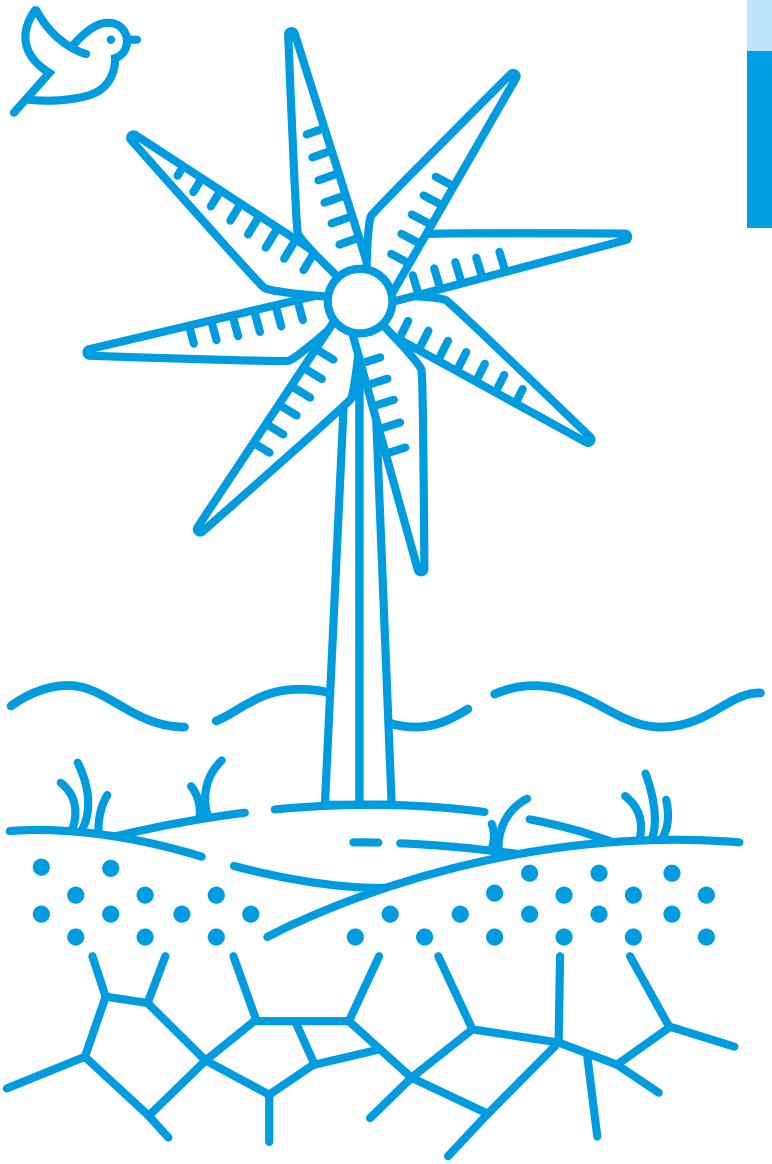
Guidelines on

How to implement MaaS

in local contexts



CIVITAS 2020
Cleaner and better transport in cities
ECCENTRIC

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This report was developed within the framework of the **CIVITAS ECCENTRIC project** (2016–2020). Within the project five cities – Madrid, Stockholm, Munich, Turku and Ruse – are working together to tackle mobility challenges that are faced in suburban districts and to move towards clean and silent city logistics.

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Guidelines on How to implement MaaS in local contexts

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CIVITAS ECCENTRIC deliverable no. D3.4
Layout: Laura Sarlin
Cover drawing: Laura Sarlin
Published: August 2020

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1 Introduction

This document – "Guidelines on how to implement MaaS in local contexts" – summarises the lessons learnt in the CIVITAS ECCENTRIC project during the years 2016–2020. The project was the first to include measures that focus on a new concept called Mobility as a Service, (MaaS).

The first project publication – "MaaS Readiness Level Indicators for Local Authorities" – was published in Autumn 2017. After that, several cities around Europe started to use the readiness level indicators and found them to be very valuable. In this publication, you will find the updated version of the readiness level indicators. These indicators have been updated based on several workshops that have been carried out around them during the years 2018–2020. Thank you to all of the active participants who have provided their know-how on the topic!

There are several publications that have been written about MaaS during recent years. This document is not a summary publication of all of the knowhow so far. It focuses on five different areas related to MaaS:

- **Chapter 2 on Context** outlines the principles and circumstances inecessary for MaaS to flourish;
- **Chapter 3 on Key pillars** focuses on business models and stakeholder involvement;
- **Chapter 4 on User-centric approach** highlights the main points to take into consideration when designing services;
- **Chapter 5 on MaaS readiness levels** introduces the updated readiness level indicators;
- **Chapter 6 on MaaS readiness levels in ECCENTRIC cities** highlights achievements in each city.

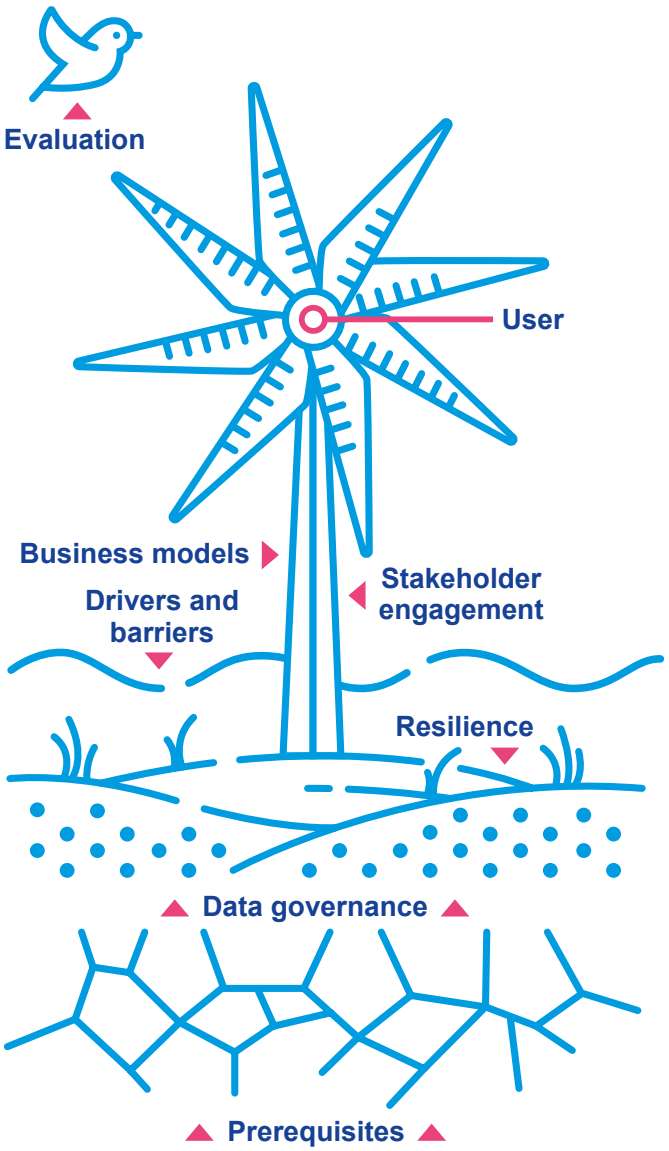

Figure 1. Illustration on the Guidelines on how to implement MaaS in local context.

1.1. MaaS measures in ECCENTRIC

In CIVITAS ECCENTRIC, there were seven MaaS-measures that dealt with differetn aspects of the MaaS approach. The outcomes of these measures are highlighted in this document as case examples. A short summary of the content of these measures is found below.

In the city of Turku (FI), two measures related to MaaS were implemented. The first measure – **Smart Multimodal Mobility Services: Applying Mobility as a Service Concept** – focused on creating a common understanding and ground for MaaS-related work in the city of Turku. The second measure – **Integrated Ticketing and Information System for Mobility** – set the stage for ticket integrations for the operating system of the regional public transportation. The first integration that took place was the new bike share system, called Föli bikes, in the city of Turku.

In the city of Madrid (ES), the measure – **An Open Platform for Multimodal Mobility Information and Services** – created the MaaS platform, following a process mareked by large stakeholder engagement.

In the city of Munich (DE), two measures explored different user groups around MaaS. One measure created a **beacon-based indoor routing as a mobility service application** and the other one an **application for the city lab (Luftlotse)**.

In the city of Ruse (BG) , a **mobile application** and **internet portal for public transportation** were created.

In the city of Stockholm (SE) , the measure – **Develop Smart Choice of Mobility Services** – actually consisted of four distinctive measures:

- The creation of UbiGo-Stockholm, a MaaS service;
- Snapcar P2P carsharing platform;
- GoMore P2P carsharing and ridesharing platform; and
- An awareness campaign ("without private car") to promote the three measures above.

However, most of the partners (public transport, traditional carsharing, free-floating carsharing, rental cars, bike sharing systems, micro-mobility operators) and most of the resources (money, information techology and application developers, etc.) that were necessary for creating the MaaS service, UbiGo, were formally outside of the ECCENTRIC project but involved through networking and dialogues during ECCENTRIC.

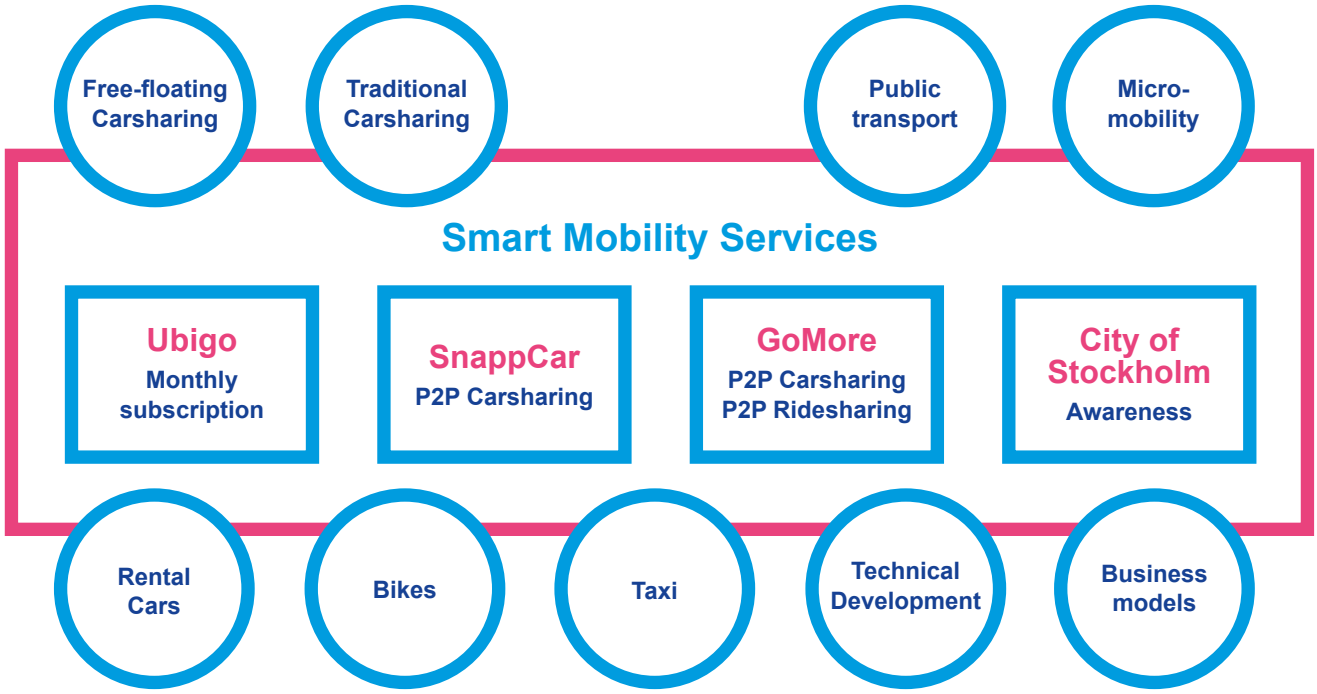

Figure 2. MaaS measure in the City of Stockholm

1.2. Expert input

As part of the Mobility as a Service development an expert Delphi study was carried out in 2019. The collaborative research, which was conducted by the University of Turku and the City of Turku consisted of two parts: review of ex-ante literature and a two-round Delphi study. The difference between a modified Delphi and other questionnaire-based methods is the possibility for participants of a Delphi study to reflect, in the second round, on the answers they provided during the first round. Traditionally, in a Delphi study, the questions remain the same throughout the process. However, for the purpose of this study it was deemed necessary to restate some of the themes for the second round, while also maintaining the possibility for reflection.

The first round focused on three scenarios related to household expenditure on transportation services and MaaS service models. The second round had two aims. First, to see if the arguments provided for and against the expenditure and models presented in the scenarios made participants re-evaluate and change their views and dig deeper into the organisation of the markets, including public interventions. The first round yielded 35 decent responses. The respondents represented seven countries; 12 respondents from Spain (ES), 11 from Finland (FI), four from Sweden (SE), two each from Germany (DE) and Belgium (BE), and one each from the Czech Republic (CZ) and Portugal (PT). One respondent did not identify the country of origin. Six of the respondents were entrepreneurs or corporate representatives, 14 were public officers, six were researchers, and one was a policy maker. Eight of the respondents identified themselves as being something else (e.g. representative of an NGO or public transport association, expert in public transport and sustainable mobility).

In the second round of the survey respondents were asked to further think about and elaborate on the emerging implications. They were also presented with the popularity of expenditure scenarios and alternative service models and the main arguments supporting them. Respondents were at this point also able to change the answers they provided in their first-round, if the presented facts and arguments were convincing enough. There were 25 participants (FI=10, ES=8, SE=3, DE=2, Denmark=1 and Estonia=1) in the second round. Among the participants, there were seven entrepreneurs or business practitioners, eight public officers, three researchers, and seven who indicated something else. Unfortunately, only nine of the respondents in the second-round had also participated in the first round of the survey, which made the Delphi element of the survey rather limited.

2 Context

The world has changed a lot in recent years. One of the main changes concerns the servitisation of different aspects of society. Transport is among the first areas where the digitalisation of services has been rapid. Nonetheless development in this area is slower than it could be due to the various actors, interests, and barriers in the transport sector.

The concept of Mobility as a Service itself is still rather new, and this can be easily seen in the variety of the ways the concept is interpreted. After MaaS, several similar concepts - such as Cargo as a Service, Logistics as a Service – have also emerged.

In essence, the core idea of MaaS is the integration of different modes of transport into one service for customers. It is an approach that is used to facilitate a shift towards sustainable mobility by improving the availability of high-quality alternatives to private cars.

MaaS includes the creation of business models that enable cooperation with different existing service providers. At he same time, it attracts new MaaS operators to cities by creating different service packages and marketing them through a variety of communication channels.

A MaaS concept must include as many types of services and modes of transport as possible (intercity travel, local public transport, car sharing, etc.) and offer smooth one-stop-shopping including real-time information, trip planning, booking and payment. Thus, information and communication technologies (ICT) are vital for MaaS.

When developing mobility services for cities, a holistic approach to Mobility as a Service is needed, as many of the drivers and barriers related to the success of MaaS are not in the hands of traditional transport planners in local authorities. This creates a high demand to develop new understandings and know-how that can speed up the development of mobility services in cities. These are described in the following chapter.

Case example – definition(s) of MaaS in Turku

In the City of Turku, one of the aims was to develop a shared understanding of the Mobility as a Service concept and incorporate required actions into the city's plans. The process started with creating a shared understanding of what MaaS is. The use of the MaaS Readiness Level Index was of great help in this process.

To make it more understandable, comparisons to water and hair salons were used to make the concept more understandable to users. This figure was published in the Eco-support calendar for the staff members of the City of Turku in 2017.

In Turku, the short-term goals included creating cooperation models between different parties and providing the first MaaS service to citizens. Long-term goals consist of a wide variety of MaaS services that impact modal split and lead to fewer cars on the road, less pollution, and an improved city environment.

