutions. For example, for offering alternatives to people that are bow mostly using car, or to make cross-border travelling more easy, or to make the transport system more accessible to people with disabilities. So there were different policy goals, and we wanted to monitor the development of MaaS and these pilots in one uniform way. So this is way we set up a learning environment. And I think as a ministry firstly we took on more a facilitating role in bringing all the different parties together and do a lot of consultations also with MaaS service providers, but then more and more we took the role for steering the development. And I think this was mainly because we saw that a lot needed to get all these parties in one room, and to make sure that we would start with exchanging data, work together. And of course we had a lot of interest to connect with these policy goals. Because we are very interested in seeing whether MaaS can contribute to goals we have surrounding sustainability, or accessibility, or liveability, or inclusion. So for us there has always been a very direct link between MaaS and these goals. And that's also why we think we have an important role in the further development.

2. Ok, that's clear. Thank you. Now we will move on to the core part of the interview. The next couple of questions will focus on the regulations and policies related to MaaS:

2.1. Could you provide 1 MaaS regulation/policy that are most relevant to the success of MaaS implementation?

One of the difficulties is that we don't really have a MaaS regulation yet, because the whole idea of these pilots is that we want first to learn what is MaaS, what it means, how it can contribute. Then, based on that, maybe we have to change some current regulations, or putting something new in place. That's something that is part of this monitoring, to see whether the current regulation still is up to date or not. But that's the public regulation part. But of course we now have this framework agreement with MaaS service providers, which we granted, I think, at the end of December 2018. This is a private regulation, and in this of course we have a lot of arrangements with the providers. And they mainly focus on data sharing, transparency, rules surrounding privacy of course, security, and also they have to be open in including all the different kind of transport operators. So they cannot discriminate. And that's one of the main requirement, I think. Those rules, I think, somehow, after this framework agreement is finished, they need to somehow get a place in these new regulations.

But we're still looking in how we should form these governance models, and how we can for the ecosystem, actually. So, it's not clear yet what is the best model.

2.1.1. Because the question regards also regulations or policies that have not been implemented yet, or also policies and regulations implemented at local, regional, national but also European level. Are you aware, for instance, of any European regulation or policy regarding MaaS implementation

I know that there are quite some differences based on scale. I think in the [anonymous] we have a quite national approach, and of course there are some regulation that are more on a local scale. That is considering these shared mobility concepts. And I think what we are trying to do here is try to find some uniform instrument or we try to make sure that all these cities come up with the same requirements for these permits for the providers. But I do know that in Finland they have this Transport Act. Well, I think that they are actually making sure that all these operators need to share data, so that all their services can be offered in integrated platforms. So I think that's one side of the spectrum, and then I think, but I'm not really familiar with it, I know that in France they have some regulations around MaaS, and in UK they are also looking into this. There's a study by DG Move, and they are also looking into these different models. Not sure if you're familiar with this researcher/policy advisor, because I saw a presentation of her at the meeting of the MaaS Alliance. Her name is Victoire Champenois. And she is leading this research in different governance models, from DG move. But we are actually currently studies, or TNO is doing study for us, on different governance models, well that's why I'm not really sure on these models yet. We are still trying to do the inventory with them.

Ok, thank you. So you already partly provided an answer to the next question. The question is: could you provide other MaaS regulation/policy that are relevant to you?

53

Yes, but I think that what it might be interesting to mention is that the way we approach, so this ecosystem approach I think that's quite different from other countries. I think you're familiar with these levels of integration, that you come across in literature on MaaS levels. And we are really focusing on MaaS level 4, where there is this link with policy goals. And of course, this has some consequences on governance models, that in the end you want to have. And we also have this focus on public-private-partnership. So we don't want it to be completely top-down, but we want that all the stakeholders, all the parties that are somehow part of this ecosystem, that they put something into it, but they also get something out of it. In this sense, we always use the idea of quid pro quo, so you give some and you get some.
Ok, so in the literature we have different kinds of public-private partnership models. There's the PPP model and the PPP model. And in the PPP, there are also the users, so also the people.
Yes, we are very interesting in those kind of examples. So, that's also our idea of MaaS, course, that also as the end user you also want to get all of your data, what has been used, within this whole MaaS chain, and in the end the traveller is really put in the centre.

2.2. Do you think there are any regulatory/policy related issues that would make it difficult for mobility service providers to join a MaaS scheme?
Yes, so I think there are some hiccups surrounding the current way that we have the public obligations, concessions, which of course give some specific positions to public transport operators. So we have to be very keen that we are not helping specific advantages when offering MaaS apps because of course they have certain positions because of these concessions. There are other transport operators that are experiencing difficulties with this, with gaining market share. Furthermore, I think that also here for transport operators is quite hard (something I mentioned earlier) that all these different cities have different regulations, or different requirements in the permits for shared mobility, so they have different procedures, and different requirements, while most of these operators are still pretty small businesses so it's quite an investment to, time after time, focus on these new procedures, new requirements. So it would be helpful if it would be more uniform, or more harmonized. And I know that there are some barriers surrounding the reselling of tickets, of the public transport ticketing. That's not currently in all concessions taking care of, that the public transport operators need to make their different products available for MaaS service providers, but we are now working on new texts for those concessions, and new arrangements with these companies so that they will also provide these travel products for MaaS service providers. So I think that these are the main ones I can think of right now.

