Mobility as a Service – What is it, and which problems could it solve?

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Mobility as a Service, MaaS, is a hot topic when discussing the future of transport. But what does Mobility as a Service really mean, how far has implementation come, and which are the problems it could potentially solve?

The way we travel within our cities needs to change for many reasons

Today, most people agree that we need to change the way we travel within our cities. Emissions of carbon dioxide from the transport sector are one of the main causes of climate change, and although many cities are investing in public transport and better cycling and walking infrastructure, the sale of new cars continues to increase. Furthermore, car traffic has numerous other negative impacts on cities, causing e.g. congestion, noise pollution and air pollution. Roads and parking infrastructure occupy a substantial amount of space in cities, that could otherwise be used for housing, parks etc.

At the same time, the transport sector is undergoing a fast transformation. Digitalisation and automation are two strong trends with a potential to fundamentally change the way we transport ourselves. Digital information is increasing accessibility to public transport and creates new opportunities to adjust supply to demand, e.g. with flexible on-demand transport. The development of self-driving vehicles seems to be moving faster than anyone imagined just a few years ago. What impacts autonomous cars will have on the transport system as a whole remains to be seen. Where some see a great potential for a more efficient use of vehicles, others fear that self-driving cars may increase the demand for transport, reduce public transport ridership and increase congestion.

Another important trend is younger generations' changing attitudes towards private ownership, which creates opportunities for new types of services. Some services draw upon the concept of "sharing economy", e.g. car-pooling services such as Gomore, whereas other are more traditional services focusing on new markets. One interesting example of the latter is private car leasing, which is becoming increasingly popular among young people who want to have access to a car, but at the same time wish to avoid all the commitments associated with car ownership.

Mobility as a Service – what does it mean?

Mobility as a Service (MaaS) is increasingly promoted as an opportunity to reduce demand for travel by private car, and hence as a way to reduce car traffic in cities[1]. But what is Mobility as a Service? Various actors define the concept in different ways, depending on their starting point. The original definition of MaaS stems from Sonja Heikkilä's master thesis from 2014[2]:

"Mobility as a Service (MaaS) - a system, in which a comprehensive range of mobility services are provided to customers by mobility operators."

Heikkilä's starting point is that public transport in Helsinki does not succeed in offering a transport service that is attractive enough to meet the challenges that the city's transport system faces, primarily in terms of increasing the share of sustainable transport modes. Within the MaaS Alliance, a network created to spread MaaS around the world, a broader definition is used which focuses on the customers and their demands on a well-functioning transport service[3]:

"Mobility as a Service (MaaS) puts users, both travellers and goods, at the core of transport services, offering them tailor-made mobility solutions based on their individual needs. This means that, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users."

In a working paper from the Swedish knowledge centre on

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[1] *See e.g. Holmberg et al. (2016), Mobility as a Service-MaaS. Describing the framework. Viktoria Swedish ICT; Catapult Tranport Systems (2016) Mobility as a Service – Exploring the opportunity for Mobility as a Service in the UK.*
[2] *Heikkilä (2014). Mobility as a Service – A Proposal for Action for the Public Administration. Case Helsinki.*
[3] *MaaS-Alliance: http://maas-alliance.eu/*

public transport, K2, the term "Integrated Mobility Services" (IMS) is used with the following definition[4]:

"[...] we adopt the term "integrated mobility service" (IMS) to describe a service that not only integrates a range of mobility services, both public and private, but also provides one-stop access to all services through a common interface (hence creating a seamless customer experience, i.e. the service)."

Yet another related concept is "combined mobility", a term which is primarily used by public transport actors. UITP uses this term in a position paper, with a rather broad definition[5]:

"Combined Mobility is the result of public transport in synergy with other modes, like car-sharing, taxis, cycling"

In a newly published article that develops an index for comparing different MaaS services[6], the following definition is made which rather well covers the most important aspects:

"The term 'Mobility as a Service' stands for buying mobility services as packages based on consumers' needs instead of buying the means of transport. Via 'Mobility as a Service' systems consumers can buy mobility services that are provided by the same or different operators by using just one platform and a single payment."