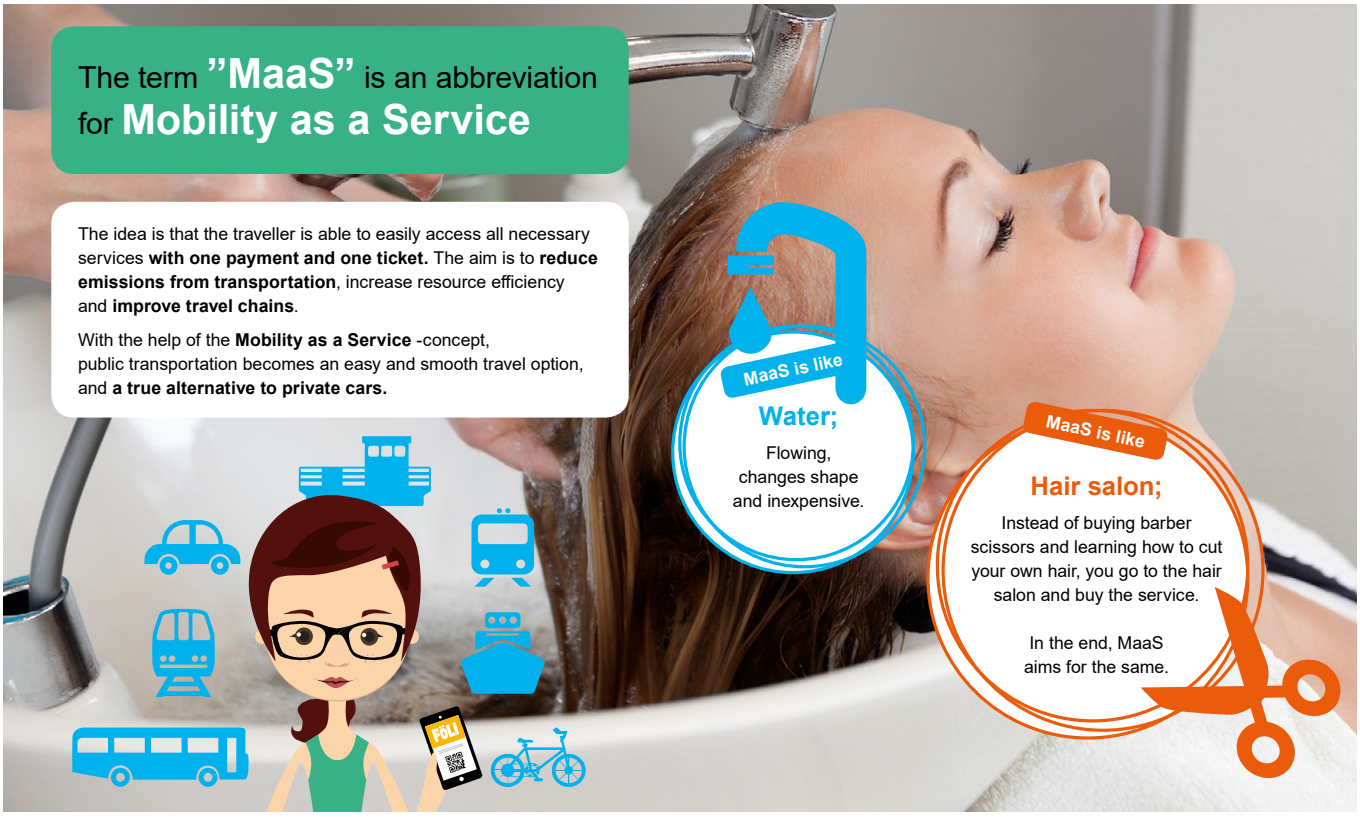

Figure 3. Illustration of the core idea of MaaS in the Eco-support calendar of the City of Turku. ©City of Turku

2.1. Prerequisites

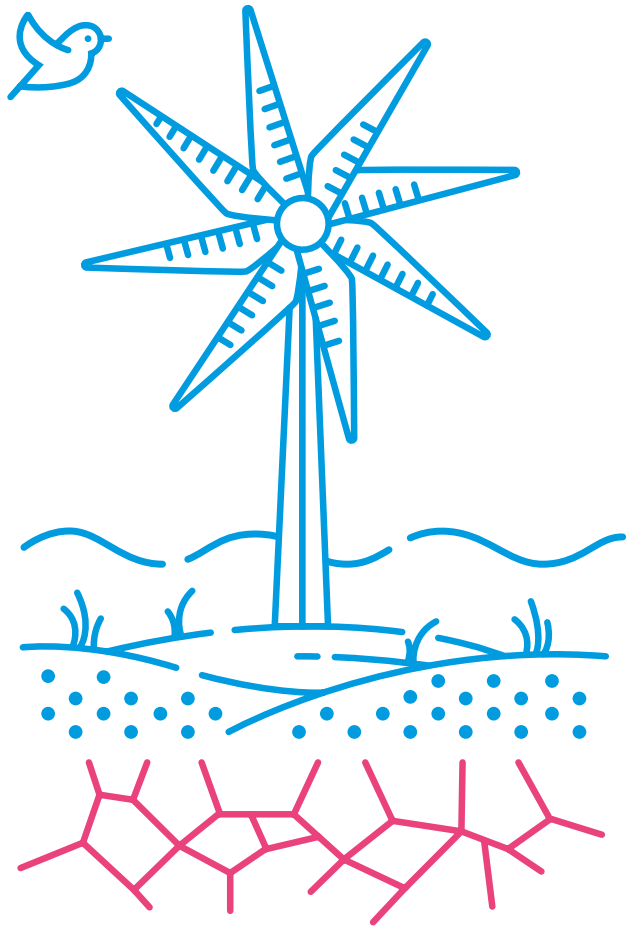

Figure 4. Prerequisites

The requirements for a functioning MaaS ecosystem relate to demography, the level of “app- and digital maturity” of expected customers, availability of data, existence of transportation services, and a sufficient level of technological developments, both in terms of digital infrastructure and application-specific technologies.

In terms of population and demography, a MaaS solution should have an adequate base of potential users. This means that it is easier to create useful and feasible MaaS services in densely populated areas. In rural areas, MaaS can also be an option, but it needs to take a differetn form. City centres are the obvious areas where MaaS has potential, whereas in the countryside the potential is smaller. A very interesting question for many regions where cities are surrounded by growing suburban areas, concerns the feasible reach of a given MaaS solution. Should it encompass all suburban areas, only some where the most commuting occurs, or just focus on the urban centre? Or should society only support areas where public transport on its own is, insufficent (e.g. in the first and last mile), thereby making MaaS an enhancer of public transport (PT) in areas where its reach is low.

The backbone of many MaaS initiatives should be the public transportation system. In addition, many existing private transportation services, such as taxis, can be integrated into a MaaS offer. Some transportation modes can also be completely novel, as the recent entry of the electric city scooters highlights. But constructing a MaaS ecosystem is primarily dependent on the availability of existing transportation modes that can be harnessed to provide the physical transportation services required for MaaS. In other words, if there are only privately-owned cars in a region, coming up with a MaaS offer is more difficult than when there are existing alternative modes and mobility services that are able to be integrated into a MaaS service.

MaaS solutions are highly dependent on data. The data sets that are necessary include traffic data, transportation service data on individual vehicles (type of the vehicle, occupancy, position, etc.), and geographical data. In addition, a MaaS solution requires user-specific data and financial data. For existing data sets to be used in a MaaS solution, the data should be able to be integrated, i.e. standardised to a sufficient degree to enable various actors to integrate their systems through application programming interfaces (APIs). Currently, many datasets related to public transportation and traffic in regions are on their way to being digitalised.

There are several levels of technological requirements. Firstly, the regional digital infrastructure (mobile data networks) must be on a high enough level to support the seamless data flows that are necessary in MaaS. Secondly, a MaaS

service must be deloped and well-functioning on all platforms that are commonly used by expected user groups (e.g. mobile phones, etc.). Thirdly, a MaaS developer must have the technological know-how necessary to pool together the various components of MaaS into an application. Fourthly, the technology in the vehicles included in the mobility services feeding into the MaaS-based transportation service providers must enable sufficient data collection, sending, and interaction/use.

Practical tips:

- Do not develop closed systems with vendor/operator lock-ins. This stops future development and creates extra costs.
- Focus on creating an open but secure architecture with standard interfaces. As a requirement, you need to request interoperability of ticketing and payment systems.
- Support cooperation in the ecosystem. It is important to highlight that this cooperation should be between all agents involved (public and private ones), with the involvement of the policy makers and other decision makers necessary.
- Clarify the different roles and responsibilities also regarding data issues.
- Guarantee that the level of access to APIs – is the same for all the actors, no exclusivity to any operator.
- As a public transportation authority, it is best to provide similar contract conditions and pricing for all MaaS operators. Otherwise you end up having difficulties in the long run linked to not treating all of the different operators equally.
- Request that the gathered data is also shared with the local authority for analysis.
- Carry out an analysis of the area where the system will be developed; each city has their own peculiarities and the focus should be put on them as a starting point for the MaaS.
- For more information related to the requirements for a functioning MaaS ecosystem, see **Guidelines on Mobility as a Service (MaaS) and Sustainable Urban Mobility Planning (2019)**.

2.2. Data governance

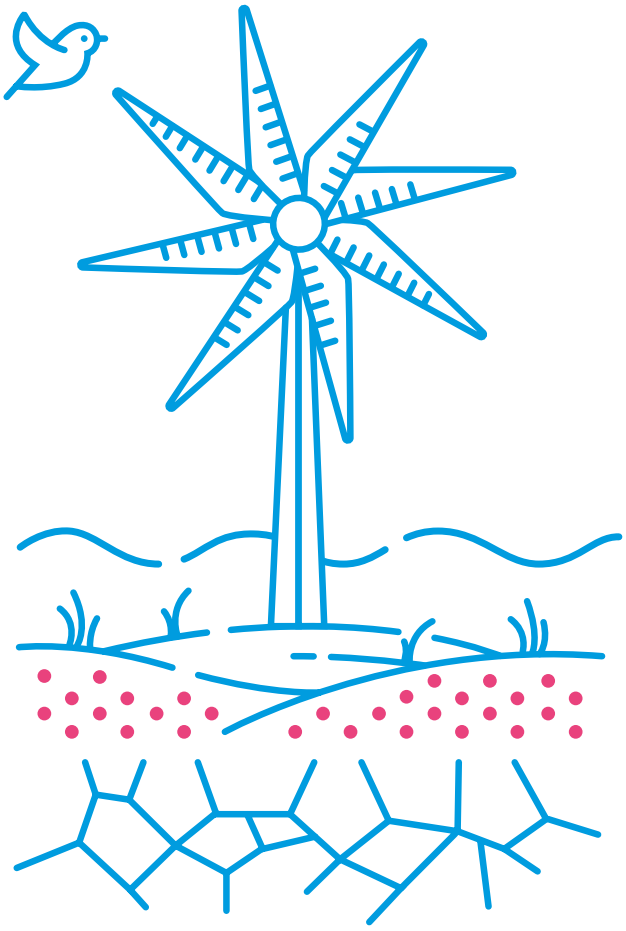

Figure 5. Data governance

One of the trickiest aspects concerning the implementation of MaaS ecosystems relates to the architecture and governance of the required data ecosystem. This pertains not only to the technological requirements for integrating the data systems of various actors, but also to the more fundamental questions of data ownership, data rights, and privacy issues.

In terms of architecture, the question is who, if anyone, should be responsible for both the technological design and security of the overall system throughout its lifetime, from sourcing to processing to utilisation. Is it feasible to focus efforts on the integration of diverse actors and the creation of interfaces between them, and trust that each actor ensures the functionality and security of data within their own systems? Or should, for example, the MaaS operator have wider access to and a governing role in assessing the data flow in its entirety?

The examples from the mobile phone ecosystem highlight the benefits of creating an integrated platform that provides standards of technological architecture and APIs that diverse application developers can take advantage of, thus contributing to the overall development of the platform ecosystem. However, the critical nature of transportation must be acknowledged: while having cybersecurity or functionality issues within a gaming application will seldom threaten lives, having a problematic component within a system responsible to transporting humans from one place to another may well result in serious accidents. This risk will be more severe when autonomous vehicles become a more prevalent part of the transport system.

Therefore, when designing platform-based MaaS ecosystems, it is not feasible to only take into account examples from such ecosystems that are by nature less critical. Instead, a level of oversight must accompany the architectural design, development of individual components, and overarching data security of MaaS solutions. In addition, it is essential to initiate discussions about the rights and ownership of data not only from the perspective of MaaS service providers, but also from the perspective of customers: is there unanimous agreement that data traces linked to individual transportation needs and trips made can be stored, shared, and processed in ways that make it possible for an entity to track the movements of an individual? Cities and regional authorities play a crucial role in market creation and the incentives they create are decisive factors in meeting the different aims set for MaaS.

Case example – Air pollution application in Munich

Munich is developing an application (app) for its Living Lab area that offers optimal routes with low levels of air pollution for people who are walking or cycling. The app is called “Luftlotse - Der saubere Weg durch die Stadt“ (“The clean way through the city”).
Its main function is a routing algorithm. If people want to cycle or walk from A to B, areas with high levels of air pollution are detected. The app then offers two routes: the fastest route possible and one that takes people through areas with better air quality. Users choose one…and the navigation begins.

A measure grid of monitoring devices in the Living Lab detects areas with bad air quality; this information is then communicated to the app.

The installation of this grid was also part of the measure.

In addition to the routing function, a heatmap that shows information about air quality in the Living Lab can also be derived from the grid. When users have completed a route, they also receive information about the CO2 savings they have made as a result of not using a car.

Respectively, the app will also contain/integrate further offers, such as those from carsharing providers. This development/refinement (also for the app as a whole) depends on developing possible business models or acquiring further financing after CIVITAS ECCENTRIC has come to an end.

Photo 1. The air quality app in Munich. ©Green City e.V. / Leon Crusius

2.3. Resilience

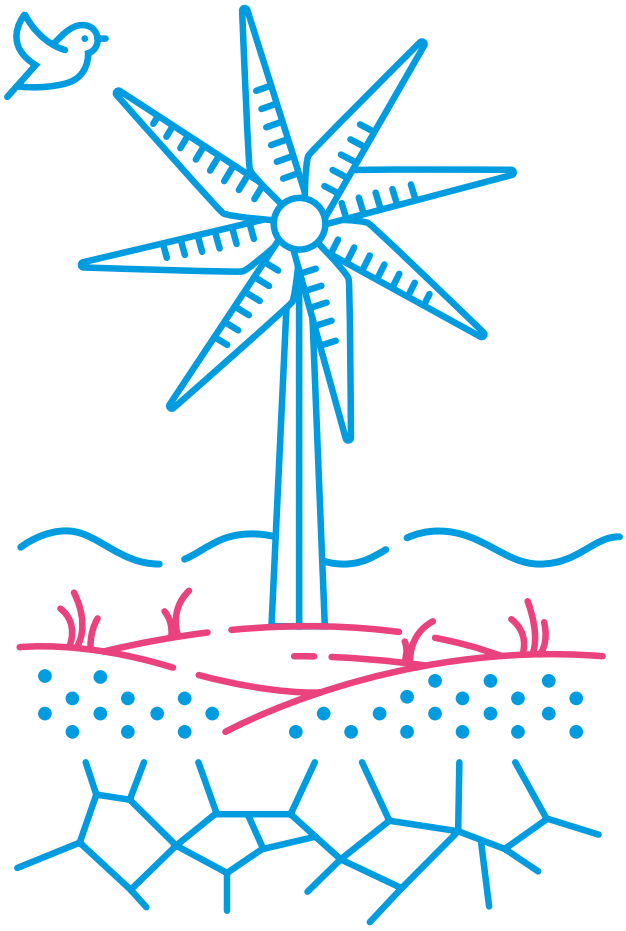

Figure 6. Resilience

A systematic analysis of potential risks and threats faced by a MaaS ecosystem and strategies to cope with them is almost non-existent. This is not a focus of this project, but the current COVID-19 pandemic makes it necessary to at least initiate a reflection on it.