2.3. Will the implementation of MaaS in your area require changes to existing regulatory frameworks related to the operation of individual services? (public transport, taxi, transport on-demand, bike sharing, etc.)
Yeah, I think it's a kind of the same of what I mentioned in the previous question. Those are the main barriers that we see for the MaaS service providers, that are now connected to specific transport means.

3. There are distinct governance models that a MaaS system can have. The first includes a situation where the MaaS operator is a single entity and acts as a **broker**, meaning that it buys and resells capacity in

MaaS packages. In this case, the MaaS operator takes on the full risk of the activities. The second situation is when the MaaS operator is a **partnership** of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the "partnership" and can be referred to as the "MaaS coordinator". The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.

3.1. Which of these two models (broker vs. partnership model) would be more acceptable in the market and why?

So, you have the broker and partnership. Is it possible in this construction that the MaaS service provider is a transport operator as well?

Yes, we could also consider the transport operator as MaaS provider.

Yes, I think that we don't have an idea yet of what it could work the best. But the only think that we find really important is this requirement that we put in the contract that they have to offer all types of transport from all types of operators in the integrated offer. So that they cannot put their own or their partners offer first, let's say. They cannot discriminate, that's the whole point. And I think that when we look, for example, the consortia that are now selected to do these pilots, it's pretty interesting that they are very different, so there are MaaS service providers that are originally public transport operators. And there are also service providers that have a background in technology, ICT solutions. There are also some that have a background in automotive. But actually they're always working together with several partners. And yes, it's really hard to say anything about the success of these consortia yet.

4. Thank you for your answers, they're very useful. Now we will move on to talk about the economic, political and social factors that influence the regulatory policies and governance models of MaaS. There could be one or several factors positively or negatively influence the MaaS regulatory policies and governance models.

4.1. What are key economic, political and social factors that influence the design and implementation of MaaS regulatory policies and how?

Ok, well. As for economic, I think that is really important to know first whether these providers can have business cases of their own. Because, at least what they've been telling us, is that they can make the business cases but they need to have scale, so that's also what we tried to do with these national pilots. We make sure that they're all national scale, and not on a regional scale, or not just for one city, but for the whole country, so they can really increase their market share. And then, I think, we have to see if they are able to, and whether there are positive or maybe also negative effects on people start travelling with MaaS. Because the idea that we have and the potential that we see is that through MaaS we can optimize the system, because, of course, all these types of mobility are connected and integrated, and also the data comes available which we can use for policy making. But it's not clear yet how fast we can make the transition, so it depends on how fast we can start with this optimization that will affect also the regulatory framework which is needed. If there are any negative effects for example, like people through MaaS can use more car sharing concepts for example, which ultimately leads to a lot more traffic, which is not in line with the policy goals that we have considering congestion, and accessibility. So well, there also other measures are needed, for example when people through MaaS are stimulated to use shared concepts and public transport which then reduce the private cars usage. So those kind of effects we're still gaining insights in. And those, I think, determine what kind of regulation is needed. Yes, that's kind of also political or social aspects.

4.2. Ok thank you. Again, in relation to the key economic, political and social factors, what are those that influence the adoption of broker or partnership governance models and how?

Well, I'm not really sure what you mean for social factors.

You can also consider for instance the age distribution, lifestyle, or cultural norms. Or political, such as data protection law. Take your time to think about.

Yeah. I don't really see the direct connections with business models. Of course, as MaaS service provider you need to target specific groups. I assume that with their offer they will use these social factors to increase their market share. I guess you asked about the differences between the different models?

Well, the question is about out these factors can influence the adoption of broker or partnership governance models.

I think I don't really know an answer to this question. Sorry.

Ok, that's fine.

5. Now moving on to our final group of questions, these focus on the best practices of MaaS regulatory schemes. MaaS regulatory scheme is the plan implemented to regulate MaaS, with a set of regulatory measures, using different policy instruments in the framework of given governance models, in order to achieve policy goals.

5.1. Can you give us an example of MaaS regulatory scheme and In which city?

I think that the difficult thing here is how you define MaaS. Because if you're asking about regulatory schemes in cities, I think you might use different definitions of MaaS that we do, because, cities, they can only regulate specific types of transport. While we have a definition that is focused on the integration of all these types of transport, the digital integration and makes all these transports available through one digital interface. And that's on a different level that you might need regelation for, with the digital part. And as a city, you're more about regulating the public space, and the transport modes themselves, so I'm not sure about what kind of examples are you looking for.

So, for example, if there is any city, also in the Netherlands, which have adopted a regulatory measures or policy instruments to enable the implementation of MaaS.

