

CHALLENGING MOBILITY AS A SERVICE

A Personal vision based on the available literature

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What is Mobility as a Service?

There are many definitions available. Interesting is the characteristic of MaaS in Jittrapirom et.al (2017) created out of an inventory of definitions. They arrive at: integration of transport nodes, tariff option, one platform, multiple actors, use of technologies, demand orientation, registration requirement, personalization and customisation.

But I like best the definition of Kamargianni and Matyas (2017): *Mobility as a Service is a user-centric, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by a sole mobility provider, the Maas provider, and supplied to users through a single digital platform.* Please note here ; user- centric, and all mobility service offerings. And it is not just an integrated mobility service, but in essence a complete restructuring of mobility supply. MaaS can only work if the majority of the dominant transport service providers are convinced to join.

Who are the potential users of Maas?

Users need to subscribe to a mobility provider (later called the MaaS provider) to receive mobility according to an advice produced for the individual user. At best, with a subscription by the user to the Maas provider the basic payment for the transport services is done. Actually, in essence there seem to be three forms of users, two with a strong bias and one more intermediate group. To classify:

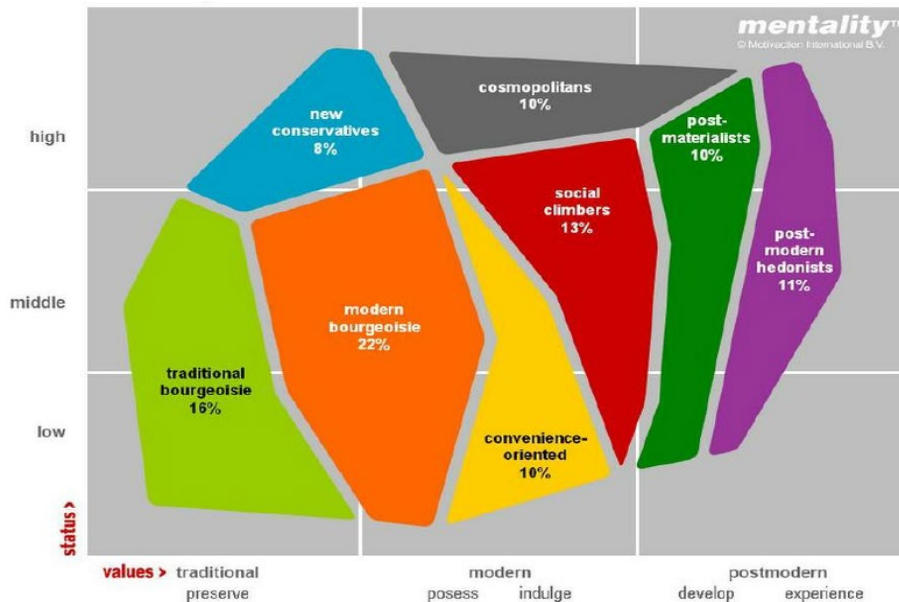
- Only PT users: four groups ; a. cannot afford car ownership, but have a driving license, b. no car, and a driving license, c. no car and no driving license out of free will, d. no car and no driving license not out of free will
- Choice users, three groups; a. sometimes use PT, have one car available in household, b. sometimes use PT, but have two or more cars in household, c. sometimes use their car, but are in favour of PT
- Only car users: a. have one car available in the household, b. have more cars available in the household.

This is certainly not the complete picture, but a "proxy" of all potential user types.

Another perspective is possible, and can be found in the literature; what are early or late adopters? This is related to age, education, and lifestyle. I like the division by Motivaction, made for the

Netherlands. The division is based on lifestyles and attitudes, as much as on the default category of socio- economic class (see Jeekel, 2018).

In the picture the groups that are least car oriented are the post- modern hedonists (younger households, often studying) and the cosmopolitans (real city dwellers, live in urban worlds, frequent flyers). Within the post- materialists, although great car users, the orientation is towards sustainability and towards trying to diminish their individual car use and ownership.



All in all, some 30 % of households has an inclination towards MaaS – ideas, at least in the Netherlands. Akyelken, Banister and Givoni (2018) note that key users could be people aged 25-35 , without children, well- educated and living in cities. Note that this is also the Uber- profile (see; Alemi et.al, 2018).

What forms of Maas can be noted from the literature?

I will present three alternatives, with each time a broader scope of transport modes and a broader working area. These alternatives can be found “*in statu nascendi*” in the MaaS-literature.