What the pandemic is showing is that the more interdependent and complex socio-technological systems become, the more fragile they are to shocks. The distance to the origins of a shock means little, as reverberations travel rapidly throughout the system. As MaaS leans heavily on a combination of very diverse actors that pool their resources together, this does not only give customers easier access to all of the offerings that are made available by the participants of the ecosystem, but it also creates various entry points for problems that can freeze or, at worst, destroy the whole ecosystem. From the perspective of an individual with a transportation need, having a privately-owned car with a full tank of fuel provides security, reliability, and availability that a system with a number of interdependent actors is hard-pressed to match. Especially in crisis situations, it might be more comfortable for customers to have a central, reliable mobility provider that can compete against the private car.

The systemic risks embedded in MaaS must be acknowledged, identified, and tackled – the ostrich strategy seldom works. The size of this endeavour is beyond the scope of this report. However, to pave the way for future research and practical problem solving, a number of questions that could provide openings for such tasks are listed below.

- How is the privacy of individual customers protected when they use heavily data-based services? Who is responsible for the architecture of the overarching cybersecurity of any given MaaS system?
- In cases of concerning acute and critical transportation needs (e.g. an emergency, need to catch a flight) or during an event of connectivity loss, what is the back-up system?
- In the case of less acute transportation needs (e.g. getting to work) during connectivity loss, what is the back-up system?
- In case when a contagious disease becomes epidemic, how can the safety of an individual who is relying on shared modes of transportation be ensured?
- How modular is the system and how many (and what kind of) modules can be removed without risking a total collapse of the system? Ideally, a resilient system should be able to dynamically change the interdependencies within the system (i.e. be able reorganise the supply network).

2.4. Drivers and barriers

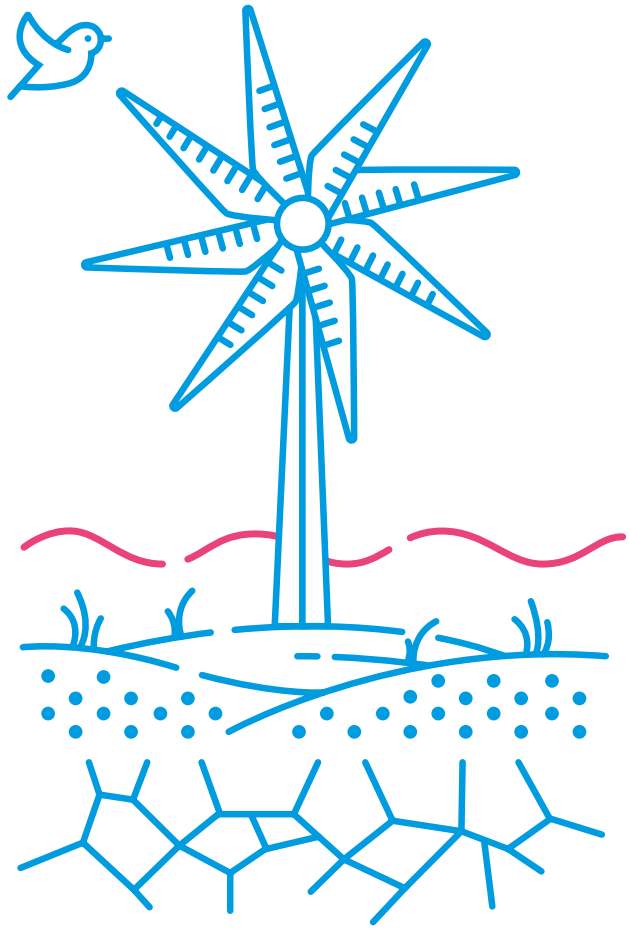

Figure 7. Drivers and barriers

There is rather wide literature concerning the drivers and barriers of MaaS. For instance, Lund, Kerttu, and Koglin (2017) provide an extensive literature review. In their analytical framework, the drivers and barriers of integrated mobility services can be mapped at macro level (political decisions made by national governments related to laws and regulations, taxation, etc.), meso level (administrative decisions made by regional/ local governments, and public and private service providers and their culture and business models), and microlevel (individuals and their values, norms, attitudes, and habits, and their transport needs). Instead of replicating existing literature, this section of the report presents the results of the previously mentioned Delphi study as well as the experiences from CIVITAS ECCENTRIC cities.

2.4.1 Survey views about the drivers and barriers of MaaS adoption

The drivers and barriers of MaaS adoption were addressed more implicitly in the first round of the Delphi study, and more explicitly in the second round. For more information on the background of the respondents, see chapter 1.2. The first round of the survey explored three possible money flow scenarios concerning the diffusion of MaaS-related innovation. The three scenarios were viewed from the perspective of households, in terms of how much money households will spend on transportation in 2030. There were three possible options:

- the overall amount of money households spend on transportation remains approximately the same (Scenario 1),
- the amount of money increases (Scenario 2) or
- the amount of money decreases (Scenario 3).

When asked directly about which of the scenarios will happen, the respondents answered that expenditure on mobility will either decrease (n=14) or remain at the same level (n=12). Scenario 2 – money spent on mobility will increase - was seen as the least likely outcome of the development. When considering respondents' views regarding how likely it is that a scenario will be realised, the picture changes slightly and scenario 3 becomes the most expected outcome.

The second round of the survey started basically with identifying the local drivers and barriers of MaaS adoption. The responses indicated that the main barriers that hinder adoption are:

- Lack of a business model/no consensus about money flows: the development of viable services requires a clear business model, not only in response to the needs of the business as such, but also for the purposes of pitching the idea to public decision makers and negotiating with business partners.
- Few combinations offered to customers: the services currently available are not enough to serve the population beyond the customer

segments consisting of early adaptors (young, urban, do not own a car).
- Public operators do not integrate new mobility services with their offers.
- Very complex municipal organisation: organisational inertia makes required decision making slow.
- Low density of households: No critical mass of customers for viable MaaS services to be able to replace private cars.

The Drivers of faster MaaS adoption are partly the flipside of the barriers. First, new services that provide superior value for consumers and society drive adoption.
However, new services require that actors can solve aforementioned problems related to hazy business models and public decision making. In addition, new technologies, including autonomous vehicles, can help to bring new services to the market. On the other hand, one way to improve the competitiveness of new mobility services is to make the use of private cars more inconvenient (less parking slots, car-free zones, etc.) or more expensive (new taxes and use fees).

Government subsidy policy can naturally have a remarkable impact on the diffusion and uptake of new services. According to the respondents, government subsidies should focus **towards more sustainable modes of transportation** (e.g. electrification of mass transit, more shared mobility, including also shared private passenger vehicles, biking lanes, micro-mobility charging spots, etc.). Furthermore, more subsidies for alternative fuels were requested: since private cars are hard to replace in certain cases, subsidising **alternative fuel development** and delivery could partly solve the environmental problem. Here, the concept of **untravel** was also mentioned. This means that governments should invest more in high-speed internet connections instead of roads; doing so makes travelling (especially commuting) redundant in many cases.

The respondents were also asked to identify behaviour changes at the societal level that most likely have an impact on mobility. **Urbanization** increases population density and the competitiveness of mobility services when compared to the private car, leading to a higher modal share of walking, cycling, and the use of public transport in dense city areas. Increasing **online shopping and better delivery services of groceries** decreases the need for owning a car, which may further lead to a higher use of regional and long-distance rail (also competing with short air travel) and carpooling. Increasing remote working and offering more remote working hubs leads to less transport and commuting. One quite radical vision was related to the changing role of the private car in society: a private car is the cigarette of the future – it is bad both for you and society!

> **Users want particularised solutions for making their door-to-door trips. This implies that multimodal trips will go beyond traditional modes of transport (public transport and private car) to include also new mobility services, such as city bikes, carsharing, carpooling, etc. This will also increase the demand for MaaS solutions among users who would like to make their trips without using different apps and without losing much time.**

In the Delphi study, as well as MaaS discussion more generally, even the use of the term is rather unsystematic. Typically, the discourse focuses on bundled/packaged MaaS offerings. Even if all people can be seen as potential customers and the service matches their needs and works well, the typical users are young people who live in major cities, do not own a car, and do not view cars as a status symbol. In addition, they are likely to have a monthly public transport pass, are part of (at least in the near

future) the working age population, as well as are accustomed to pay a rather fixed fee for traveling services. Bundles can then be seen as upselling: services that bring something extra - ease, reduced prices, more flexible offers, which previous generations fulfilled with their own car.

On the other hand, there is criticism towards bundles, since the individual travelling habits and needs of people are diverse. “Bundles/packages are less useful than picking the most suitable MaaS option among the array of services. People do not like fixed fees but prefer pay-per-use. For instance, if a person commutes by bicycle, they do not need a monthly public transport pass in the bundle, but something else.”

2.4.2. Action-related risk assessment

Below is a summary of barriers and drivers that have been identified in the CIVITAS ECCENTRIC project. It can be used as a check list for risk assessment when planning for measures to be implemented around MaaS. The list also contains good proposals on how to overcome some of the barriers.

Barriers:

1. **Involvement and communication:** Repeated issues highlight weak communication between stakeholders when it comes to some measures, especially when they are not located in the same city. Since MaaS involves more than one institution, communication is key. Local evaluation managers also reported difficulties related to the governance of the projects, as they were frequently facing one-man-show issues; it was stated that in such cases, a special set of skills is required to steer governance in the right direction. Another issue that was faced when it came to some measures was the repeated change of the measure leaders, which significantly affected their performance.

2. **Institutional/Organisational:** A ccording to the experiences shared in connection to MaaS, the topic is not yet sufficiently well established and fully understood in key institutions; for example, cities frequently lacked the know-how to deal with technology. As a result, issues such as an unfavourable or unclear regulatory framework, as well as a lack of funds and support from policy makers were reported under this category. This seems to contribute to a high perception of uncertainty with regards to the topic. In particular, local evaluation managers experienced difficulties when setting clear Terms of Reference.

3. **Problem-related:** Most barriers are connected to the complexity and lack of understanding of the MaaS concept, as well as the rapidly changing landscape of mobility services/options/supply. Often, new options on the market also mean new technological barriers to overcome. All of these factors create highly volatile and unstable markets for MaaS; this makes it more difficult to position measures and create the partnerships required to operate, for instance MaaS with PT, or private shared mobility initiatives, or dissolved partnerships. Other particular problems were the very high level of competition among partners to run the platforms, and maintaining interest among partners so that they kept participating in the schemes when they themselves were not running the platforms

4. **Technological:** This category included both technical problems to physically implement the needed installations and matters relating to unexpected performances of the technology, which compromise the safety of the users. In addition, the lack of technical capacity of the public administration affected the measure’s implementation. It was also highlighted that technology was not an issue, but that the issue was rather the availability of human resources to carry out development, since that is scarce.

The key actions that were identified to overcome such barriers include improving communication between all stakeholders, encouraging cities to clarify legal frameworks and engage in developing MaaS, and promoting more robust planning to identify potential problems in advance.

Drivers:

1. **Planning:** Most MaaS actions recognised strong planning as a driver, in particular its design, leadership and flexibility/adaptability within the measures, which in some cases, such planning was replicated in other countries.

2. **Cultural:** Participant cities have a strong business culture in the information and communication technology (ICT) sector that supports these measures (i.e. IT infrastructure, high interest in actions, high smartphone penetration, etc.). It was also recognised that there is growing public interest to make things faster and easier through online services (integrated booking, payment, routing, etc.).

3. **Involvement and Communication:** Good leadership, cohesion between teams, and a high level of interest among the target population were mentioned. CIVITAS ECCENTRIC's involvement and the inclusion of more of its measures in the Living Laboratory area had a positive effect.

4. **Political/strategic:** The measures are naturally aligned with environmental goals, regulatory frameworks, and the Sustainable Urban Mobility Plan (SUMP) concept. In some cases, this translated into favourable regulatory frameworks, strong support from regional policy makers and key stakeholders, as well as interest in and commitment towards cooperation. In general, growing political will to set proper conditions for the success of MaaS was perceived (restrictions on motorised individual transport, shared mobility, etc.).

5. **Positional:** In general, previous drivers also allow some measures to gain more visibility and to position themselves.

Other drivers include institutional support, the allocation of funds provided by ECCENTRIC, and technological maturity. The favourable conditions were maintained through effective communication with stakeholders.

2.5. Evaluation of Mobility as a Service

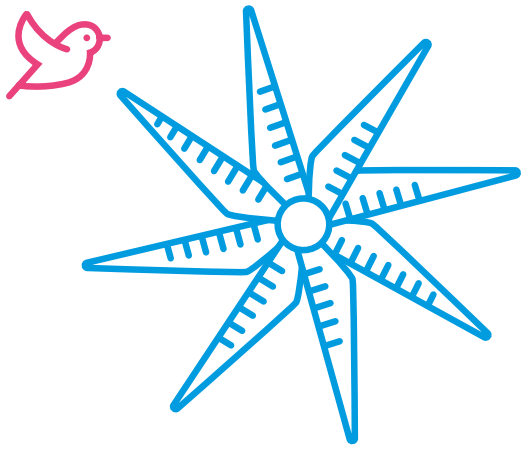

Figure 8. Evaluation of Mobility as a Service

The analysis of Mobility as a Service (MaaS) in CIVITAS ECCENTRIC differentiates between the short term and the long term. It is fair to assume that, in the short term, satisfied MaaS customers will not necessarily behave more sustainably when it comes to mobility. Nowadays, there are many "sustainable" mobility solutions that are launched under the banner of MaaS, despite very little proof of its positive impact on travel behaviour or the environment. Nevertheless, the market is delivering solutions that, at least for now, are not contributing to a reduction in the number of Vehicle Kilometers Travelled (VKT), increasing the share of public transport or active mobility, or improving any other figure commonly linked to "sustainable" mobility.

The low market penetration thus far and numerous barriers are reasons for this. CIVITAS ECCENTRIC explored different options to turn this around and turn MaaS into a solution that lives up to its sustainability promise.

In the long term, it is also fair to assume that MaaS will shape into an option which actually deliver better mobility services for all citizens. At the same time, it will contribute to reducing car dependency, VKT, and overall emissions.

2.5.1. Market relationships

The scenario below in figure 9 has not been proven by any CIVITAS ECCENTRIC measure due to its long term nature. It is the result of a systemic analysis that involved experts in the field and the knowledgeable people that participated in the project.

Mobility as a Service (MaaS) market relationships will evolve from their current form (based on the assumption of an expanding mobility demand), to an actual preference of "sustainable" mobility solutions over motorised individual transport (MIT).

The bundling of infrastructures, services, and information, with the user in the centre of the ecosystem, leads to satisfied customers that consider MaaS to be their first mobility option. This will secure investments to deploy the infrastructure, services, and ICT platforms needed to provide a high-quality MaaS.

Investors and companies deliver mobility solutions because customers today appreciate having an increased number of options for mobility. The customer decision has nothing to do with the sustainability aspect of it, and in many cases trips are being created or shifted away from cycling and walking.

The expanding size of the mobility market has created an opportunity for these new alternatives to pop up, and deliver infrastructure, services, and platforms commonly marketed as MaaS.

While still following a niche strategy, some of those MaaS providers want to become mass market solutions. Moving away from the niche strategy seems to be a precondition to have a relevant impact when it comes to "sustainable" mobility.