All definitions have the same idea in common: through combining different transport solutions into easily accessible and comprehensive mobility packages, attractive services can be created that could compete with the private car. Why should I own a car if it is both more convenient and cheaper to consume mobility as a service? Public transport with its high capacity is often considered the backbone in such a system, which can then be connected to car sharing, car leasing, taxi, bike sharing systems etc. to cover consumers' full mobility demand. Integrated information on all available transport options and ease of payment are other important ingredients. The MaaS concept draws upon the trends that were identified above: digitalisation, changing attitudes towards ownership, and in the future potentially also automation.

To create a complete MaaS solution, many different competences are needed. In addition to all mobility services that are to be integrated, an IT platform is necessary to handle information, booking, payment etc., and a service provider who sells the integrated service to the end customer. Figure 1 provides an overview of the different roles in the MaaS ecosystem and how they relate to each other. Who will take on the different roles could vary, and depending on competences the same actor could potentially fill different functions within the ecosystem.

Examples of Mobility as a Service
Internationally, there are several examples of MaaS solutions being developed. A number of them are included in Figure 2. Several initiatives originate from the public transport side, such as Smile in Vienna, Hannovermobil
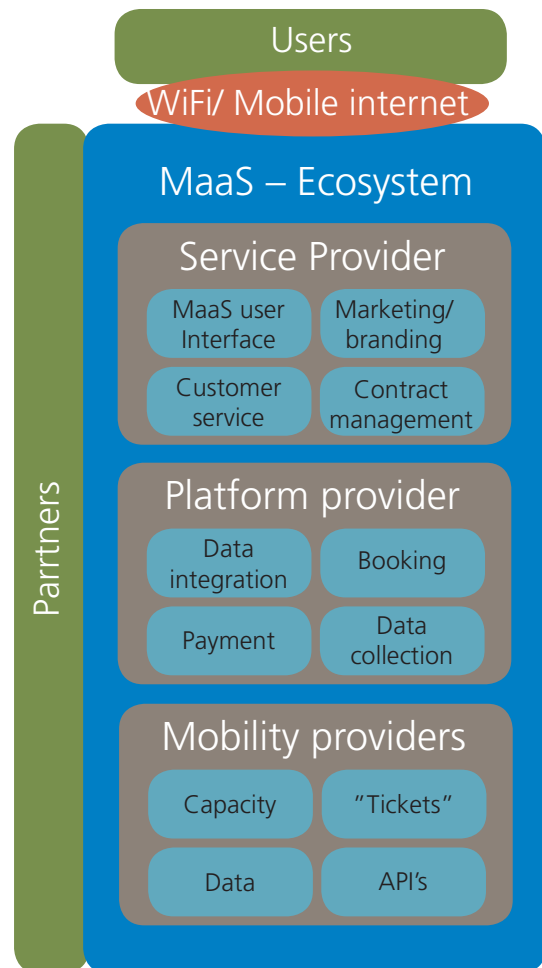
Figur 1 The MaaS ecosystem. Source: Adapted from Movia notat 2016-08-18.

and EMMA in Montpellier. In Sweden, the public transport association Samtrafiken have taken on a role as MaaS enabler, obviously with public transport in focus[7]. Car manufacturers also seek to position themselves in the market. One example is Daimler (the owner of Mercedes-Benz) who have put a lot of resources into the development of their MaaS solution Moovel, which is now being introduced in several cities. Also, IT manufacturers such as Ericsson and Sonera have shown activity in the area.

Services available on the market vary in terms of scope, e.g. how many different transport services are included and how well these are integrated. On the most basic level, integration could mean that holders of a public transport card are offered rebates on e.g. car sharing services, which is the case in several cities around the world. In more integrated solutions, payment and IT solutions are also connected. This means it is possible to both seek information and pay for trips with all involved transport modes within the same application. This category contains many of the services initiated by public transport providers, but also Moovel.

[4] Mukhtar-Landgren et al. (2016). Institutional conditions for integrated mobility services (IMS). K2 Working papers 2016:16
[5] UITP (2011). Becoming a real mobility provider. UITP position paper, April 2011.
[6] Kamargianni et al. (2016). 'A critical review of new mobility services for urban transport'. Transportation Research Procedia 14 (2016), 3294-3303
[7] See Laurell (2017). Swedish Mobility Program (SMP). Den avslutande rapporten för projektet Vitt papper och samtidigt ett förarbete till Swedish Mobility Program (SMP). Samtrafiken.