So, yeah, I know that there are few cities now, Eindhoven and Amsterdam. They currently included in the permits they have for the shared mobility operators some requirements that they have to connect to MaaS providers. They are obliged to. And also that they have to use specific data standards, which are used by MaaS service providers. So that's maybe the most concrete example. And also other big cities like Rotterdam, they have fewer data standards that they are requesting the operators to use. But not only the MaaS standard but also some other open standards as well. So they're a bit more open to others as well. But I think that's the best example.

5.2. And what are according to you key elements that a MaaS regulatory scheme should include and why?

I think that this link we are looking for with the policy goals. I think that the regulatory framework must ensure that as a government you also have options, when is needed, to jump in, when certain negative effects might occur. And you need to have the possibilities and tools to steer in the right direction. In what way I'm not sure, but now we have of course set up this data environment, learning environment. And this is a very important step, but also a very important part of the ecosystem, that would definitely help us in understanding the way that MaaS works, and the

underlying structures of how these different involved operators, providers, work together. So that it will help us to make more well informed policies, as well.

5.3. What is the best MaaS regulatory scheme in your mind and why?
Yeah, I'm not really familiar with any regulatory schemes, yet. As I mentioned, I really see it all as an element of the total ecosystem, for example all those cities with the permits for shared mobility operators. And that's a very good element, but in the end you need more an overarching set of rules that concerns all the parties involved in the ecosystem. And preferably, as we already talked about, the end-user or the traveller needs to be in the middle of it, to be central. But unfortunately we are not really there yet. But it's something we need to think about already, of course, to look at the best practices and gain some experiences, also from other countries.

So, I'm very interested in the outcome of your study.

Interview transcript: sample 2

Thank you for your time and for participating to this interview today. So, this interview will help us to improve our knowledge of best practices and leading initiatives in regulatory policies and governance models. The data will then be used for ProMaaS project and academic publications.

Pro MaaS is an European project, funded by the EIT Urban Mobility, and based on a consortium made of universities, cities and private companies working on urban mobility projects. The aim of the project is to develop a set of recommendations and tools for governments to draft better policies and regulations that could facilitate MaaS implementation.

Before we start, did you sign the consent form?

May I record this conversation?

1. *To get started, we would like to ask some short questions about you and your organisation:*
   1.1. First, Could you briefly describe your role within your organisation?
   1.2. And secondly, could you explain if your organization participated in a MaaS scheme?
      So, I'm *[anonymous]*, and I'm involved as the responsible for MaaS pilot project which we won as the public tender in *[anonymous]*. And we have been working in MaaS over the last ten years, but that was focusing on employers rather than employees or individuals. For the MaaS pilot in *[anonymous]*, we are in a consortium with three other companies because we have responded with three other companies the request for proposal. That's why we have set up a consortium to deliver in fact the project.
      As *[anonymous]* we have national coverage.
      If we look at the MaaS project, the *[anonymous]* project, we focus on employees, rather than employers. The goal is to be able to get somebody as a customer while he is a student and track him for the rest of his life until he is in pension, using the *[anonymous]* app and the *[anonymous]* MaaS proposal. If he changes this from employer, we will have a solution so that each time the

employer isn't get some of the relevant data and ultimately we want to make sure that it follows the individual for the rest of his life. And offer a quality service for the rest of his life.

The *[anonymous]* app is being tested at the moment, so it's available for around 15 employees for the companies that are actively involved. We plan to have the first public launch with the end users, in the beginning of September and the full operational launch in the app store on the first of December of 2020.

[anonymous 2]

I'm working as *[anonymous 2]*, since February 2019. And my role is to look for potential cases, partnerships, customers, and products for the sales team. And since the beginning, the first round for *[anonymous]*, I've been involved in the MaaS team together with *[anonymous]*, and after two intense tendering rounds, the pilot was finally awarded to us last summer. Ans since then we have been very busy with contracts, negotiations, with the municipality, connecting mobility suppliers, working on marketing and of course developing the app, so it's a very interesting project.

2. *Now we will move on to the core part of the interview. The next couple of questions will focus on the initial considerations and opinions on regulations and policies related to MaaS:*

   2.1. So, How does current regulations influence the MaaS implementation? We would like to have your opinion also on regulation at different levels, starting from international and European level, and then also on national and regional level (with a focus on Amsterdam).

      2.1.1. Regulation at international level

      2.1.2. Regulation at EU level

      2.1.3. Regulation at national level

      2.1.4. Regulation at regional level (in your city)

[anonymous] is now allowing transport operator, so parties that deliver shared bikes, shared cars, that use the public space. They need to get licenses and in order to get licenses, they need to conform to some data sharing and options to integrate the individual apps into a MaaS solution. So in the past companies could develop a service, and make the services available using their own app, but now they are forced to be able and to open enough to be integrated in a full-fledged MaaS solution. So, that's a huge step forward that it's in fact a requirement which has been set by the *[anonymous]* (Infrastructure and Water Management), in the *[anonymous]*. To be able to win one of the seven pilots, we're forced to meet some of these standards. So that's an interesting step forward. This is valid for the whole country. The seven MaaS pilots are forced to do this.