Weak MaaS

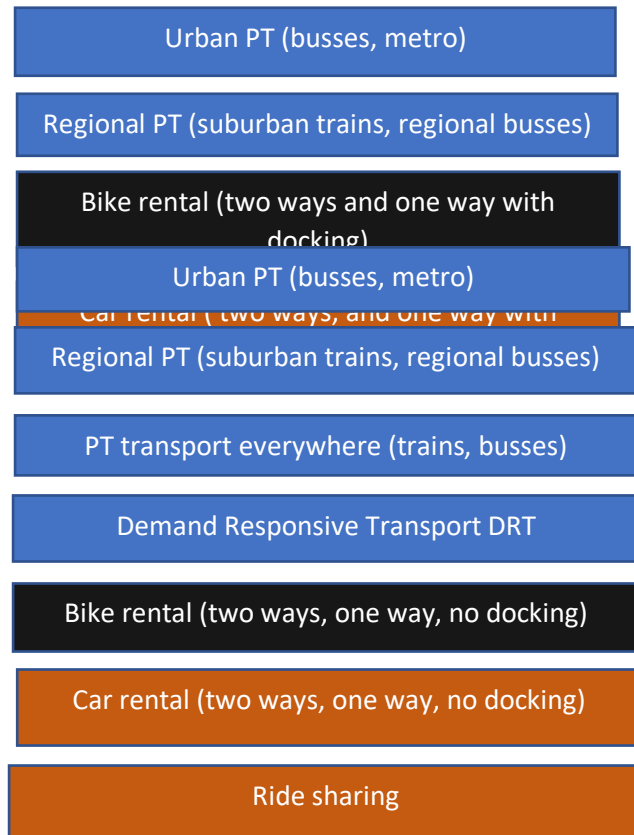
Working area ; city

Scope:

Urban PT (busses, metro)
Bike rental (only two ways)
Car rental (only two ways)

Intermediate MaaS

Working area ; urban region or defined region



In its strong form MaaS envisages *"not only bridging the gap across transport operators in the same city, but across different cities and initiates the idea of roaming in the transport sector"*(Kamargianni and Maytas, 2017)

Interesting is to note the position of the standing taxi services and the Uber ride hailing and taxi services. Could these services also be integrated in the Maas- arrangements? Or is the price difference a real problem? To be a substitute for normal individual car use, the price of MaaS should be in competition with what households normally pay for car use or for PT, and this is a price far lower than the Uber services and certainly far lower than normal taxi services. However, in relation to Uber, Young and Farber (2019) write ; *"Uber ride hauling may be a substitute for other modes than just taxis, and it may in fact be taking users away from more sustainable modes, such as PT and active modes of travel"*. This discussion is still active, as Hall, Palsson and Price(2018) consider from their research Uber more complementary to PT (especially in early morning and late evening/night) than as a substitute.

An intuitive confrontation of possible users and Maas alternatives

	PT a*	PT b	PT c	PT d***	Ch a	Ch b	Ch c	Car a	Car b
Weak	x	x	Only bike rental as extra	Only bike rental as extra	Only an extension for bike rental	Only an extension for bike rental	Only an extension for bike rental	-	-
Intermediate	x	x	Only bike rental as extra**	Only bike rental as extra**	A small extension	A small extension	Very little extension	-	-
Strong	x	x	x	x	An extension, and even substitute	An extension, possible removal of second / third car and even substitute for first car	An extension, possible removal of the car	Should be a great service	Possible remove second car

*= price could be a problem

**= and possible ; coordination between urban and regional PT

***= price could be a problem

The confrontation gives the following outcomes:

Weak Maas only delivers some extra opportunities on bike rental for car users living in cities and creates extra opportunities for non- car owning city inhabitants who have a driving license. Where is the business case here, except for decreasing urban PT coverage, by substituting part of this coverage by bikes or car rental? If a MaaS service only targets the local users the benefits may be limited (Li and Voegelé, 2017)

Intermediate Maas creates opportunities extra for choice drivers outside the cities in the urban region, with more coordination on the use of PT services (urban and regional). This is an extension, but a minor one. And urban dwellers receive somewhat more options too in this respect. And for all driving license holders the one- way option (with leaving cars in docking stations) becomes possible.