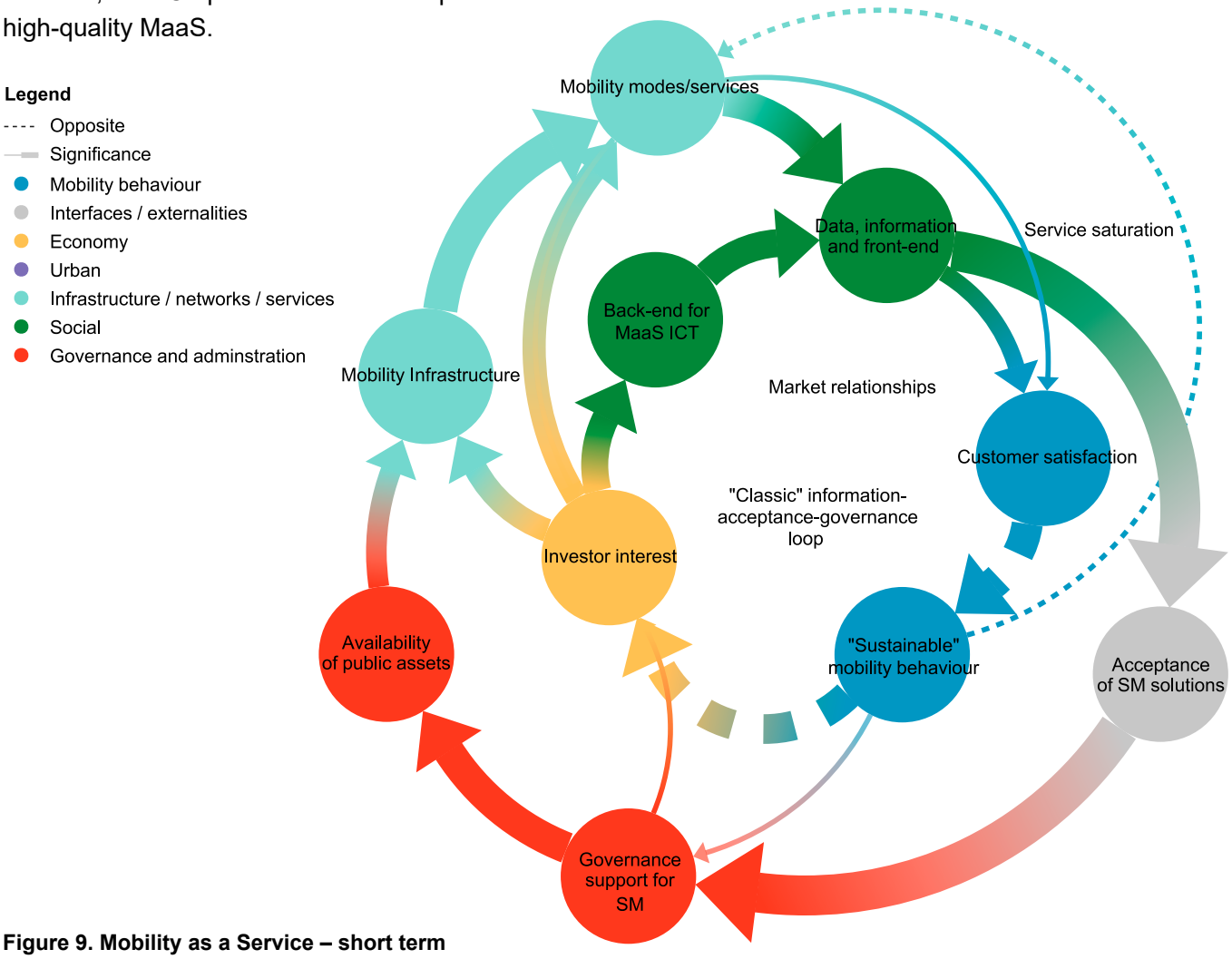

Figure 9. Mobility as a Service – short term
©Helber Y. López Covaleda, kumu.io

2.5.2. Service saturation

The quality and capacity of MaaS is limited by the existence and capacity of the mobility services themselves, and by the number of services available or integrated into the MaaS platforms. The greater this availability and integration is, the more attractive MaaS becomes for customers and for mobility service providers as well, who see this as a sign of a promising market that it is worth taking a risk and investing in.

2.5.3. Information-Acceptance-Governance

The CIVITAS ECCENTRIC project has demonstrated with MaaS measures ithat were mplemented in the city of Turku that the impact and importance of the connection between information available to the user, its acceptance and the positive impact in the governance processes to deploy the services, infrastructures and ICT solutions are all needed to consolidate a MaaS.

Although there is still a long way to go until all the pieces are available and fall into place, identifying the strings to be pulled to mobilise a governance system that secures the assets and resources needed for a MaaS is of major importance.

MaaS is not only the user front-end, or the services that form part of it. It implies securing public space to operate, permissions, transparency, and contracts good and beneficial for all parts. But more importantly, MaaS implies a healthy dialogue among a huge number of parties that need to agree in order to move forward in the implementation. CIVITAS ECCENTRIC gave important steps to proceed in this direction.

In any case, governance systems created during the development of MaaS should remain in place to a certain extent. This is important not so much to secure resources, but to ensure that MaaS keeps its orientation towards customers and lives up to its sustainability promise.

2.5.4. Infrastructure-Services dependence

The availability of proper infrastructure and mobility options are preconditions to secure resources from the private sector. The point in time when public support starts being phased out has to be carefully chosen, to make sure that there is a good basis for the private sector to operate on its own and invest further in infrastructure and improved services, beyond the IT back and front-end of MaaS.

2.5.5. Market discouragement

In the future, if MaaS is successful in the mobility market, this will lead to a reduced nterest to establish a cooperation network between public and private sectors, thus weakening governance support for MaaS.

Today, public support lags behind (regardless of its sustainability). However, as the market becomes more mature, support for MaaS will somehow be dismounted.

Support of MaaS schemes by projects, like CIVITAS ECCENTRIC, is a bet on the future, supporting the transformation of the mobility market in urban areas. From the market perspective, this support should become unnecessary if the bet is successful, as it is a function of the administration to foster healthy markets, but not to interfere, run, or take an active part in them.

The public sector will turn to its more classic role, overviewing and setting the rules for proper competition in favour of citizens, and providing a stable framework for the market to operate. Only a few assets will still remain in its hands, namely public space and other public goods that are needed for MaaS to operate (e.g. radio frequencies and similar).
The bulk of the investment for infrastructure and services is expected to come from the private sector, which will slow down the deployment or, at least, limit implementation to what the market is actually demanding.

3 Key pillars of development

After analysing the context where MaaS development takes place, it is essential to focus on two key aspects that enable the process to proceed further – stakeholder engagement and business models. These aspects are crucial for other areas to develop.

3.1. Stakeholder engagement

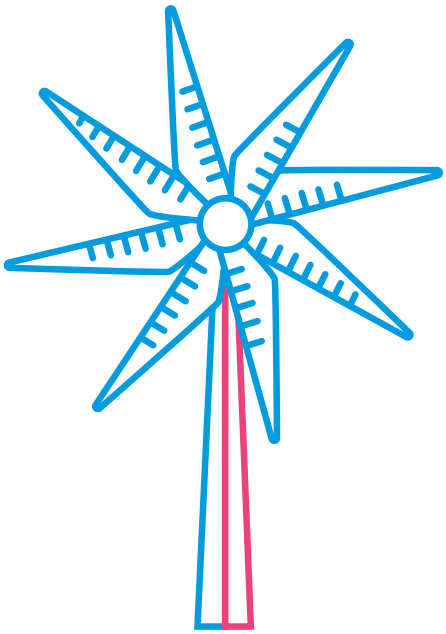

Figure 10. Stakeholder engagement

There are many ways to foster stakeholder engagement (digital and non-digital). This chapter does not focus on the different ways of creating it, but on the intention behind stakeholder engagement.

The different measures carried out in the CIVITAS ECCENTRIC project have showcased that, in the long run, perhaps the most important achievement of the different actions has been the communication with stakeholders and the establishment of continuous cooperation. It is vital to create an environment where open communication and interaction can take place and where knowledge and ideas are shared for mutual benefit.

The first objective of stakeholder engagement should be enabling the delivery of the components of the MaaS scheme. Individual arrangements can vary for every city, but, in general, the public sector can contribute with land regulation, permissions, and other assets (including incentives) that enable the creation of infrastructure, operation of transportation means, and implementation of ICT solutions.

Successful stakeholder engagement in the early stages results in a higher acceptance for MaaS. Eventually, stakeholder engagement should evolve towards more structured and permanent collaboration forms that enable strategic functions, as well as evaluation and oversight, which should lead to an achievement of desired mobility patterns and environmental objectives.

The key ingredients for successful discourse:

Identifying and stating the role of the city and the region in the discourse. A role for which the city is well suited is networking and the facilitation of networking at different levels (project, city, national) to involve potential partners, create awareness, and bring together parties who share a common interest. Regional cooperation is of huge relevance for the development of MaaS solutions and it can play a significant role in stakeholder engagement.

Identifying and stating the role of the public transport authority (PTA) and/or city. It is important to clearly state the difference between the role of the city (landowner, city planning, street management, setting rules) as opposed to the PTA (providing transport services). In addition, it is important to differentiate the role of the MaaS operator, PTA, and the city.

Involve **internal stakeholders** as early as possible and ensure firm ownership of development duties. MaaS issues relate to a number of municipal activities and departments. It is essential to identify common goals as well as potential legal, administrative, technical, and financial restraints.

Constant identification of stakeholders. Identify and contact external stakeholders to find out what they can provide, as well as what they need and expect. Prepare for a lot of legwork and do not forget to include also the disruptive mobility providers and app developers. Sometimes a more participatory approach is needed to facilitate the process, as many stakeholders are reluctant to collaborate unless they see a value also for themselves. It is worth considering more regular ways of integration, such as focus groups or expert groups with well-known participants that are committed to the process.

A key factor in this type of project is the **continuous involvement of external and internal stakeholders.** Often, the internal stakeholders in the city organisation are not properly engaged since the focus is more on external public and private partners. Without proper engagement, it is not possible to understand all the different types of drivers and constraints that come into play or anticipate the multiple technical, financial, and administrative issues that require attention.

Establishing a framework that supports the development of business models. It is important to focus not only on the digital side, but also the physical world to support MaaS efforts. In this way, the mobility services in the physical world and the digital world become clear to customers.

Finding a shared vision of the future. It is worth initiating a co-creation process with service providers in order to establish a shared vision in which the providers' strategies can be compatible, for example, with their partial integration within the public transport system. Such a shared vision could provide the pre-conditions for these providers to be integrated in, for example, open data platforms.

The city is in a good position to reach the public and, in most cases, has at its disposal skilled communications personnel and a good coverage of different channels of communication. In addition, organising and coordinating different kinds of promotional events is something cities usually have a lot of experience with and good knowledge of. However, this is not enough for fostering fruitful stakeholder involvement. The development requires:

- **A long-term and mid-term plan**, taking into account short-term efforts.
- **Different know-how** on how to lead the process with added value for all participants.
- **Clear plan with practical steps.** The plan needs to be clearly communicated to identified stakeholders.
- **Adapt constantly** and consider using agile methods.

Creating a positive and encouraging approach. In order to create an enthusiastic atmosphere, it is important that the key persons have a service attitude and believe in the cooperation themselves. Their approach is contagious and has a clear impact on the process. It has been noted that, in general, the discussions with all stakeholders have been very positive, enthusiastic, and encouraging. There is every indication that it is possible to contribute positively to the development of the local mobility market with it. However, it is more realistic to expect slow overall progress than immediate results in the form of, for example, a rapid increase in the availability of new services.

Find ways to create synergy in marketing the MaaS solution to end customers. Each of the stakeholders has their own communication channels and it is worth finding out how communication could benefit both sides and could be targeted in joint efforts. Users appreciate it if they receive clear messages from different channels that support the overall goals.

Case example – New Mobility Portal in the Madrid Region

In the Madrid Region, the public transport authority, CRTM, has developed a mobility portal where information from different modes of transport of the region will be integrated; not only information about public transport services (more than 40 operators in the whole region) but also information about shared mobility, accurate mobility information from different municipalities, and other information relevant for mobility management. Thanks to this portal, citizens will have access to a huge amount of information related to mobility in the whole region. On the other hand, in those cases where the information is provided in an open format (such as the public transport information published by CRTM), the portal will be an access point for developers who want to make their own applications.

During the planning and implementation phase of the mobility portal, some difficulties occurred. The difficulties were both technical, related to the high number of sources of information that should be integrated, and strategic, related to new mobility providers' strategies and their reluctance to open their data.

Photo 2. New Mobility Portal in Madrid.
©Public Transport Management Centre

The creation of a common strategy and a shared vision for the future among all agents involved in mobility management is crucial for the optimal implementation of any MaaS solution. They must see themselves as part of a common framework through which they provide mobility services to all users, rather than as competitors. Thanks to the work of CRTM in Madrid region, all the public transport operators integrated in a common system have now tested the advantages of the coordinated work.

Case example UbiGo, Stockholm

The company, UbiGo, launched its combined mobility service in Stockholm in February 2019. In order for it to be a realistic and attractive alternative to car ownership, the service needs to meet all mobility needs of a household, and need to be flexibly designed, easy to use, and easy to modify.

As customers of UbiGo, household members share a subscription that contains public transport, carsharing, rental cars, and taxi. The trips are booked in an app and invoiced monthly. There are no fixed costs - customers only pay for what they use.

UbiGo was founded to commercialise the concept of a pilot that was carried out in Gothenburg in 2013. Vast amounts of knowledge and lessons learnt remained from the pilot. However, new service subcontractors, producers of apps and booking systems, public transport suppliers, etc. were difficult to find and engage.

The launch of UbiGo in Stockholm was made possible partly by funding from the EU project, CIVITAS ECCENTRIC, as well as a decision by the Stockholm Traffic Authority to open up to digital resellers and to participate in pilot projects for combined mobility. The role of the City has been to enable UbiGos work within the project and to support in cooperation especially with Stockholm Transport Authority, and also to feed the experiences of private actors who are trying to develop mobility services in Stockholm back into the city organisation.

UbiGo Stockholm continues to develop and recruit new customers. The build-up is progressing gradually, as is expected with a new and complex service. By February 2020, 250 households had tested UbiGo. In May 2020 bike-leasing options were included into the UbiGo offer.

Photo 3. Family entering a UbiGo shared car. ©UbiGo

3.2. Business models

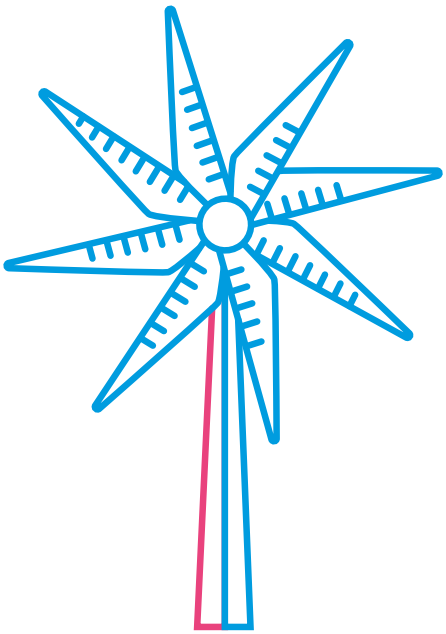

Figure 11. Business models

In many companies, the concept of a business model has surpassed the importance of the conceptstrategy when it comes to figuring out how to makeprofit. A business model refers to an overarchingunderstanding of the value flows created andcaptured by a company. In other words, it is aboutexplaining how a company realises its offerings,who could find them appealing and why, and howa company get revenues from them. Thereare several tools for designing a company-specificbusiness model, with particular tools available for product-based companies, service-basedcompanies, and platform businesses.

Business models are company specific, and constructed from the viewpoint of the focal company. The roles of public authorities (at city, national, regional, or global level) in a business model of a company vary, as they can be perceived as paying customers, suppliers of the service, sources of resources, providers of regulatory frameworks, or co-creators of value. For public actors, it is therefore essential to understand what role they play in the business models of the firms they engage with in developing MaaS solutions.