And some of the municipalities involved in those seven pilots are enforcing more or less the standards, because still there is a discussion on the stability of the standards and if the standard have been well enough developed. This is ongoing, during these pilots.

One of the key elements which is also on going is that In the *[anonymous]*, they are starting to develop a model whereby public transport operators allow MaaS providers to get tickets in order to be able to offer a national coverage of public transport services. And there is a big debate ongoing regarding some margins, some of the discounts, some of the commission, that MaaS providers should be obtaining in order to have a model which allows MaaS providers to earn some leaving. So those are the two main directions which are being taken. None of the two are already operational. There is a lot of discussion. And by the end

of 2022, in fact, those regulations should be in place and should be enforced by different parties.

We are in some of the working groups which are dealing with *[anonymous]*, the Transport Operator MaaS Provider API, we are looking at the standards, which are at the global and European level. We try to make an inventory and where appropriate we try to adopt the standard which is already available, rather than invent new standard. But at the moment, within the *[anonymous]*, the *[anonymous]* is the only one which has been developed and is being implemented in the market. That's why the *[anonymous]* is considering embracing the *[anonymous]* standards.

There are some other initiatives from the European Commission, through Euorpean Commission projects, like *[anonymous]*project, which is covering the Netherlands, Belgium, France, I think Germany, and UK, where they have adopted a similar standard, which is also the *[anonymous]*. So, we see that there are some initiatives, but that's not really through regulations. It's rather through projects, which have been awarded, that these kind of initiatives are being made.

3. There *are distinct governance models that a MaaS system can have. The first includes a situation where the MaaS operator is a single entity and acts as a* **broker**, *meaning that it buys and resells capacity in MaaS packages. In this case, the MaaS operator takes on the full risk of the activities. The second situation is when the MaaS operator is a* **partnership** *of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the "partnership" and can be referred to as the "MaaS coordinator". The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.*

3.1. Which of these two models (broker vs. partnership model) would your organization be more comfortable with and why?

In the *[anonymous]*, I think that it's the first option. So, it's really the broker situation. Is the MaaS provider, the MaaS operator that takes all risks. In fact, customer-supplier relationship. I think it's being developed because It's really a pure commercial approach. Of course, in these pilots there is a government funds being made available, but in principle it's a commercial model, which is supported to kickstart by local government or central government's money. But the risk is now for *[anonymous]*, if customers don't pay, the suppliers have to be paid. If there is fraud, if there is theft, those kind of risks, are in principle all with the MaaS operator, the MaaS provider.

[anonymous 2]
For us, as a MaaS provider, it's also very difficult sometimes to fulfil these options, because of all the risks. So it's something which is very fragile sometimes. But we are working on it and also in the *[anonymous]* there is a group called *[anonymous]*, so they're also working on a standard in client ownership, data usage, also GDPR.

Between the two models, in your opinion which one is more acceptable?
[anonymous 3]
I think the one we are following here, if there are options for us to get some kid of margins, some kind of feedback from public transport. I think that public transport is a huge element in a MaaS solution. And in this moment there is limited initiative from the public transport operators to sponsor us. In fact they see us often as a competitor, rather than a partner. Which makes things

extremely difficult. But I think if you don't do in this way there is some kind of sponsorship required from some party. And that means you are not focused enough for having a good solution which in the long term will survive. I think that if you look at the initiatives in Helsinki, and even in Antwerp I think, the models are slightly different, because the local authorities take the risks on bundling services. And in the *[anonymous]* at this moment is impossible to bundle services. We have really to use the cases on individual use of trip, and you cannot say that you may have discounts if you have ten trips or more, or fixed free for month. It's virtually impossible at this moment, without a lot more information from the user about his behaviour.

In the MaaS pilot in *[anonymous]*, during the last phase, if we have sufficient data, we have committed to try to set up subscription model covering multiple modalities. But it's more an experiment, rather than full obligation in contract. But then we need to have the cooperation of public transport companies.

4. *Thank you for your answers, they are very useful.*

   Now we are moving on, to our final group of questions, these focus on the best practices of MaaS regulatory schemes. We can define MaaS regulatory scheme as the plan implemented to regulate MaaS, with a set of regulatory measures, using different policy instruments in the framework of given governance models, in order to achieve policy goals.

   4.1. Can you describe the current regulatory scheme in the city in which you operate, like Amsterdam for instance?

   I would like to come back to the initial question. In fact, there is no regulatory scheme. But both the ministry and the regional governments are working on it, to establish such scheme, whereby the operators are forced to collaborate. And in the *[anonymous]* at this moment there is no exclusion, or any MaaS provider to act on the *[anonymous]* market. So anybody, even if you haven't won a pilot or have a license you can develop the service. So everybody is in fact the same at the moment, the only thing is that you don't get the government funding or additional government funding for the pilots. But I anticipated that in two years from now, there will be some regulation in place. In fact, they're working on it at the moment to force public transport companies to be open enough and deliver some kind of margins and also a minimum set of services to make available to MaaS providers.