Strong Maas presents the complete range of surface passenger transport modes available. Users are only with this Maas alternative receiving the possibility to realise their complete travel pattern during the year via Mobility as a Service. As almost all people travel out of their city or urban region (or even do not live there) , only this alternative could really lead to substitution of private car ownership. In the other two alternatives many trips made will be outside the MaaS- scope. This scope is limited to

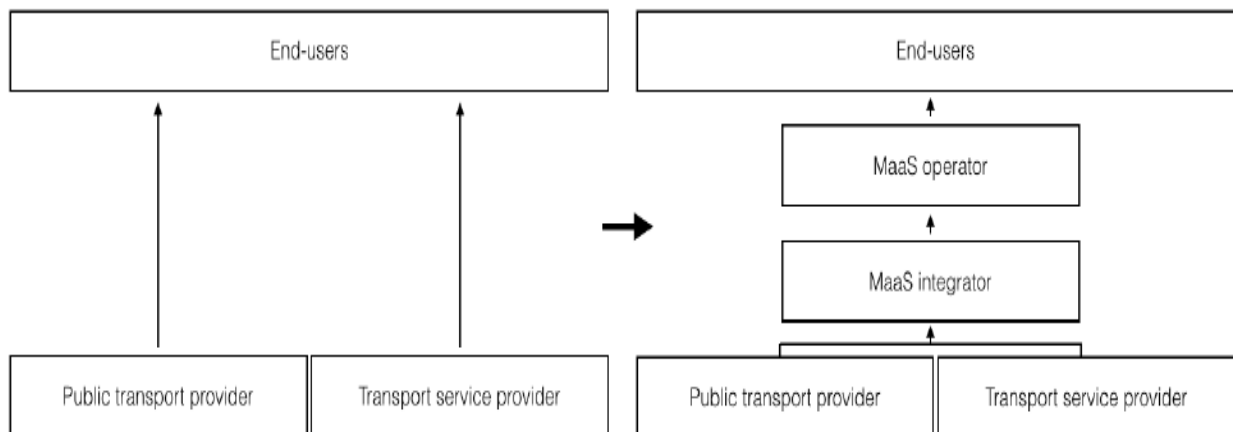
the city (in Weak Maas) or to the urban (or defined) region (in Intermediate Maas). Most households will keep their cars for these trips outside the Maas - scope. The best possible function of these two Maas alternative is to act as an extension to the normal mode used. Probably only richer households will pay for such an extension.

A personal note

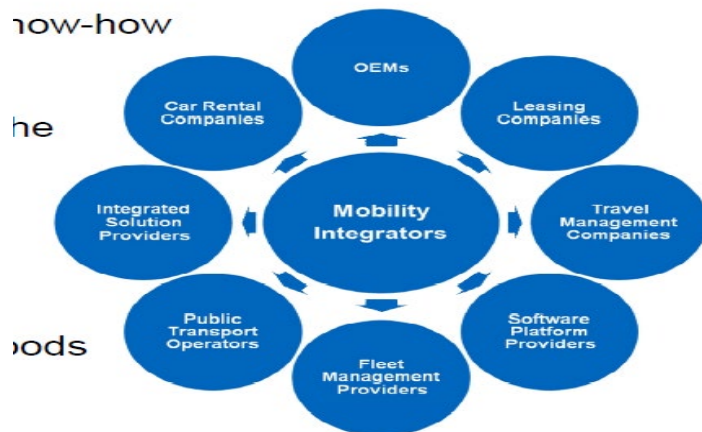
I must admit that I dislike part of the actual discourse on Mobility as a Service and consider it inappropriate. When authors and activists see Maas as potentially disruptive but operationalise Maas just as Weak or Intermediate Maas I fail to see the disruptive character, as normal car use or normal PT use remains necessary for at least a (often rather huge) part of all trips made by an individual or a household (many leisure trips, part of their work trips). The existence of Maas in a city or in a defined (urban) region does not change this circumstance. Why should people ever give up their car ownership for Maas when they still need cars outside their Maas - city or region, for leisure, family visits or even part of their work? As often in mobility research I consider disruption narratives combined with incremental changes as anomalies (also : Spreij, 2018)!

Different roles in Maas.