From the viewpoint of a city, it makes a big difference whether the firms it is collaborating with to realise MaaS solutions perceive the city as merely a regulatory organ, necessary resource, gatekeeper to resources that are required for creating offers, or source of revenue. The following sub-chapters explain the fundamental elements of business models, with the aim of making it easier for a city to understand its relationship with the MaaS-related business sector. The nature of that relationship varies not only depending on the region or the regulations that are in place, but there may also be variation in how different MaaS actors within a single regional MaaS ecosystem see the role of a city.

3.2.1. Overview of business models

A business model describes the very essence of a firm: how it makes money. A business model consists of three dimensions: value creation, value delivery, and value capture.

Value creation simply refers to the benefits of the offerings of a firm, be they services, products, data, or hybrid combinations of each. “Value” in value creation means both the perceived functional value of the offerings as perceived by the customer as well as other more intangible things the customer finds appealing. For instance, statements such as: “With this offering, I can fulfil my need to get from A to B”, this includes sentiments like “If I use this service, I will be environmentally friendlier than using an alternative”, “If I use this product, I will be perceived trendy”. Put simply, from the perspective of the firm, value creation refers to identifying the needs and desires that its offerings could satisfy, and creating solutions that customers find appealing not only because of their functionalities but also for reasons linked to personal preference. This theme is often captured with the concept of value proposition. Value proposition, put simply, translates to: “with this service you can fulfil your transportation needs” in a better way than would be possible with any other current alternative.

Value delivery refers to the mechanisms and technologies with which the perceived value of the offerings is transferred from the firm to the customer. If the value offering concerns transportation needs, the delivery mechanisms include products (e.g. cars), services (e.g. taxi), or, in the case of MaaS, a combination of diverse technologies and physical services. To recapitulate, while value creation focuses on why (a customer should need/want a certain offering), value delivery focuses on how (a customer's need/desire is fulfilled).

Value capture is the cornerstone of business. While value in the other two dimensions of business models is something that is perceived by the customer, in this dimension it refers simply to money. In other words, when value flows out from a firm, it has many shapes, whereas when it flows into a firm, it consists only of money. Value capture consists of the monetisation logic (e.g. advertising, asset sale, lending/renting, licensing, subscription, subsidies, usage fee, freemium) and profit calculations (the formula of revenues minus costs equals profit).

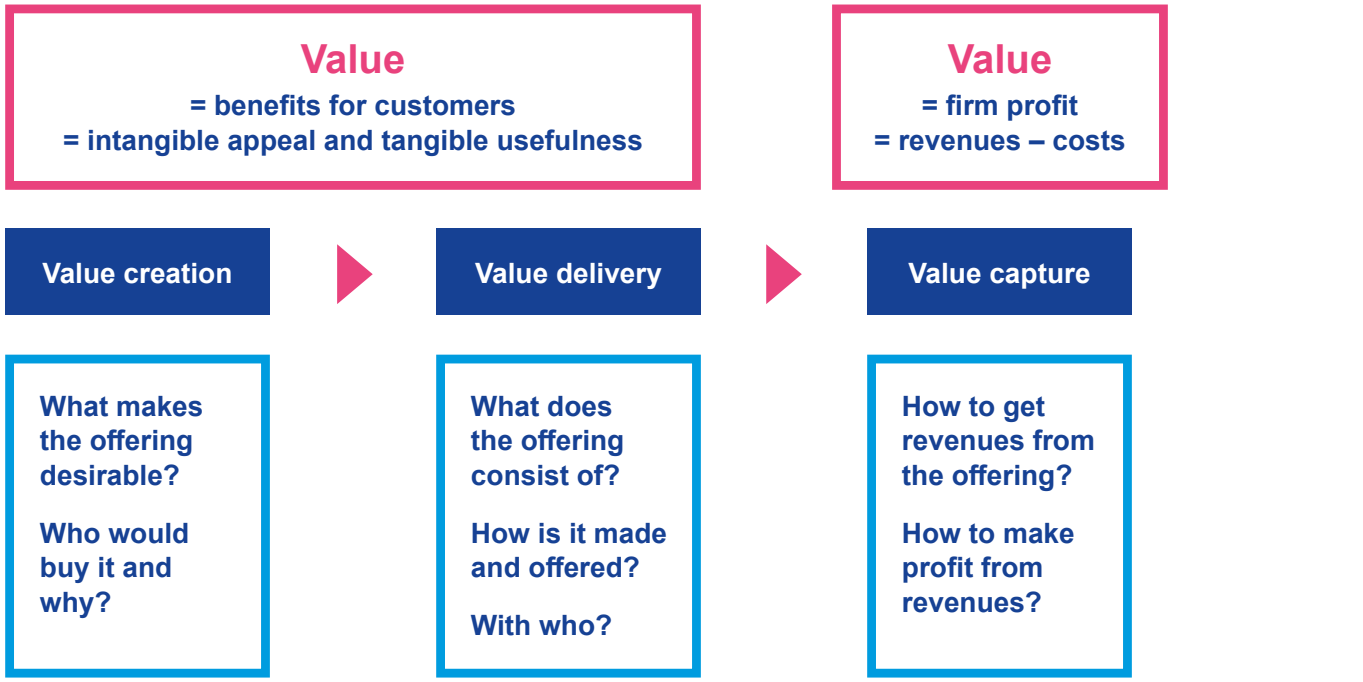

Figure 12. Main elements of a business model

This business model skeleton that is presented in figure 12 can and must be elaborated and contextualised by each company that is participating in a local MaaS ecosystem. The first two dimensions incur costs, require assets and capabilities. In most cases, these happen in complex ecosystems, where one actor can be both supplier and customer, competitor and collaborator, and can access, contribute or even govern platforms or other technologies all members of the ecosystem are dependent on. The third dimension is unique to each firm, as it ultimately underpins the ability of a firm to gain sufficient revenues for being in business in the first place.

The following sub-sections take a deeper dive into these concepts in the context of MaaS ecosystems.

3.2.2. MaaS Business Models – Value Creation

The dimension of value creation is the most advanced area in all MaaS-related scholarly discussions and practical realisations. MaaS proposes solutions for the following assumed and identified needs and desires of its customers:

- Environmental friendliness
- Flexibility at the individual level
- Cost benefits at the individual level

The environmental benefits of adopting MaaS are anticipated to materialise through the:

a. diminished need for and use of private cars, resulting in less emissions and more space for green and environmentally-friendly mobility opportunities;
b. cuts to pollution resulting from the manufacturing cars,
c. increase in the use of public transportation, which is comparatively less polluting; and
d. increase in the share of less polluting modes of transportation, like cycling.

It is doubtful that, during the first stages, a MaaS scheme can deliver all of the societal and environmental benefits that cities are aiming for nowadays. More likely, **MaaS can increase mobility rates, and only for those who belong to niche profitable markets.** Consequently, mobility patterns are not likely to change radically and environmental impact is expected to, at the very least, remain neutral. Nonetheless, support for incipient MaaS schemes should remain active as long as there is a strategic perspective for reaching most, if not all, citizens and having a lasting impact on mobility behaviour and the environment. In the meantime, MaaS should focus on delivering individual flexibility and cost benefits for users as the main value proposition.

An actual impact on the environment will take place when the market is more mature. By then, MaaS should deliver benefits on its own, and external support should take some form of evaluation and oversight to ensure the permanent alignment of MaaS with the objectives of sustainable mobility. Value will then include the environment, with little interference in the market.

The flexibility at the individual level is anticipated to result from: a) time savings due to needing to spend less time in traffic jams or looking for parking space; b) the availability of multiple choices for diverse transportation needs; and c) the relative easiness of accessing diverse transportation services through a one-stop-shop, namely one application or a set of applications. The individual cost benefits are anticipated to result from: a) freeing customers from the costs of owning and using a car (purchasing a car, its maintenance, and fuel); b) providing transportation services at more affordable rates in bundles, than when purchased individually (e.g. accessing taxi services as part of a bundle compared to paying for a singular ride).

In terms of value creation, the competition MaaS is facing emerges from the responses of the traditional car industry regarding alternative solutions to the needs and desires explained above. **Car manufacturers** are designing and building cars that are greener to both drive and manufacture, exploring solutions for autonomous vehicles that could reduce congestion and the hassle of parking, and, together with retailers and financial institutions, **exploring alternatives that enable the decoupling of private car use from private car ownership.** The car industry is strongly networking with politicians and creating cooperation possibilities with different sectors. In addition, the traditional car industry leans heavily on perceived value components that appeal to individual identity construction: the power of brands is well understood in the industry.

Summary of study findings in regards to MaaS value creation

MaaS-related discussions strongly emphasise value creation as part of business models, especially with regards to responding to existing needs. However, the part about creating the desire to reap the identified benefits seems to still be missing in MaaS discussions. This was also evident in Delphi study: while the majority of respondents articulated and re-articulated the benefits of MaaS, the main concern involved the ability of MaaS proponents to communicate the benefits of MaaS widely and effectively enough to enlighten potential MaaS users of its utility.

The responses highlighted a strong shared assumption: in general, **when it comes to the three main issues that are tackled through MaaS (environmental friendliness, individual flexibility, and cost efficiency), the benefits of MaaS solutions were considered superior to those of the alternative solutions that are being designed by the car industry.** This was reflected in a predominant view where it was perceived that MaaS diffusion was only a question of: a) enlightening potential customers about the superior functional solutions that are offered by MaaS; and b) solving the practical problems (discussed in more detail in the chapter on value delivery).

> **Bundles/packages are less useful than picking up the most suitable MaaS option among the array of services. People do not like fixed fees, rather they prefer pay-per-use.**

There were only a few responses that indicated an awareness of the desirability of MaaS beyond its functional benefits. **"In 2030, owning a car will no longer be a status symbol"** reflects this thinking, especially as it highlights the dominant driver behind the appeal of the privately-owned car. However, there was no further elaboration concerning how MaaS could appeal to the same area of identity building that car manufacturers tap into. At least so far, the actors in the MaaS field, in general, predominantly emphasise the actual functionalities of the solutions.

Insights:

- Further developments in value creation should consider not only the functionalities of MaaS, but first consider the aspect of desirability of MaaS. What is the challenge that we are really trying to solve?
- Alternative solutions for the transportation needs that are expected to be solved with MaaS are ignored to a notable degree. Perceiving MaaS as the only possible solution bears the risk of becoming blind to other possible solutions, thus not being able to really validate the competitive advantage resulting from the MaaS value proposition.

3.2.3 MaaS Business Models – Value Delivery

The dimension of value delivery within this context refers to the actual MaaS-related offerings – how is the value that is proposed within the dimension of value creation delivered to customers? At its simplest, a MaaS offering consists of the following components:

- User interface;
- Integrator/operator;
- Financial system;
- Data ecosystem; and
- Physical transportation service providers.

The user interface is the "one-stop-shop", most often an application through which a customer can plan, book, access, and, at best, also pay for transportation. However, depending on the solution, the user interface may consist of only a part of those functionalities. For example, the financial system may be decoupled from solutions that offer planning and pre-booking. The component that sets a MaaS solution apart from other kind of solutions is the integrator. **The novelty of MaaS results from bundling a set of offerings, which have individually existed longer.** The role of the integrator is, by definition, to integrate transportation service providers, data providers, and financial service providers and to enable access to a bundle of offers through the customer interface. The data ecosystem is a complex entity: the integrator can source and process required data on its own or it can collaborate with other data providers. The types of necessary data include data from traffic, maps, vehicles, payments, among other possibilities. The transportation services may include public transportation systems (e.g. trains, trams, buses, city bikes), private service providers (taxis, limousines, car rental options), or more novel services (carsharing enterprises, city scooters).

The problem with providing a clear definition of MaaS results from the many alternative ways of bundling and packaging the aforementioned components. Is something MaaS only if it consists of all of the aforementioned parts, or can a travel planning tool count as MaaS? Or maybe the services of a company that provides carsharing and city scooters? And what about public transportation systems, which in many regions already offer versatile transportation modes with a single-access ticketing system – are they inherently MaaS? This is an area in MaaS-related discussions (both in academia and practice), where the opinions and alternatives are most varied. **The very real practical problems** related to integrating physical elements (e.g. vehicles, individuals and their possible cargo), data-based elements (e.g. maps, traffic insights, access right), and business-related issues (e.g. collaboration agreements, contracts, responsibilities, and rights) **preoccupy the majority of individuals that are interested in developing MaaS.**

> **The aforementioned components could be replaced by different transport services.**

Summary of study findings regarding MaaS value delivery

Beginning with the very problem of defining MaaS in a way that is accepted by all respondents, the area of value delivery is notably complex. Unsurprisingly, respondents list the problems that are relevant to the practical issues they are currently dealing with and define MaaS in a way that is relevant in their contexts. A theme of notable discord is the issue of bundling: **is it possible to even try to bundle everything under the umbrella of one MaaS service provider**, or would it be more beneficial to accept that the markets will consist of a variety of different private and public firms that each offer some sets of transportation options? For some, for a solution to be considered MaaS, it has to, at least, include travel planning, options for booking and accessing a variety of transportation modes, and a payment interface. Others, however, are happy to label a transportation planning system as MaaS. Another similar question concerns the link between the public transportation system and MaaS: can a public transportation system by itself already be MaaS, or can it only be a part of MaaS in a bundle of services that is integrated by a private actor?

The problems of developing MaaS value delivery mechanisms are: a) technological, especially regarding the requisite system integrations between the integrator systems and transportation service provider systems, financial service provider systems, and various data producer systems; and b) contractual, referring to the data sharing and ownership rights and responsibilities of the various actors.

Based on the responses, **the architecture of the necessary data ecosystem is a black box.** There is little understanding of: a) the types of data that are needed; b) the practicalities of data sourcing and the roles of the actors that are responsible for sourcing data; c) the requisites of data processing, including the question concerning the extent to which the data necessary for a specific MaaS solution can be acquired from actors that are external to the specific MaaS solution; and d) the notable issues of data ownership (e.g. if a public actor, city or government, collects traffic data, does that data need to be openly shared with all interested parties or is it possible to grant access to that data to only one or a few actors – and if the latter, on what grounds?). The lack of understanding relating to the data ecosystem is worrying. There was no mention of the personalisation-privacy paradox or potential cyber-security issues.

Another absent theme, especially relevant as an underpinning of the value capture dimension, is the discussion on the financial and other resources required in constructing the value delivery mechanism. It is possible that this primarily reflects the complexity of designing a MaaS offering bundle of any scope: as each bundle has to be designed individually, the costs and cost sources vary, as do the resources and their acquisition, making it difficult to discuss the theme on a more general level. However, it is also possible that this absence reflects something more fundamental: since creating an offering that involves multiple actors from both the public and private sector is a complex and relatively novel operation, anticipating and identifying ex-ante the requisite resources and potential cost sources is simply not possible – the current MaaS actors engage in a more trial-and-error type of process.

Insights:

- Technological issues per se are not the main problem, but the contracts on the grounds of which the technologies can be developed are tricky.
- There are major gaps in understanding the data ecosystem, not only from the perspective of issues that can be solved through technology (practicalities of sourcing and processing), but especially when it comes to the very fundamental questions concerning data rights and ownership.

3.2.4 MaaS Business Models – Value Capture

Of the three dimensions of business models, the area of value capture within the MaaS context is unquestionably the haziest. In literature, there are, at least, the following examples of the different monetising logics (presented in alphabetical order, not by familiarity):

- Advertising;
- Asset sale;
- Freemium;
- Lending/renting;
- Licensing;
- Subscription;
- Subsidies;
- Commissions; and
- Usage fee.

Monetising through advertising is the cornerstone of the business models of Facebook and Google: value proposition of the firm is based on the service users interesting to a paying customer, i.e. advertiser. With regards to asset sale, the oldest and most established way of monetising, the ownership of an entity transfers from the buyer to the seller in exchange for money. Freemium, in turn, represents the newer monetising logics that are increasingly used in gaming: the customer gets a level of access or a certain use period for free, but additional services or extended use period come with a fee. Lending/renting is also a traditional option where the customer pays for the right-of-use without ownership. Licensing is a mechanism for diffusing the sales to third parties, which pay the licenser for the possibility of selling or lending the offerings further as a part of their own offerings. Subscription used to be the predominant model for funding, for example, newspapers and it builds on the loyalty of customers who, during their time as customers, end up paying more than their share of the costs of production. Subsidies are the lifeline of industries that are, from the wider perspective of the society, deemed desirable but are so cost-heavy to produce that they could not exist in pure markets (e.g. arts industries, public transportation). Usage fee is similar to renting, with the distinction of a usage fee being allocated per-use, whereas renting is most often tied to a specific timeframe of usage.