   4.2. What are key elements that a MaaS regulatory scheme should include from your point of view and why?

   There must be well-balanced contracts and there must be sufficient services that are being made available to the MaaS providers, and there must be some kind of reward for taking the financial risks, plus for the sales efforts and the customers service efforts that is offered by the MaaS provider. There must be mechanisms both technical but also financial in place to do this.

   4.3. What is the best MaaS regulatory scheme in your mind and why?

   So, it's an open system where all the arrangements are published, so that everybody can join, where there are potential volume discounts, so somebody that does a better job in attracting customers maybe has a financial reward, if he does better than his competitors. There should be some kind of quality label involved as well, so that both MaaS provider must deliver quality and the transport operator or the public transport operator must deliver quality. And there should be some elements of data sharing, also with the government to be able to evaluate the service and to have some steering measures in respect to developing the service.

   [anonymous 2]

I also think so. Regarding to the other MaaS initiatives in Europe, so looking for example to Helsinki and maybe Berlin, with their Jelbi app it's called. Over there, the city transporter are the main part of the consortium and in most of the cases they will provide the app. So they already have a sufficient amount of customers, daily travellers, and for the new parties, so for the market, it's very difficult to attract new customers. So regarding such a scheme, I think it should be open also, like what *[anonymous 2]*said. And everything like all ways of day tickets, or maybe 2-hours tickets, a week ticket should be available. And these days is still quite difficult.

5. Thank you very much for your patience and openness during this interview. Is there anything else you would like to add that you think would be useful for us to better understand the MaaS regulatory scheme?

Yes, if you have any practical information about how it's going elsewhere, obviously we are very interested. I think that in UK there are some different approaches. I hear from one of our competitors and one of our partners, Transdev, and they have more experience with international development, so I'm really interested in understanding what is happening elsewhere, so that we can push also in certain directions. I think the climate in the *[anonymous]* is very positive, and we are looking from different angles also to other experiences, so I'm definitely interested in your research and in the outcome of it.

Sample 3

Do you have questions before starting this interview?

What are the objectives of this interview?

We are working on the ProMaaS project WP 2 and we want to learn about the different vision on the regulations in 4 cities; how do you perceive it and have a better view and more details about in. For that we are looking for two people in each city: one more institutional and one more investigational.

I) YOU AND YOUR ORGANISATION
Can you briefly describe your role within your organization?

Yes, I am in charge of a department within the *[anonymous]* that has individual members as clients. We are *[anonymous]* in *[anonymous]*. We provide system servers at home and travels.

If you have any problem/accident with your family, with your car, plane, train then you can call *[anonymous]* and get assistance. It's a very similar concept to the insurance except that you don't get compensation, you get help to get out of trouble. This organization as a department *[anonymous]* foundation which is in charge of policy, research innovation, consultant services in the field of mobility.

Has your organization participated in MaaS in the past?

Yes, it has developed a MaaS application with is already available in the market. So you are a specialist? Yes, to some extent. The commercial exploitation of this application is in a if department but we support

them with the public administration, with the legal framework, briefs and initiatives, but we don't exploit it commercially.

Did you already participate to Pro-MaaS project, or it's the first time?

I think one colleague of mine had a short interaction with you in the past.

How does current regulation influence the MaaS implementation? There are different regulation models and we wonder how these regulations influence the MaaS?

I think it depends on the regulation but today the local level is where there is the higher influence followed by national, EU and international. But it could change very quickly.

Can you describe the influence or start by the regulation at the regional level?

Different cities are regulating appraising of data and the access to data from private operators but there is no other national or EU regulation giving insight or items on this topic. The regional and local administration have had to regulate themselves to some extend because they don't have mature. Also, since MaaS is a very local low position, it can teach a lot from different metropolitan areas it in important for local administration to get involve.

What about the regulation at the national level?

Most of the work is yet for be done. On one side national are negotiating at the European level, it's a legal framework that is sharing and regulated at the EU level, members states who will incorporate this legislation into national l legal framework. One side they are working at EU level negotiated at EU level what it should look like and there is national level they are letting local regional transport administrations to do the work, I think it's similar in northern country. *[anonymous]* national and then public transport is organized by metropolitan. *[region A]*and *[region B]*is different.

Therefore, the first layer which is being impacted by this model disruption is the regional administration. They are the first that are doing something. The national having MaaS propositions which are regional is not common perhaps in Finland. And therefore, the national authority is not doing so much work on it.

Do you have a national in *[anonymous]* for example?

There is no legislation on this? What we have is Best practices and pilots. But there is no formal regulation in place

Do you think in the future we should have registration or the best practices are sufficient?

Yes, for the benefit of deploying the MaaS proposal it must be necessary to regulate this.

Can we talk about regulation in on the European level, the influence?

The main discussion is about the main access to data, the right of accessing any transport data is regulated by the ITS directive but this directive is from many years ago and at that time the mobility services didn't

exist as the value proposition. But it's the closest regulation we have and it's says the transport data should be accessible to third parties. But not going into details, which kind of data, operational data etc, it doesn't include critical information beyond shadows and static data which are easily accessible from data. But important discussions are taking place already on how to regulate and open the right to access operational from transport operator and make it easier for digitalization services to make it accessible.