In general, in Maas 4 (or 3) roles can be identified. The role of the *end users*. The role of the *Maas operator*: the planner of the journey for the end user. The role of the *Maas integrator*: mediating the offers of the different transport operator or providers (PTA's, rental car companies etc.) Often the roles of Maas operator and Maas integrator are combined, in what could be called the *Maas provider*. The best definition of this combined role could be found in Callegati et.al (2017); "*shall provide its users with information, and procedures for discovering, planning, booking and guiding journeys, , , combining any variety of means of transportation*". And finally, the role of the *transport providers*. There are in essence two types of providers Public Transport Agencies, and private transport service providers. The core roles are presented in Smith, Sochor and Karlsson (2018):

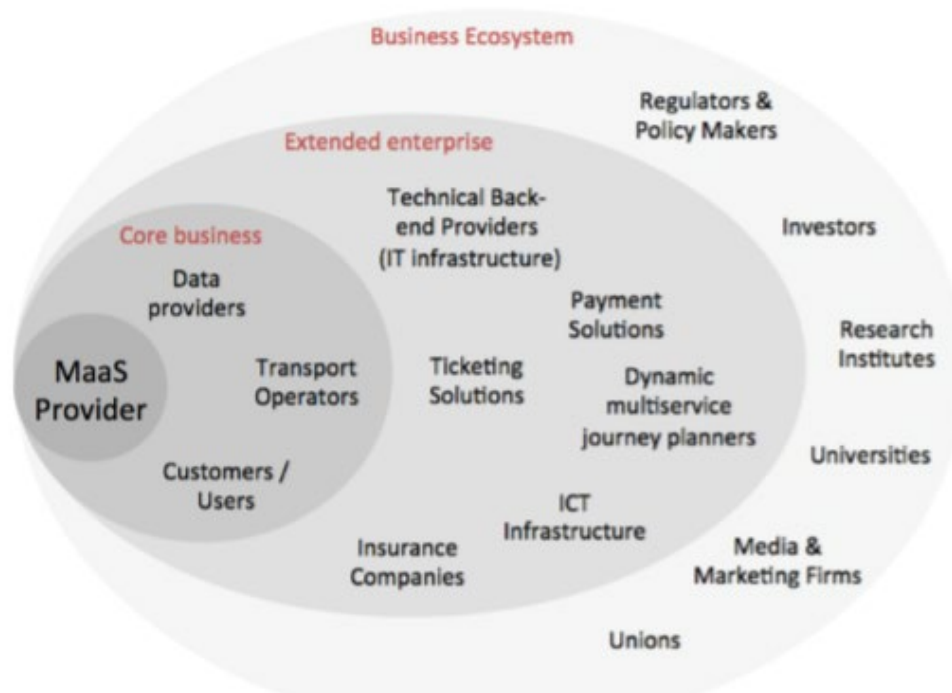


The role of Maas provider or Mobility Integrator (as called by Giesecke , Surakka and Hakonen, 2016) is free as this picture shows (Giesecke , Surakka and Hakonen, 2016).



Problems of Implementing MaaS

Implementing MaaS will be more difficult when moving from Weak to Strong. In general, MaaS needs a “*business ecosystem*” as Kamargianni and Matyas (2017) write. In their vision this ecosystem could look like this.



In each alternative two implementation elements remain crucial:

- The relationship between the MaaS provider and the range of transport providers, that really deliver the transport modes at the right time and the right location. Are this at least two organisations or is it possible to create a full mobility provider? With at least two organisations this leads to challenging questions such as:*

1. What is the business model of the MaaS provider? Here it should be stressed that when the MaaS-providers could acquire dominant positions this could diminish the transport service providers' (doing the real work) ability to act independently. Such a position of the MaaS provider might eventually suffocate the business models of the transport service operators (Smith, Sochor and Karlsson, 2019).

2. What is the character of the relationship between the MaaS provider and the transport provider? How can, in the circumstance that the MaaS provider is independent this MaaS provider *coerce* the transport providers that they deliver the best quality available? And how will be the contact pattern with the other transport providers when the MaaS-provider is a transport provider (rental company, bike company, lease company or the PTA (Public Transport Agency)) itself? On this situation Ebrahimi, Sharmeen and Meurs (2017) state : *"providing services directly to the end-users and possessing the D&M (meant is : distribution and marketing HJ) channel is negatively related to the substitutability of services."* A PTA may find it rather difficult to extend its role into providing bike and car rentals. This could take years. And when the MaaS-operator should be a private firm Kamargianni and Matyas (2017) suggest from interviews that such a privately owned MaaS provider would prefer to provide their services via a privately owned provider, because they believe such a new provider would have more incentives to promote their services.