So far there is little discussion on the alternative monetising logics of MaaS at the interface between MaaS offerings and the traveling customer. Instead, what is already nascent is the discussion is the reallocation of the money flows towards MaaS from established transportation solutions. It is widely perceived that the origin of the money flows towards MaaS, in general, is the savings that occur when a household is freed from the need to spend money linked to owning or driving (e.g. maintenance and fuel) a car. However, this notion is currently equally an assumption and a desire as it is reality.

> **It's more about data sharing for the benefit of targeted marketing for the different beneficiaries than monetising it on its own.**

Summary of study findings regarding MaaS value capture

The findings of the Delphi reflect the general status quo of the value capture discussion related to MaaS: regardless of having explicitly asked respondents about monetising logic, no answers were forthcoming. Based on the study, it seems that few actors have explicitly engaged in pondering the diverse monetising logic options. Instead, actors that are already active in the field have opted for the traditional alternatives, namely a usage fee or subscription. In addition, **the role of public subsidies is large:** there was no reflection regarding a fully market-based alternative – instead, in most of the answers, the public transportation system was considered to be the backbone of any MaaS bundle.

The answers provided in response to the question about the origins of the money flows highlights a dominating basic assumption: **it seemed to be very difficult to distinguish between what the participants saw as desirable and what they perceived as feasible.** In other words, there is a strong tendency for circular logic: the expected impacts are conflated with the desired aims. An example is the often-repeated notion: **"MaaS reduces the need for private cars." It is stated as an impact, whereas it is simultaneously** one of the pillars of the value proposition of MaaS, **a desire based on preference.**

Questions regarding the distribution of costs and revenues within a MaaS ecosystem highlighted the murky nature of this theme. While there was a number of direct answers, even with anticipated percentages, the views differed both in terms of who the relevant actors in a MaaS ecosystem are, and in terms of who pays what and for whom.

Insights:

- The discussion on the value capture dimension of MaaS is sorely in need of being initiated.
- This includes reflection on established monetising logics, and potentially the innovation of new possibilities.
- The circular logic does little good for the field: it would be highly beneficial to develop MaaS offerings through being able to distinguish desires from impacts, and preferences from feasibility. This includes also the discussion on the origins of money flows (changes in household spending on transportation).

> **Subsidies are important for creating PT as the backbone for all MaaS services.**

3.3. Tips and further reading

As already mentioned, business models are widely discussed, and there are several tools, free and for a price, available for already established as well as new companies. The three main dimensions of business models (value creation, delivery, and capture) have been taken apart in them in various ways to assist the identification of relevant aspects for the focal company.

One of the most well-known approaches is the Business Model Canvas that was introduced by Osterwalder in 2005. Osterwalder built the company, Strategyzer, around the innovation, and offers a set of related online tools at: **https://www.strategyzer.com/canvas/business-model-canvas**

An EU research project aimed at supporting small- and medium-sized enterprises (SMEs) resulted in an online platform that offers a variety of business model and innovation tools for smaller companies, for free, at: **https://businessmakeover.eu**

For those interested in opportunities for hyperscaling business, the global company, Platform Innovation Kit, offers a set of tools and methods aimed specifically at platform businesses. They can be found at: **http://platforminnovationkit.com/pik4/#overviewkit**

For more information on the different roles of public sector actors, it is recommended to read Smith (2020) “Making Mobility-as-a-Service” (thesis for the degree of philosophy): **https://research.chalmers.se/publication/516812/file/516812_Fulltext.pdf**

While it remains the responsibility of firms to design their own business models in a sustainable way, it benefits public actors to familiarise themselves with the diverse aspects of business models. Understanding the various roles of public actors helps policy-making with regards to MaaS. Some of the questions a city might want to reflect on are the following:

- Are we sources of revenue for the companies? If so, how do we view our role of transferring public money to the private sector?
- Are we gatekeepers to resources that MaaS firms need in order to realise their offering (e.g. do we source and store data that the companies need)? If so, how do we choose to whom we grant access? Do we grant the access for free or do we want to be compensated? If the latter, do we charge a fixed fee or engage in bidding contests?
- What is the role of our public transportation system for private transportation firms? Is it a resource or competition? If a resource, how are we compensated for giving companies the possibility to use it? If it is competition, do we use our regulatory power to shape the markets?
- What is the position of municipal companies? What role could and/or should they play?
- If we are perceived as collaborators who bring resources to a MaaS ecosystem, how are the responsibilities, risks, and benefits shared? Do we accept shouldering the main responsibility? How do we share the revenues between the city and the firms?

4 User-centric approach

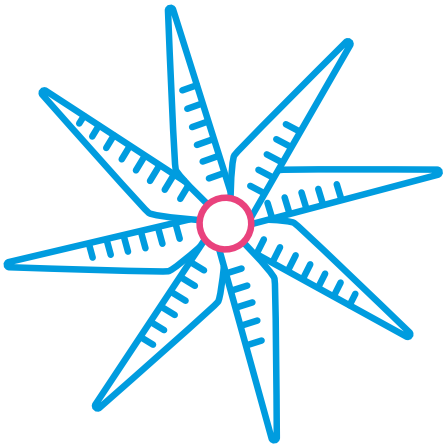

Figure 13. User

All mobility services should be designed and developed around customer/user needs and benefits. There are several ways to analyse customer needs. This section does not go into the different ways to analyse them, but rather focuses on the different approaches related to them.

Current customer needs are dependent on the **local context**, as the needs are impacted by current behaviours, experiences and circumstances. It is important to keep in mind that current behaviour is not necessarily the same as **possible and/or self-desired behaviour**. Therefore, it is not enough to analyse just historical data and base development on that. **In addition, very rarely are users able to desire something that they are not even aware of, and this is the case with new services.**

The customer needs to be seen from a **broad perspective,** instead of focusing only on the end user. The customer is more often a group/ community of potential end users, such as a family, company (e.g. as an employer), housing community, etc. It needs to be taken into account that if customer needs are analysed, a sample size that is too small can lead to uncertain results. One potential approach to cope with this kind of problem and validate the results is testing the solution with a minimum viable product (MVP) or, more broadly speaking, following the lean startup methodology. In addition, the identification of different customer segments and their prevalence, both within the population and the pilot group, mitigates risks related to wrong decisions.

Curiosity is a key driver for early-adopters of services. These early-adopters are a good way to test the different aspects of a service. However, a larger number of users is decisive for the scalability of a mobility service.

In most cases, the customer benefit is defined around savings (money, time) or gained benefits (comfort, health). Different users appreciate the availability of a variety of mobility apps, as they can look for the best options that meet their particular expectations. Users are primarily interested in getting information about waiting times, trip planning, and, to a lesser extent, on-route confirmation of the itinerary. The focus for users is, therefore, on **front-end interfaces with value-added features**. However, the decisive part of a service is the back-end of the system, as it is where all of the integration possibilities between different operators. The back-end is not visible for the users at all.

Stakeholder engagement and business models have to ensure that **user needs are held paramount**, particularly during the early stages. The focus should always be on the question “what problem do we want to solve” – and not on “what technology do we want to test/ is the best”. Other considerations and objectives will have to postponed to a later point (even though they keep a prominent place in the strategic agenda of MaaS – e.g. environmental friendliness). As the market consolidates (customer base and product), MaaS models have the possibility to incorporate other values into its operative targets.

Service operators analyse the different markets based on the potentiality of the market for them and it has to be kept in mind that not every city/ region is interesting for them to invest in and prioritise This needs to be remembered as part of the **risk assessment of the local authority**. This prioritising by the operators can lead to delays in the launch of the service and can stop the process entirely, especially if there are no contractual agreements to support the process. Furthermore, service providers need to generate enough income to cover development costs, and this may become an obstacle in developing the service as the local authorities would like to have it.

As technological development advances, it is crucial to **change over time**. It is wise to keep in mind that the products offered might not keep the promised attributes. Therefore, keeping an open and sceptical mind is therefore important. In order to constantly monitor the situation, it is advised to include a technical expert in the (interdisciplinary) team, along with a person with project management skills.

Case example – Online campaign “without a private car"

The City of Stockholm created an online campaign to promote alternatives to the private car. The aim is to provide a guide to alternatives to the private car, especially those that complement public transport, walking, and cycling.

The campaign website especially emphasises available carsharing and MaaS services. It contains market overviews that provide direct help when it comes to finding and using services available in Stockholm. Another focus of the campaign is on how to use bikes and cargo bikes for transporting children, as well as groceries and other heavy items. The campaign also focused on empowering neighbours to jointly organise carsharing and cargobikesharing in their multifamily houses. Stories told by residents of Stockholm who have shifted to a life without a private car serve as inspiration for others.

The site is found at **utanegenbil.se**

Photo 4. A man drives two kids in a cargo bike in Stockholm. ©Viktor Nordahl-Bäcklund

Practical tips

- Ask for feedback about current services from users.
- Give information to all users about new services.
- Keep in mind that some people are not used to technologies, so it is necessary to take into account their needs and study how to involve them in the MaaS ecosystem.
- Constant study of the market and new services and the level of acceptance of them among users is needed.
- To be able to react quickly is also important. Hierarchical structures could be obstructive. An iterative process and a structure like that of startups could help, for example, municipal companies to integrate customer points of view and needs in all steps involved in developing a service.

Following typical tools of user-centered design are useful also in mobility service development

- **Personas:** archetypes describing different service user groups, tools to identify user groups and develop services that better fit the needs. **https://servicedesigntools.org/tools/personas**. A recent article by María J. Alonso-González, Sascha Hoogendoorn-Lanser, Niels van Oort, Oded Catsa and Serge Hoogendoorna (**https://doi.org/10.1016/j.tra.2019.11.022**) presents the latent cluster method, which can be used in MaaS customer persona generation.
- **Scenarios:** describing the tasks users are trying to accomplish with the service and capturing the key interaction between the user and the service. Main character of the scenario is typically one of the user personas. Use case is a more detailed list about actions between the users of the system.
  See, for example: **https://www.interaction-design.org/literature/article/design-scenarios-communicating-the-small-steps-in-the-user-experience**
- **Lean startup methodology** aims to shorten product or service development cycles and test the business viability by following a build-measure-learn loop. More information about the approach can be found at **http://theleanstartup.com/principles**

5 MaaS Readiness Levels

The MaaS Readiness Level Index was published in September 2017. The index has been highly appreciated and well used by local city authorities in Europe. The development of MaaS has been active over the past years and, recently, it has become evident that there is a need to update the index with new levels and approaches that have been raised by several cities in multiple workshops around Europe during recent years.

The original index was based on the idea of having different development levels. It has become evident that this sometimes creates confusion, however, and that the easier way would be to count together the different components of readiness, the sum of which would then constitute the identified development level. In the updated version, the different components are counted together. Each component is given a value of one point. The maximum number of points available in each category varies from five to seven.

5.1. Strategic readiness – to promote, support, and incentivise MaaS

5.1.1.Strategic focus

- The local authority is working together with service providers to create measures that support the development of mobility services, and/or incentives are used to establish Maas.
- The local authority has a plan/strategy to explicitly support the development of MaaS in the local context.
- The local authority has local funding to support the change (projects at different levels with local, national or international funding or continuous funding, funding from companies).
- The local authority has a named person to oversee MaaS development. The local authority develops MaaS systematically.
- The local authority is working actively at the regional level to develop MaaS further.
- The local authority is actively engaged in networks that enhance MaaS development on national or/and international levels.
- The local authority carries out qualitative and quantitative research and feeds the findings back to the service providers.
- There is an ongoing dialogue between the local authority and the private sector, conserning their cooperation in the delivery of the required infrastructure and mobility services.

_____ /max 8 points

5.1.2. Use of streets

- The local authority has a parking policy/policy for street use, but it does not explicitly support the shared use of vehicles.
- Politicians are ready to change parking policy in critical areas in the local authority or they are ready to take measures to reduce car dependency (private motoring/ car ownership).
- The local authority is active in supporting new business models by adapting parking standards for (new) residential developments (reducing the area of parking space, allocating parking spaces for shared cars ,and enabling new mobility services for residents).
- The parking policy supports shared cars/e-cars by offering priorities/cheaper parking/incentives/ emission zones/parking zones for shared vehicles and parking permits are easy to acquire.
- The use of streets is managed holistically, considering all modes of transport (i.e. shared light vehicles) and needs related to logistics.
- Street space management is dynamic and offers different pricing initiatives.

_____ /max 6 points

5.2. Internal use in the local authorities

5.2.1. Travelling guidelines for staff and politicians

- Internal travelling guidelines prioritise sustainable mobility options.
- The travel patterns of staff and politicians are monitored actively. Different campaigns and events are used to incentivise users to change their behaviour.
- The travel patterns of staff and politicians are reported annually by the local authority.
- There is a clear plan to reduce the use of private cars when it comes to travel for work.
- Local politicians are acting as an example by using sustainable modes of transport, and this is shown in the media.
- The use of private cars during work-related travel has declined during the past three yrs.

_____ /max 6 points

5.2.2. Use of shared mobility within the local administration

- The local authority offers shared cars/bikes/etc. for its staff and politicians to use, but this is limited to a small number of employees.
- The local authority offers shared cars or bikes for the majority of staff and politicians to use.
- The local authority uses mobility services that include and combine several different mobility providers.
- The shared mobility services offered by the local authority can also be used by staff outside of the working hours.
- Different shared vehicles of the local authority are offered for citizens to use during evenings and weekends.

_____ /max 5 points

5.3. Shared use

5.3.1. Shared economy – availability and market penetration of shared and combined travel options

- There are pilots/campaigns/incentives in the local authority regarding shared mobility options.
- There are different kinds of shared mobility opportunities that are offered by companies for citizens.
- There are combined packages that are offered during specific events or campaigns.
- There are more than five different kinds of operators that provide combined mobility within the local authority, covering the following modes, for example: public transport, shared vehicles, shared bikes, ride sharing, rental cars, taxis, rental boats, etc.
- There are one or more MaaS platforms, offering combined shared mobility opportunities from different providers to customers.
- Regular service providers (grocery stores, theatres, estate developers, housing companies, etc.) work together with MaaS operators and offer package deals to their customers.

_____ /max 6 points

Case example – Combined ticketing system in Turku

The City of Turku, the public transport authority in the Turku region, Föli, and the CIVITAS ECCENTRIC project have created a harmonised public transportation authority ticketing system in Turku. The new open data interface and platform, into which the public transport ticketing system is incorporated, enables the integration of local service providers into the system and offers a variety of combination tickets. For example, when buying an event ticket, a bus ticket can also be included.

Föli operates in six municipalities. When buying a bus ticket, the same ticket is valid in the entire region that is covered by Föli. One ticket can be used for a total of four trips (i.e. one change in each direction, if necessary), and this applies also to the combined tickets.

As an example, when buying a ticket to the Turku City Theatre performance, the ticket can be used to travel on Föli buses and water buses three hours before and two hours after the event. In addition, the ticket includes the cloakroom fee at the theatre. The barcode of the theatre ticket is displayed on the card reader when boarding the bus or the ticket can be read electronically if it delivered by e-mail or via Föli's application.

The Föli combination ticket can easily be included in any event ticket that is sold through Lippupiste, a Finnish event ticket provider. In addition, there is continuous cooperation concerning combination tickets between Föli and the Turku City Theatre, Linnateatteri (Turku Castle Theatre), Åbo Svenska Theatre (Turku Swedish Theatre), Turun nuori teatteri (Turku Young Theatre), Turku Philharmonic Orchestra, and Turku Music Festival.