Do you have the power to impact or discuss with this regulation at the EU level?

We are federating with mobility. We have an office in brazil directed by the *[anonymous]* which is a global administration and they represent us and discuss on our behalves in Europe.

Regulation in the international level?

I'm not aware of this level of regulation and don't expect it to happen. Because it will have more issues happening. Big global regions like us, china, Europe and to some extend they are competing. Europe is not in a good position compared to china and us in terms of having bug platforms like google or amazon so it's not easy to have international regulation in the next future.

II)   DISTRICT GOVERNANCE MODEL:
Which of these two models does your city adopt or are comfortable with and why (explanation of the broker and partnership models), and especially why?

I think it's not a question of which one is better but a question of maturity. Probably in the beginning the best appropriate is the partnership because confident and trust between partners is not fully developed cooperation but there is lack of strong cooperation. So the broker is the best for a develop and mature market but since were are not at this level we should start we the partnership, more control, test and then it's working go to the broker. I think it's not possible to jump directly from this stage.

Where do you think you are in *[anonymous]* **(10,20,70% ?)**

I think we are trying to build partnership. Not created yet because the public transport is doing an important part, they are at the central part of any motility service. But the digitalization of public transports has to be well advanced. If it's not advanced, it's not possible to build something around it. And MaaS is digital by design. In *[anonymous]* digitalization of public transport is no enough developed to think about it. For instance, I think we are developing our MaaS scheme especially with private operators and then including public transport information because it's not possible to go beyond that.

III)   REGULATORY SCHEME:
Let's focus on the best practices for MaaS regulatory scheme:

1.   Can you describe the current regulatory scheme in your city ?
I think it's a lack of a specific regulation we can only refer to open data policies but even with it there is no enforcement to public operational data. It's a question of best practices developed by local administration. We have a local data scheme but it's not enough if you want to develop a model that take in account booking, ticketing, payments etc, you have to build trust between the parties and operators and it's

something which is not working alone, it needs regulation. And probably the first country to create that would be the European union.

2. **What key elements that a Maas regulatory scheme should include from your point of view and why?**

Those are business processes; they can happen without regulation but are not happening easily and accepted in Scandinavian cities because there is no trust between the parties. Every regulator would like to have access to data of the parties. This lack of trust and regulation that forces interaction Is the main barrier. If trust cannot be built by itself it should be created by regulation. And then you can say that the regulation should include all the business processes of transport service delivery. There is another issue it's privacy (personal data), here we have GDPR and building service with the current GDPR regulation it can be tricky because it's too strict, sharing personal data between operators and aggregator is difficult, you need the consent of the end user and it's difficult. The regulatory scheme should affect not only public but also private operators; any company dealing with transport should be affected by this.

3. **Will the current MaaS regulatory scheme require changes to make MaaS implementation more successful in the future? What aspects need to be changed and how?**

Yes, indeed. As I told you I think data sharing is an aspect to improve. Personal data treatment and business process transactions.

4. **What is the best MaaS regulatory scheme in your mind and why?**

I think the most famous one is the finish. So far, it's the best. I think it should be applicable in Europe.

What do you like in this model?

He is forcing any transport operator to open API so that other operators can interact and book and do payment. It's an urban market where competition can evolve in the benefit of user. It answers most of the problems I told you before.

Do you have some stuff that we could read to better understand the MaaS regulatory schemes ?

The finish transport act – piece of legislation that is the most advanced with overview of what can be advanced and discussions happening on EU level about access to public data.

Sample 4

Could you briefly describe your role within your organisation?

-   I'm a project manager of *[anonymous]*. In practice I have been the first person to focus on mobility at our organization, also when we started working on *[anonymous]*, and when considering my extensive background, it has naturally befallen me to work with MaaS, especially when I had to work with the city department when MaaS was developed. I'm still one to look at the big picture of things and consider new openings, more so than the average project manager.

Has your organization participated in a MaaS scheme in the past?

- Our organization is its own separate company, with the task of discovering new themes and openings. As smart mobility hasn't been directed by the city, it has been one of the themes that we have been working on a lot. MaaS has been my thing; others in our organization have not really participated in it. The official answer is that our organization attempts to in different ways support the formation of local new innovations and that is what we have done. The most accurate description of our role [in MaaS] is that of an influencer, which is what our organization is meant to do.

How does the following levels of regulation affect MaaS deployment in *[anonymous]*?

a. Local   b. Regional   c. National   d. EU
- Because a national law was passed *[anonymous]*, it's the regulatory level we have, and we don't really have much more than that. We don't have jurisdiction to formulate local regulation in the same way as elsewhere. This is how it is. Whether it has good or bad effect? Well at least we so far have the only national legislation that forces actors in the transport business to enable MaaS [by opening up their APIs]. That is at least something. Regarding the challenge, it is nice that we have the legislation, but now we need to get everyone to abide by it. Shortly put, that's the situation.

Do you think there are any regulatory/policy related issues that would make it difficult for mobility service providers to join a MaaS scheme?