In the most advanced MaaS solutions, integration has been brought one step further, meaning that the customer subscribes to a package of mobility services at a fixed monthly cost. The package can include e.g. free public transport, access to the local bike sharing scheme and a fixed amount of kilometres/minutes of taxi, car sharing and car rental. This kind of service has been trialled at a few different locations. A Swedish example is Ubigo, which was piloted for 6 months in 2013-2014 in Gothenburg, including e.g. public transport operator Västtrafik. Another interesting example is SHIFT, which was available in Los Angeles 2013-2015. SHIFT differs from most other MaaS solutions as a private operator ran all services included, also public transport. The only example of an advanced MaaS solution available on the market today is Finnish MaaS Global, who launched their service Whim in a first version in Helsinki during the autumn 2016. Take-off has so far been relatively slow, but it will be interesting to follow their plans of a quick expansion over the next few years.
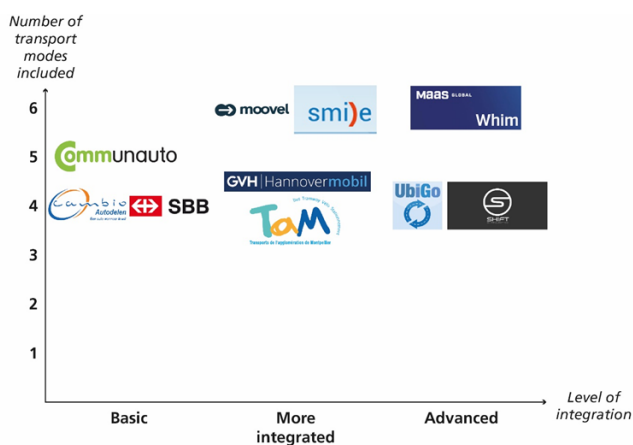
of public transport, car sharing, car rental and taxi as a well-functioning alternative to the private car, and they used car sharing and car rental less often than they anticipated. Their travel costs were also significantly lower than before. The smallest change in travel patterns occurred in the group of users that kept their private car during the trial period. Participants that did not own a car at all (neither before nor during the trial) did not change their travel patterns a lot either, but on the other hand this group already had the most sustainable travel patterns.

The fact that car ownership affects travel habits is not surprising. If you have invested in a car, the marginal cost for using the car is low, and hence the car will often be your first-hand choice. If you do not own a car, the marginal cost for using a car is high for each trip, and there is a clearer choice to be made before each trip. This means you will consider a broader range of transport alternatives, and adjust the choice to cater for the actual need, see Figure 3.
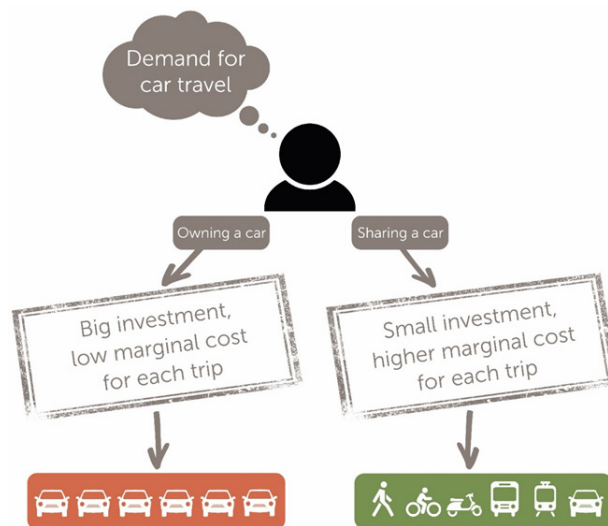

Figure 2 Overview of MaaS solutions at different levels of integration

Figure 3 Effects of car ownership on travel pattern

What impacts will MaaS have on car ownership and travel patterns?

As advanced MaaS solutions have not yet been broadly implemented, knowledge about the impacts of MaaS on travel patterns and car ownership is still limited. The Ubigo trial in Gothenburg was evaluated by researchers from Chalmers University of Technology, and results show that the participants in the study (195 individuals) to a large degree used more sustainable modes of transport during the 6 months of the pilot compared to how they used to travel before[8]. The most significant change occurred among participants that had previously owned a car, but got rid of it for the trial period.