Photo 5. Using a theater ticket as a bus ticket in Turku. ©Hannu Aaltonen

5.3.2. Public transport (PT)

- Customers can buy local PT tickets via PT service providers' own channels.
- The public transport authority (PTA) is actively connecting with other MaaS operators in the area and they have plans to offer package deals to customers.
- The PTA already offers package deals or discounts and incentives that combine PT services with different mobility services to customers.
- Customers can buy PT tickets through several sales channels that are offered by third parties.
- Hotels, theatres, shopping malls, regular service providers, etc. offer several service packages that combine PTA services with their own services."

_____ /max 5 points

5.4. Shared understanding

5.4.1. Integration platform

- PT or private third parties offer journey planners, which support multimodal transportation during the same trip (at least two different means of transport, such as combining train and buses).
- Third parties already use data gathered from PT operation and provide information services to customers.
- PTA has opened data/standardised information gathered from PT operation so that third parties can use it to create new apps and services.
- Mobility service providers/third parties work together to sell their services by using the same app as other private and/or public mobility service providers.
- Tourist information and services are combined with MaaS services.

_____ /max 5 points

Case example – Mobility portal and mobile application in Ruse

The Mobility as a Service concept is very new to the city of Ruse. Currently, the only services related to MaaS are the internet portal and mobile app, which provide information about the public transport services in the city (such as timetables and route information of bus and trolleybus lines, journey planning).

The City of Ruse is developing an app that will support people in buying and validating public transport tickets, and also support them in navigating through the system, using mobile devices (smartphone/tablet). The mobile app shall be available for more than one smart operating systems (Android and iOS, as a minimum), and it will enable the distribution, sale, validation, and checking of tickets for all public transport services that are operating across Ruse.

The electronic charging system will be a combination of technical devices, a software application, and a link to the public transport Control and Management Centre in Ruse. The app's interface will provide information in Bulgarian and English.

Payment will be possible using debit and/ or credit cards. Cashless payment options shall also be available (Paypal, as a minimum). The mobile app will also enable the collection of user feedback in the form of a Passenger Assessment.

Photo 6. Passenger using the mobility mobile app in Ruse. ©Created by Freepik

Tips!

New mobility operators that provide services outside of the traditional transport system, such as carsharing or bike sharing and micro-mobility, are reluctant to share their information in such platforms if they do not see a benefit of doing so for themselves. Efforts to change the mentality of new mobility operators are likely to require the early involvement of these stakeholders and an adequate framework to gain their trust. They must see themselves as a part of a common ecosystem where they provide their services to all users through different platforms, and through which they will receive more benefits. Focusing on all of these advantages at the beginning of the discussions with them is also very important.

All the actors are interdependent. If one actor fails – all of the actors that are connected also fail to keep the timetable. In these cases, the development work needs to be agile, open, and well-coordinated. Good and up-to-date information is needed from all of the different actors. Establish agreements with all of the involved actors, specifying that the provision of up-to-date data is one of the main requirements to be part of this common framework. Remember that this is a learning process, especially when a new service, such as a bike system, is brought into an established PTA and the different parts of the process need to be integrated. In the case of combined services, customers are better taken care of as they are provided with alternatives to choose from if some services are not available.

5.4.2. Visibility and usage – how obvious and easy are the shared mobility offers for the citizens to get

- Customers can find multimodal (min. two modes of transport) traveller information/guidance.
- Customers have several channels through which they can find multimodal traveller information.
- Customers are provided with visuals or other advertisements related to MaaS services while travelling in the city.
- Customers can change their means of transport easily in several places within the local authority (min. four transport means in one place, mobility/travel/multimodal hubs).
- Customers have found shared mobility services and their use has increased within the last year.
- Customers have found MaaS services with virtual ticketing, journey planning/information, and apps and their use has increased within the last year.
- The use of cars has been declining due to MaaS offers.

_____ /max 7 points

Case example – Beacon-based indoor routing as a mobility service app in Munich

Occasion and goals of the app

In order to provide an inclusive, location-based application for navigation and information at a metro station (mezzanine floor) for the blind and visually impaired, the Munich Transport Corporation (MVG) developed and tested an indoor navigation app for this target group. The expected effects are an increased awareness and acceptance of the tool. Based on the feedback from test persons and the experiences on the technical side, the application/ technology will be developed further for its wide use.

Moreover, the knowledge of processes related to the Internet of Things (IoT) at the public transport station and of accessible applications (VoiceOver and handling) are seen as a key achievement.

If successful, the wide use of this application by the target group could have an impact on mode choice, and the corresponding reduction of VKT by car. More importantly, the access to this option gives those who are blind the opportunity to be mobile on their own (without assistance) and without necessarily using a car (or being driven). Apart from that, the beacon could be utilised for other use cases.

Photo 7. Group of blind people testing the mobility app in a travel terminal in Munich. ©CIVITAS ECCENTRIC

Implementation, testing, and learnings

To understand the needs of those who are blind and visually impaired, representatives, for example, from an association for blind people were involved in the design and testing from the start. Close cooperation with these representatives and their involvement in several meetings of the existing round table for technology for blind and visually impaired people brought up relevant topics and made the requirements regarding a suitable, beacon-based indoor navigation clear.

At the end, the app was tested at the mezzanine floor by blind people (see photo 7). Unfortunately, the actual compass in the device does not work indoors, as there are too many other influences on the measurement, e.g. masses of people moving around in the station building. Only after a few meters of walking can the app use the real-time vector to predict the direction in which the user is walking. In the narrow surroundings of a subway station, these few meters impose a high risk for blind or visually impaired users. For this reason, the app is not offered anymore.

There might be a technical solution (ultra wide band) that is available in about five years and another use may be considered for the beacon. Nonetheless, the test persons were already very pleased with the information that was given about the surroundings and with the knowledge that their needs are seen and understood. This is why actors are currently considering how the working services (e.g. information about the surrounding) could be integrated in existing MVG services/apps.

6 MaaS Readiness Levels as guidance

The MaaS Readiness Level Index has worked as a good tool to follow the MaaS process and analyse future possibilities. This section provides an overview of the levels reached by the CIVITAS ECCENTRIC cities and short justifications related to the reached levels.

City of Madrid

Madrid, not only at local level but also at regional level, has made a huge effort in making MaaS an important part of their strategies during the last years. This is illustrated by Madrid's close collaboration with the CIVITAS ECCENTRIC project, during the lifetime of which the city created new mobility services in order to incentivise the use of MaaS. On one hand, the further development of MaaS at the regional level has become a reality thanks to the creation of CRTM Innovation Centre research. On the other hand, being part of associations such as MaaS Alliance or MaaS Spain is key for improving knowledge about MaaS strategies and their possible application within the city.

Public transport is the backbone of mobility in Madrid, providing customer with easy ways to change their means of transport and find multimodal information about the whole system. This has been improved during recent years thanks to the improvement of the integration platforms, open data platforms and the reinforcement of the public transport backend information of the whole region.

The number of shared mobility options available in the city have increased a lot during the last two years. That makes it possible to provide customers with new mobility options that they can combine with traditional ones, thus improving the MaaS concept.

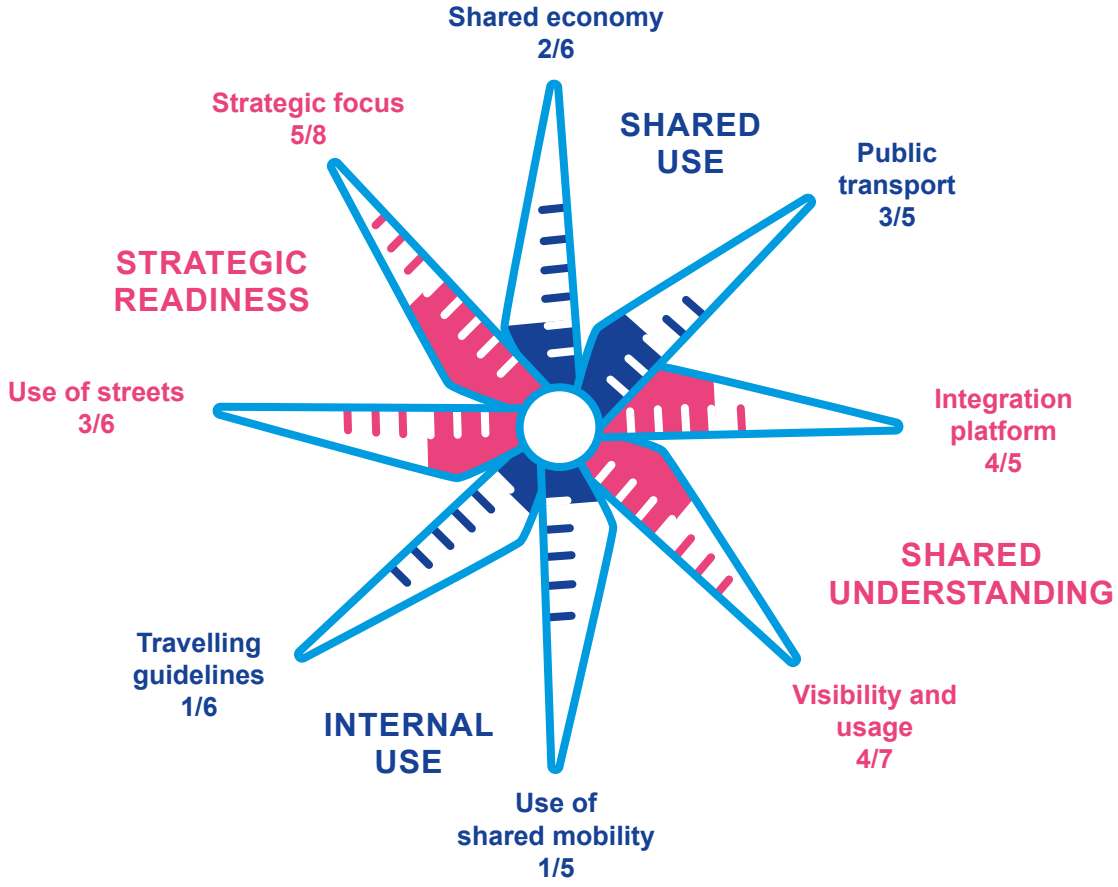

Figure 14: The MaaS readiness level of the City of Madrid (2019)

City of Munich

As Munich aims to be climate neutral by 2035, there's a clear development towards more sustainable smart mobility in the city.

The city has made several steps to ease the access to public transport (e.g. a 365-Euro-ticket for pupils, students, and other citizens in education). Also the use of combined mobility offers has become more comfortable and attractive for users, due to the cooperation between different stakeholders. Networking of different modes of transport in the digital and physical world aim to create a real MaaS environment.

Although choices for combined travel options are established, there is a real need for public non-discriminatory services that are neutral to competition. Several initiatives are planned and ongoing in order to foster combined transportation services and shared mobility. Next, an integration approach is needed to make sure public and private operators are connected and that new services arise.

CIVITAS ECCENTRIC sought envisioned to contribute to better mobility services in Munich. Mobility in a city and its suburban areas should include offers and information for all citizens. Therefore an indoor navigation app for blind and visually impaired people was developed (see page 41).

Also development around the app, "Der Luftlotse" (introduced on page 11) brought together different stakeholders. The app aims to work also as a mobility management tool for private users with a focus on sustainable local mobility offers. Negotiations to integrate such offers into the app turned out to be challenging and time consuming, thus leading to a a situation in which several offers were not integrated. A better approach in the future might be to name a municipal authority responsible for moderating such fusions.

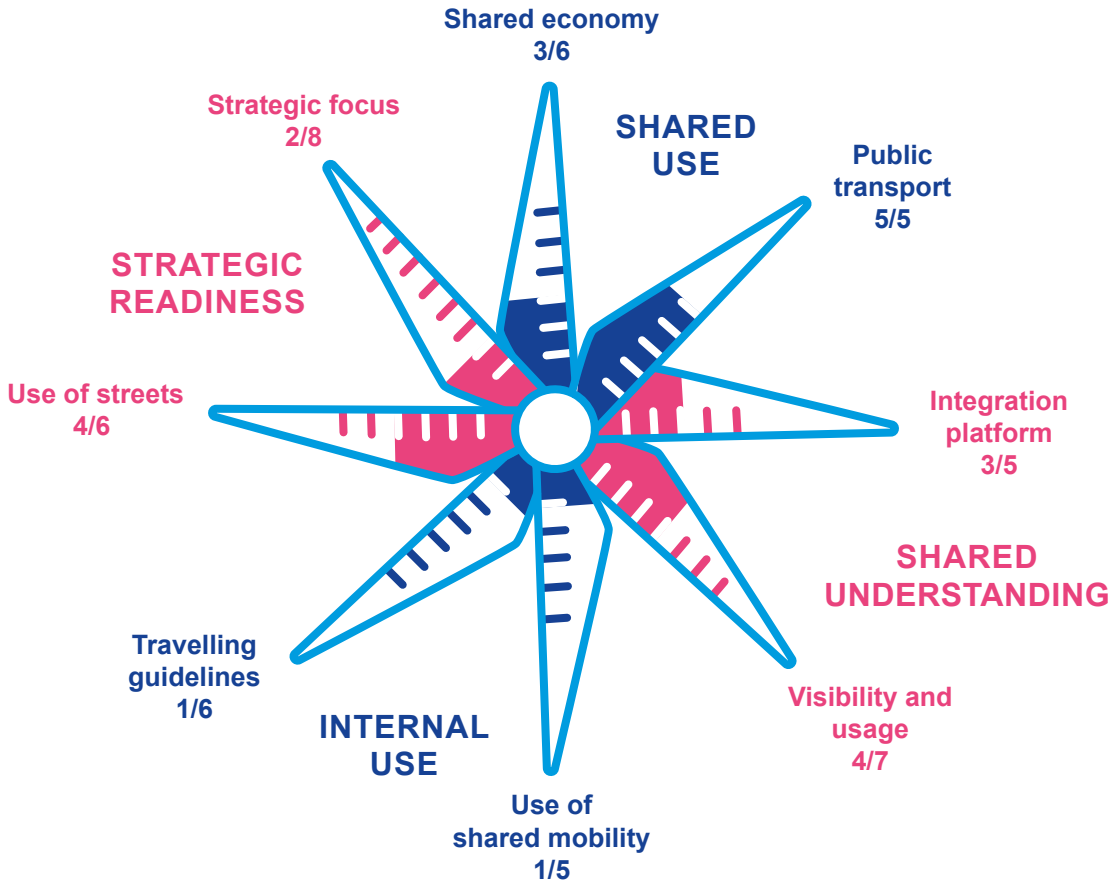

Figure 15: The MaaS readiness level of the City of Munich (2019)

City of Ruse

The Mobility as a Service concept is completely new to the city of Ruse. Thanks to CIVITAS ECCENTRIC, the politicians in the city became aware of this innovative idea. The first effort of the local authority in this area was the introduction of the Park-and-Ride facility. The facility was built at the entrance of the city, in the Living Laboratory area - Druzhba district.

With the construction of new cycling infrastructure across the city, the Municipality plans to build new Park-and-Ride facilities in different peripheral neighbourhoods and combine the service with public transport and bike rental services.

Measures are taken to reduce car dependency (private motoring/car ownership) through parking policies, mainly in the city centre. The first efforts have also been made for the combined offering of public transport - trolleybus and bus services as well as other services from different providers, like grocery stores, theatres, estate developers, housing companies, etc. The future plans of the Municipality include also offering shared cars/bikes for its staff and politicians to use.