- Well for one, of course, all [providers] don't have APIs, and some who say they have APIs don't have them documented or similar. Another thing is that an open single ticket, that anyone can sell and account for, is different to assembling different service packages from all available service offerings, because that straight away requires business-to-business agreements where some form of contract template is necessary. And because there are no readymade models (i.e. there has not been any readymade model for this), *[anonymous]* has been forced to do this pioneer work. When they [these contracts] at some point are wrestled into shape, it means that the next service provider can simply follow their example and practically copy-paste these contracts. So there are practical issues. Even though you have APIs, you have consulted your lawyers, thought about the business model and get it accepted by the public sector (e.g. relevant municipal committees and other organs), the question of whether some commission will be offered for the public transport tickets is extremely difficult. That's maybe what's the most central challenge.
- Still another thing is (which I touched upon earlier), that not everything was resolved and [meaning that] the *[anonymous]* only covers a part of all the needs [all that needs to be regulated]. So when we consider such a thing as taxation, it's a good example. Even though the law states that the third party can access others' services, etc., when the third party resells these, if it's unclear how to formulate the VAT, they practically cannot resell them. So you have to look at it [MaaS] as a whole when formulating the regulation. Input is needed from a surprisingly large bunch of actors. For instance, there may be some part of the Social Welfare and Health Care regulation that needs to be taken into consideration. Especially when you combine payments from the public sector, such as the subsidy contributions for HSL, education and SOTE, it's like a bog. There are still a lot of bottle necks also outside of the actual transport regulation which influences the situation and we don't have them ready. But that's why I have been trying to say that other aspects need to be

considered, because it's not that simple, when taking the next step. A simple pilot is always a simple pilot; you can do that as basic R&D if you will. But if you want to create real lasting business there are plenty of different issues will emerge, e.g. there will definitely be service level issues and plenty more.
- Then we should remember the EU's travel service directive [i.e. Package travel directive]. We'll see what additions that will bring to the table. It has to do with who integrates travels and how the travels are integrated. When three different tickets are combined, it will add responsibilities, etc. So there's plenty to do.

Will the implementation of MaaS in your area require changes to existing regulatory frameworks related to the operation of individual services? (public transport, taxi, transport on-demand, bike sharing, etc.)

- In our case it would be to so-to-speak sharpen the existing Act on Transport Services, and creating clear rules of conduct. For instance, what are the API requirements and what model should it follow, and more of the same level stuff. This work was started by the Ministry of Transport and Communication and has been continued by Traficom, and is still proceeding. I guess it is starting to look like something soon, but it is still under work. We have been discussing it for several years with MaaS Global, but that's because they, in the role of a pioneer, have been forced to tackle most issues by themselves first. In some cases they have also been forced to fight these windmills all alone. The rest can wait and see what the results will be and launch a product once all is clear, which obviously is a wise strategy from their perspective; let the first one fight all the conflicts.

There are distinct governance models that a MaaS system can have. The first includes a situation where the MaaS operator is a single entity and acts as a broker, meaning that it buys and resells capacity in MaaS packages. In this case, the MaaS operator takes on the full risk of the activities. The second situation is when the MaaS operator is a partnership of several organisations participating in the MaaS scheme. In this case, there is a MaaS operator who coordinates the activities of the "partnership" and can be referred to as the "MaaS coordinator". The operating costs of the MaaS scheme are assigned to the whole "MaaS partnership" while revenues are allocated to the participating partners. The MaaS coordinator and the participating partners share the same risks.

Which of these two models (broker vs. partnership model) applies to [anonymous]?

- In a way there are subsections, [depending on] whether the 'single entity' is a public or private actor. Also a public actor can differ. If it's a commercial MaaS operator which functions as an extension of the public transportation, it's completely different [from e.g. a private business]. But yeah, either you do it together or alone, so I guess you can simplify it like this. Technically it's not wrong, but there are obviously many other ways of dividing MaaS systems, but that is one relevant way of doing it.

Would you consider one to be superior to the other, for instance in [anonymous]?

- No. I don't think there's enough evidence yet, anywhere, to conclude which one is better and under which circumstances. Every local regulatory environment and ecosystem is different. There are ups and downs with all of them and it must be decided locally, which one that is most suitable to that context. It may come down to operating culture. In some areas cooperation is more natural and somewhere it may be less.

- One more thing: It says in the first model that the 'broker' carries the risk. That's not necessarily the case. It can still be that the broker means different things. The broker can be of a MaaS Global type which definitely carries the risk. But a broker is also the one which only resells the ticket without any liability for what happens after that. For instance if the tickets are sold at some kiosk, they carry no liability for whether the customer receives the service or not. So there are clear differences. That's why it's such an extreme generalisation to simply say that it's either operated by a single entity or collectively. Then [in the mentioned example] it's a different kind of activity and I think there's a greater difference then.

Thank you for your answers, they are very useful. Now we will move on to talk about the economic, political and social factors that influence the regulatory policies and governance models of MaaS. There could be one or several factors positively or negatively influence the MaaS regulatory policies and governance models.

What are key economic, political and social factors that influence the design and implementation of MaaS regulatory policies and how?