Despite the fact that users in this group changed their travel patterns considerably, they experienced Ubigo's package

Depending on how the MaaS solution is designed, impacts on travel patterns will vary. If the service is designed primarily with the aim to provide easy access to car travel for users who do not own a car, there is a risk that MaaS leads to increased travel and increased car traffic, which is negative from an environmental perspective. However, the number of vehicles could potentially be reduced, as vehicles would be used more efficiently[9].

Today, municipal requirements on the number of parking spaces that need to be provided for new housing developments largely mirror current levels of car ownership. However, research shows that among individuals who join a car-sharing service, car ownership is reduced so that one car-sharing car on average replaces 5 privately owned cars[10].

[8] Sochor, Strömberg och Karlsson (2015). *An innovative mobility service to facilitate changes in travel behaviour and mode choice. 22nd ITS World Congress, Bordeaux, France, 5-9 October 2015.*

[9] Kerttu, Smidfelt Rosqvist och Wendle (2016). *Konsekvenser av Mobility as a Service. Jämförelser av alternativa scenarier för implementering av nya mobilitetstjänster (förstudie). Trivector Traffic rapport 2016:112.*

[10] Indebetou and Börefelt (2016). *Effekter av Sunfleet bilpool - på bilinnehav, ytanvändning, trafikarbete och emissioner. Trivector Traffic Rapport 2014:84.*

This relation has led many Swedish municipalities to offer a reduction in number of parking places required to be provided according to parking standards (generally around 20 %) to property developers who instead provide residents with access to a car-sharing service. Swedish car-sharing company Sunfleet, owned by Volvo, today market this solution directly to property owners and developers[11]. This type of solution is beneficial both to the developer, who reduces costs through avoiding the construction of expensive parking spaces, and to the municipality, who reduces the number of cars in circulation. An interesting opportunity ahead could be to bring this idea one step further, and provide a more advanced MaaS solution connected to residential areas. This would make sense as a large share of the trips we make either start or end at home. In Sweden, there are some early movers among property owners who have begun to think along these lines and complemented car sharing with e.g. access to cargo bikes for loan. One example is the development Fullriggaren in Malmö. However, no examples exist which include a link to to public transport.

Trivector has worked as consultants within sustainable transport for 30 years, and during the last few years followed the development around MaaS with great interest. As we see a large potential within this field which is not being realised as quickly as we had hoped for, we are finding it increasingly difficult to remain passive observers of the development. This is the reason why Trivector has initiated a R&D project called EC2B, with the purpose of developing a new solution for MaaS connected to residential areas[12]. EC2B contains a mix of mobility services, offers them in an integrated way which is made easily accessible to individuals in their place of residence. Together with the municipal housing company LKF, a pilot is now being planned at Brunnshög in Lund, with expected occupancy in 2019. Several other pilots are also in the pipeline.

Conclusion – What does MaaS mean to me…

… as a municipality?

MaaS could contribute to reduced car traffic in cities, as well as reduced demand for parking spaces, but the impacts depend on how MaaS is being implemented. Here, municipalities have the possibility to steer development, both through creating an enabling environment for MaaS and through formulating clear demands on operators.

… as a public transport agency?

MaaS will change the market for personal transport, and as a public transport agency it is necessary to follow the development and analyse what role the agency should play in the MaaS ecosystem.

… as a mobility provider?

MaaS will change the rules of the game on the market, which could mean both threats and opportunities for mobility providers. Relationships and business models will change. MaaS will mean new opportunities to reach out to a bigger market, but possibly at the expense of "owning" the customer as before.

… as a property owner?

Once MaaS is implemented broadly, many property owners will experience a surplus of parking spaces. In new developments, it could therefore be wise to start analysing which options already exist to reduce the demand for parking, and instead plan for alternative mobility solutions.

About Emma Lund

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[11] *https://www.sunfleet.com/nyproducerade-bostader/*
[12] *Lund (2016). Feasibility study MaaS – A business case for EC2B. Trivector Traffic rapport 2016:85.*