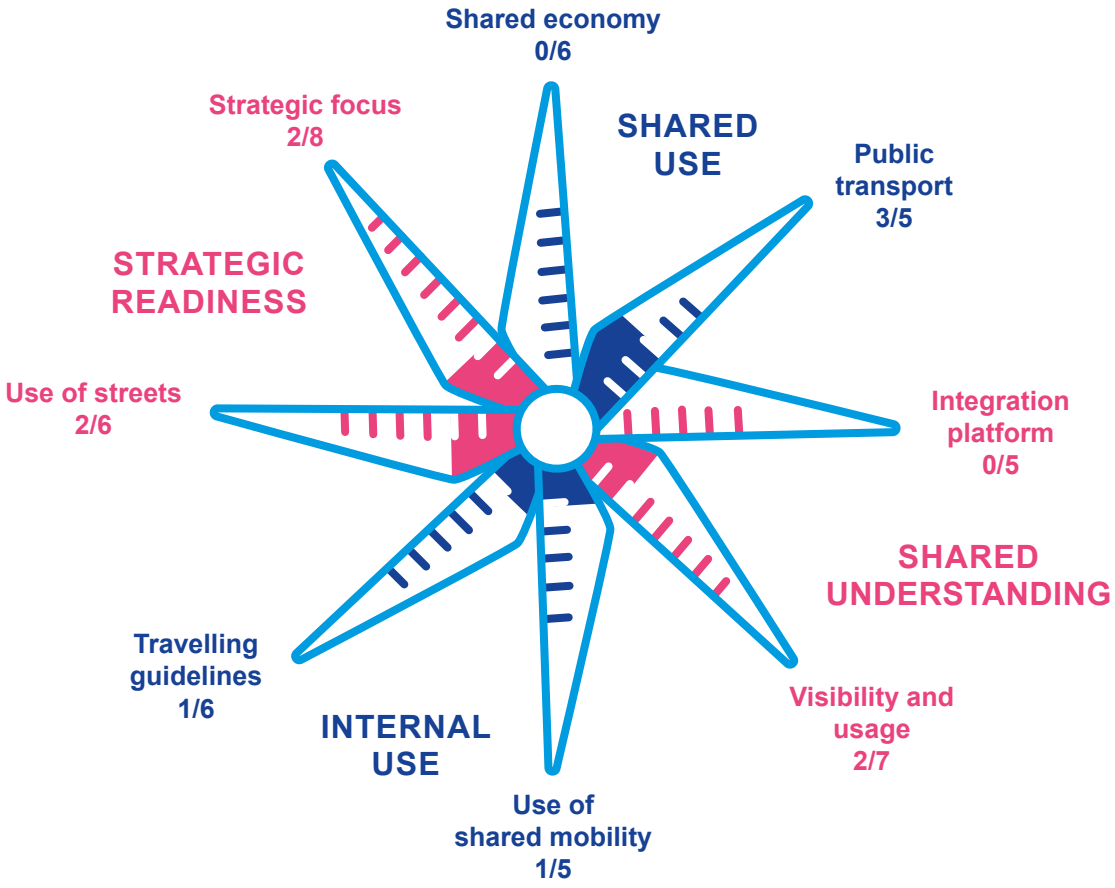

Figure 16: The MaaS readiness level of the City of Ruse (2019)

City of Stockholm

In Stockholm, unlike in most European cities, public transport is in the hands of the regional PTA, whereas the City decides on matters concerning land use, city planning, and street maintenance and development. Redistributing street space from car to public transport, walking, biking, and also deliveries is a goal that the City has been outspoken about. The City of Stockholm also procures a city bike service and cooperates with micro-mobility suppliers on a voluntary basis to shape the use of micro-mobility on the streets.Incentivising mobility services through green parking permits for parking lots in new residential areas is the strongest incentive in the hands of the City of Stockholm. Strong parking regulations, high parking fees and fines, as well as congestion charges are other policies that indirectly favour mobility services by making the use of a private car less attractive.

The development of individual mobility services as well as MaaS services in Stockholm was, thus far, driven to a great extent by private actors – with support from national and EU funding. The City's involvement in MaaS development is focused on participating in demonstration projects, research and evaluation of the first trials, and raising awareness about new mobility services and combined mobility. The City also provides its administration with the option to use carsharing via a procured commercial car sharing service. The same cars can also be used by citizens. Many city administrations have company bikes that are available for employees to use when in duty.

Stockholm Transport covers the whole region and several transport means (subway, tram, commuter rail, bus, and ferry), and provides real-time information, trip planning, and the buying of tickets through their own app as well as through third party resellers. Stockholm Transport has, until now, decided not to include "new mobility" in their offer. However, it has decided to enable other actors to include and resell tickets from Stockholm Transport.

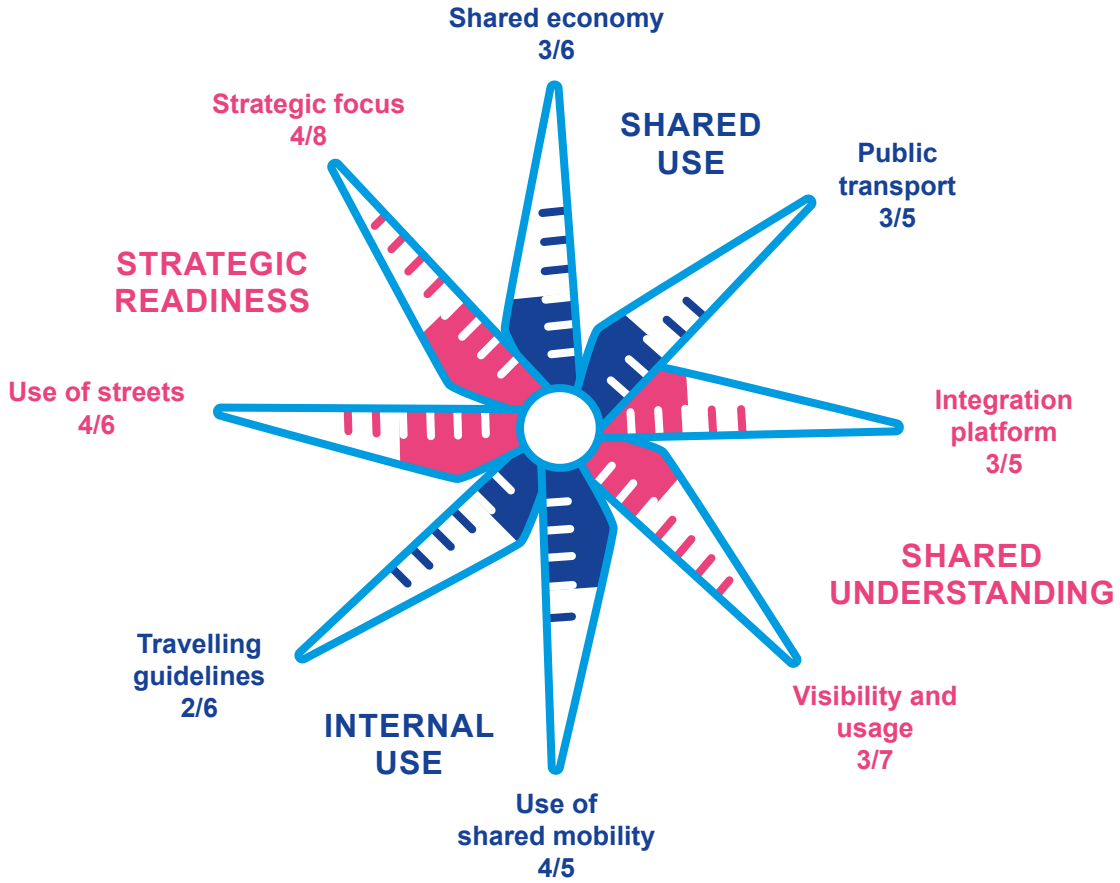

Figure 17: The MaaS readiness level of the City of Stockholm (2019)

City of Turku

During the past three years, the City of Turku has made advancements especially when it comes to bringing MaaS into the strategic focus of the City. Mobility as a Service has been acknowledged as one of the key areas to develop in order to improve travel chains. This has meant several improvements in the IT backend of the regional public transportation authority. These improvements enable the development of combined packages, such as theatre ticket combinations.

As a first full integration, a bike share system was launched in the city of Turku. In addition, several new mobility service providers are now operating in the city of Turku and this has improved the choices available for combined travel options.

The parking policies of the City of Turku have been reviewed and approved in the end of year 2019. The top priority related to street use is to advance sustainable mobility. It is for this reason that bicycle parking, shared vehicle parking, and parking cost reductions for low emission vehicles have, for example, been taken into account. Open data services for better parking as well as measures to reduce emissions caused by traffic related to parking are being developed.

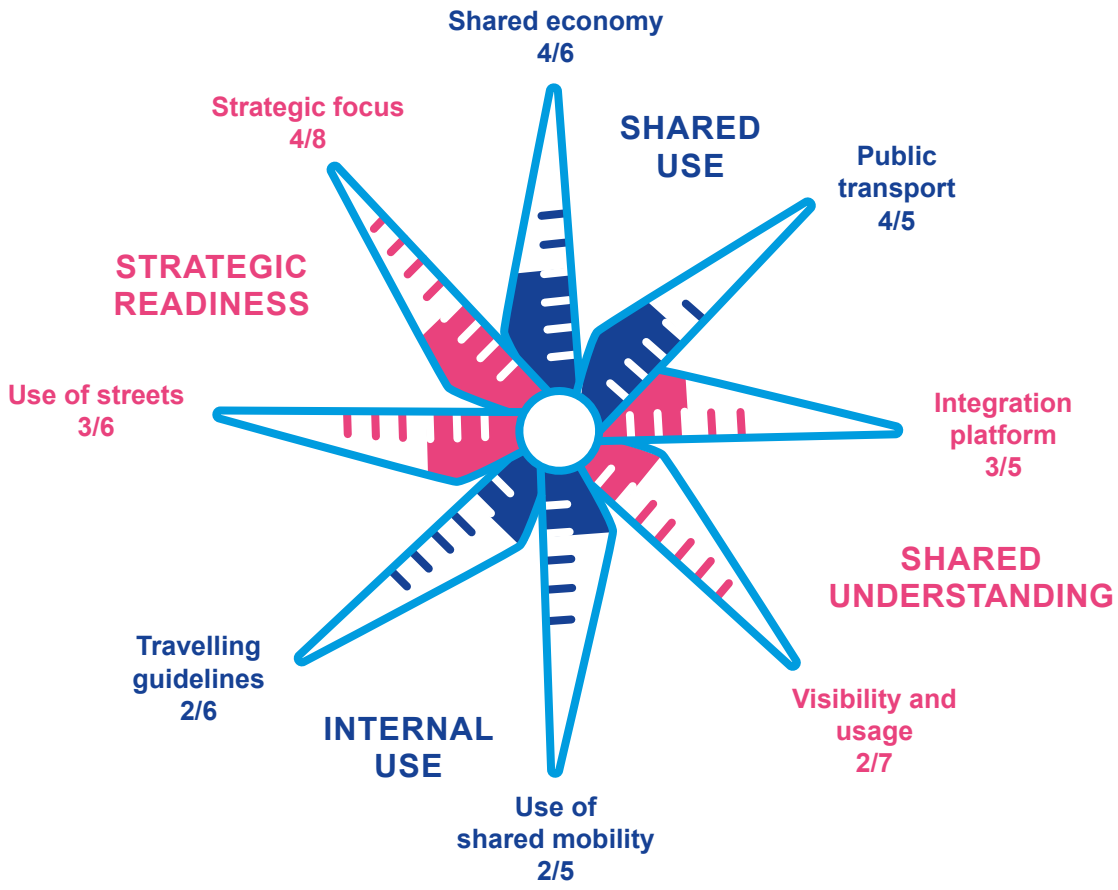

Figure 18: The MaaS readiness level of the City of Turku (2019)

7 Summary

The CIVITAS ECCENTRIC project has showcased that the development of Mobility as a Service requires systematic work in creating the preconditions necessary for MaaS to operate in the local context. This involves developing an understanding of the different principles and circumstances that are necessary for MaaS to flourish, specifically with regards to prerequisites, data governance, resilience, and drivers and barriers. After that, the focus should be on strong stakeholder engagement and enabling the MaaS business models to flourish.

At the centre of the work are user needs and the question concerning how to enable the creation of interconnected, sustainable, and seamless services to respond to them. The focus should be on how to support the behaviour change.

Local authorities can support the development of MaaS in eight focus areas that have different MaaS readiness levels. These levels were developed in the project and offer a good framework for future work on MaaS.

The different measures implemented in the project showcase well the different dimensions and approaches needed to develop MaaS. It does not matter where one starts the process, as long as one thinks holistically about the development and keeps an open and flexible mind while focusing on services for users.

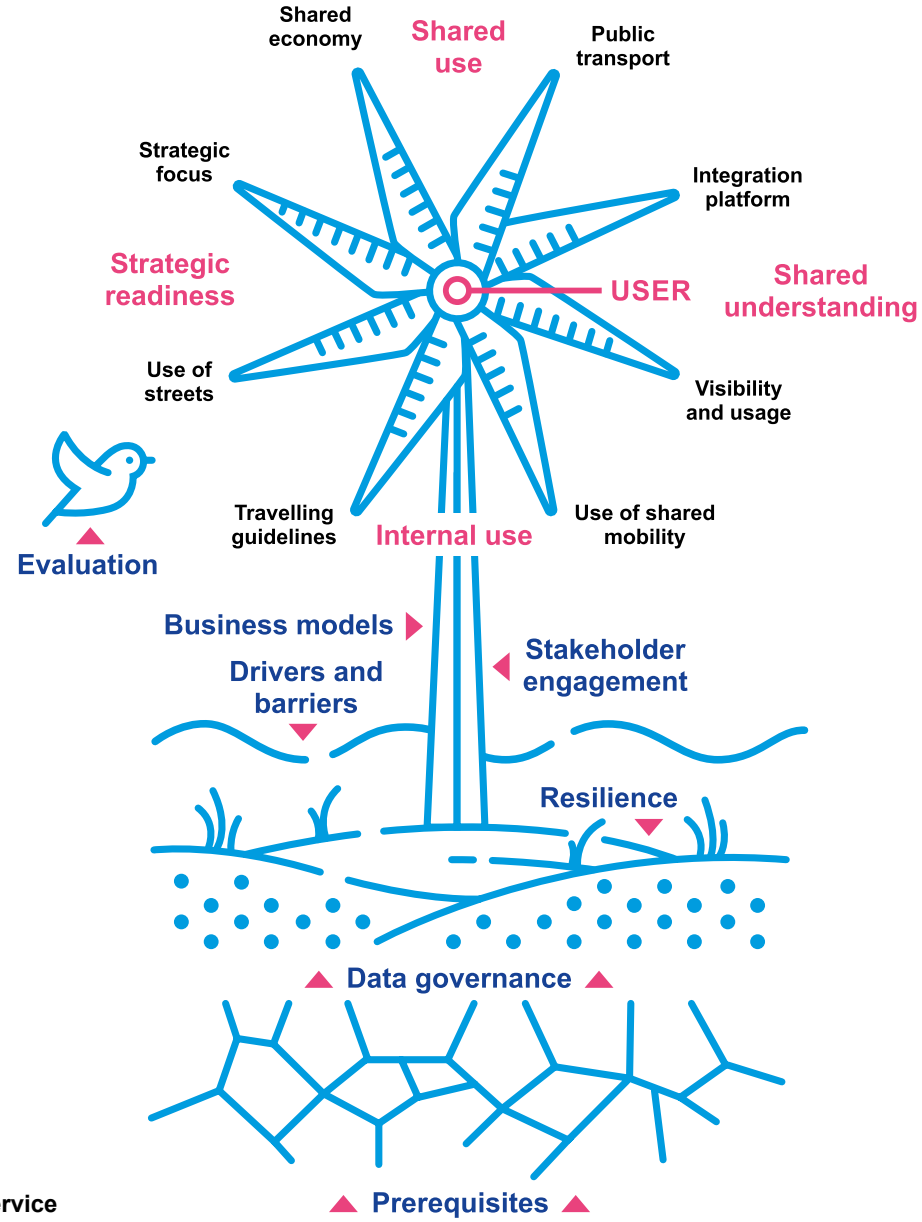

Figure 19.
The windmill of Mobility as a Service

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