- Economically it is simple. If you want to promote private MaaS operators, you need a business model and the regulatory policies could consider this somehow, this is the *[anonymous]* model. If it [MaaS] is operated by the public sector, it's considered a continuation of public service and public transportation and then the business model is quite different; then it doesn't have to make a profit, because neither does public transportation, on the contrary it can be subverted using public funds. That's maybe the most central point, economically.
- Politically, it maybe relates to the same thing, namely, do we want to promote private activities or public activities. And traffic, urban traffic, which connects to public transportation awakens a lot of ambitions in the direction of publics transportation as the thing that connects everything (if we allow a bit of exaggeration). It derives from the notion that public transportation is responsible for and produces the majority of urban traffic, and that the private sector is inherently bad. So the economic and political dimension is deeply intertwined in that aspect, i.e. who controls and who dominates. It relates to the idea that urban traffic becomes chaotic if no one actor controls it from above; planning and optimizing it. It's probably true, but in the current disruption we need to be able to rethink that.
- Then the social aspects. Usually that question is posed as: is MaaS equal.. equity and equality. And the thing is, that if it's a continuation of public transportation, then obviously it has to be accessible to all in the same way as public transportation has to be. Of course it's never completely equal, because you still pay something for it, it's not free, so everyone cannot necessarily afford it. In that way public transport has not been able to become entirely equal, except for maybe in Tallinn, where it [public transportation] is free. Another thing I like to answer to that question is: If MaaS is seen as a broker.. Well if you have 20 different modes of transport which are more or less equal (e-scooters aren't equal either, all elderly people cannot use it, regardless of its fee it's not suitable to all), and someone is trying broker, to make a wholesome service using them, how can it be equal if the building blocks aren't equal. So you have to ask the question the other way around: If you think about regulation, if you want to make sure everyone can move, MaaS is not opposed to it, although some might argue that it is. Rather I would say that MaaS then is trying to allow everyone to find a suitable mode of transport, in which case MaaS promotes equality. In that aspect it should be considered in the regulation that you want to help MaaS to make it easier for

people to choose the mode of transportation that suits them the best, which then promotes the social aspect of it.

What are key economic, political and social factors that influence the adoption of broker or partnership governance models and how?

- Of course, you have to choose a model and then formulate the regulation to support a certain direction. But then you have to consider the core values of the EU, such as free competition. We must abide by the European competition law, because if we don't it will only end in someone suing us. That is an example of how the EU puts boundaries on our actions, we cannot just do whatever we want, there are limits.
- I would say that more experiences are needed to establish how these different models works. If you can define a few models and how they work, what results they bring, then you can start by choosing a model and define regulation that governs that direction.
- To my knowledge a proper analysis of these models have not been undertaken, and before such work is done, I don't really have a good answer. Someone should do such an analysis. As it is now, there is not enough to go on. The partnership model is tricky. I don't really understand how it should work. Straight out of my head, I cannot imagine a good partnership model. Vienna may be such an example, but it is such a mess, that I would never use that as an example for anything. If you can show me a single functioning partnership model, then I can make an evaluation and draw conclusions, but prior to that I cannot say. There may have been pilots, but pilots are again only pilots. They never deal with the real-life situation in full, so they don't have to solve all the real-life causal effects of such a systemic change.
- In summary: the world is not ready to answer that question.

Moving on to our final group of questions, these focus on the best practices of MaaS regulatory schemes. MaaS regulatory scheme is the plan implemented to regulate MaaS, with a set of regulatory measures, using different policy instruments in the framework of given governance models, in order to achieve policy goals.

Can you give us an example of MaaS regulatory scheme and in which city?

- There aren't many to choose from, because pilots don't really have a regulatory scheme. I would say that it should be mix between the model used in Finland and in Antwerp. In *[anonymous]*, we have decided to that legislation and regulation should force the actions needed. In Antwerp they lay a much greater focus on collaboration by convincing and supporting actors to engage with each other on their own accord, while some regulation has been added to define the ground rules of the engagement in order to hinder exclusive silos from forming, and it is good that they try to stop such a development using regulation.

What are key elements that a MaaS regulatory scheme should include and why?

- First of all, it should enable. The purpose of the regulation is that MaaS activities emerge. Details may differ, but it [the regulatory scheme] has to make sure that the regulation enables MaaS. In Finland, regulation has focused on forcing mobility service providers to open their APIs, but the same target can surely be achieved in different ways. Most important is that MaaS operators have a strong foundation for creating sustainable activities; not only a pilot, but permanent activities, regardless if they are private or public.

- The regulation should cover different aspects of MaaS to make sure that it's holistic, e.g. for ticketing you have to deal with taxation issues. Of course that will not be possible in all countries, because different parts of the whole may be covered by different legislation. One could say that the regulatory scheme should gather all the different aspects that are needed. Based on that you can then make investment and business decisions, such as 'we will now develop this, because we have regulation that enables it'. So the regulatory scheme must create trust towards the future, so that investment decisions can be made. That may, in the end, be the most important element to a regulatory scheme.