What could be problematic in some countries is the role of the PT providers, as for example in Sweden; *"under current legal circumstances PTA's cannot take any other role in the emerging ecosystem than the role as provider of traditional PT (Smith, Sochor and Karlsson, 2017).*

b. *The four basic challenges:*



On the **IT** the challenge is to produce best trip advice to the users in a dynamic environment, with congestions and PT running too late, so connections could be missed. MaaS needs changing of trip schedules to create the most actual and efficient trip. As data on mobility situations belong to a scattered plethora of operators, integrating data is key. Melis et. al (2017) present the vision of a federation of providers, each trading its resources to coordinate multi-modal solutions for mobility. Such a flexibility comes with many security and privacy concerns. Callegati et. Al (2018) arrive at the same conclusions. Data provision to the Maas provider could become an important issue as Li and Voegelé (2017) conclude: *'While many PT operators have made their real time data available, operators of other transport modes (bike or car rental) rarely open their data to third party developers'*.

On the **business model** it should be clear that MaaS has to be an instant success, as you cannot start with just a little bit pragmatic MaaS. No potential user will then ever step in. In general marketing terms it is costly to attract users when you have an unknown brand and an unknown product. This holds especially true for the Weak Maas; why start something new, bring it with great enthusiasm, but the change seems minor...Large volumes seem required to create a viable business model, due to small margins and cheap products within the transport sector. And as Smith, Sochor and Karlsson (2019) state correctly; *'for these reasons, MaaS is associated with high economic risks, huge marketing costs and a long time return on investment.'* On paying a key factor of Maas is the opportunity to use single account to pay all transport services. And on pricing of MaaS very little is known as yet. I like the analysis of Hensher (2017) on this point: *"The literature on point-to-point motorised MaaS is, as far as I can find, barren about trip costs to users who currently use conventional public transport. What may be of interest is whether a MaaS package can be designed and offered to the market under a price that is sufficiently attractive to support the occasional (or even more frequent) use of the car-based mobility options, while still supporting the majority of travel activity using conventional public transport. A successful MaaS plan, at least in the foreseeable future, is most likely to contain a mix of such offerings."*

However, in my vision the greatest challenge for MaaS will be the **logistic challenge**; how to create the chain of transport modes and services. As Jitrapiron et. al (2017) signal: *"the major challenges in designing MaaS services are fleet optimization and relocation strategies (...). A step forward needed to bring them further under a Maas ecosystem would be to take the integrated MaaS supply network into account in these relocation strategies"*.

Related to this I will present two examples of what in my vision the magnitude of Maas is about.

1. A trip to a conference centre in the woods (workday)

You live in a city neighbourhood at 10 minutes cycling to the station. You travel with your own bike. You take the train to another major city. From there you take a commuter train from another company to a village station. From there it is still 13 kilometres. You could, once in every two hours, take a bus. But your Maas provider did deliver a far better option; ride sharing with a driver who picks you up at the village station. The driver ends his trip in another village, 10 kilometres nearer to the conference centre. At the local bus stop a bike is waiting for you and you bike the last 3 kilometres. You arrive nice in time at the conference centre. The MaaS – provider did do a good job!

2. Playing golf and visiting your daughter (weekend)

On a Saturday you would like to play golf with a friend who lives in another city. You will play at his golf-course which is near his city, some 25 kilometres away from your home. But you organised via the Maas provider a rideshare with another golfer who lives in your city and is member at the golf club of your friend. He dislikes driving alone and likes to speak with a colleague- golfer. After the match you have rented a car to drive to your daughter who lives in a suburb 10 kilometres from the golf course, but in another direction from your city. The car stand waiting for you. You leave the car near her house. Your partner is already there, she took her bike to the station, took the train to your daughters' suburb and took a nice walk. After your visit, and after a nice dinner, you have arranged another rented car for you and your partner, and also that car already stands waiting around the corner. You are clever and you do not want to pay idle for the 4 hours you spend with your daughter, so you pick up two car rents of each a time slot of an hour. Easy also with the golf luggage you are carrying, public transport is not a very helpful option. You hope that at a certain moment you both do not need to drive the 35 kilometres back to your house yourself anymore yourself. When will an automated car , when possible in the form of a people mover be an extra service in your subscription?

It would now be clear that these rather seamless trips present a great number of logistic problems for Maas providers and for the transport operators. However, in my vision, *only when also these sort of trips will be delivered by MaaS, MaaS can act as a substitute for the actual regime of individual car ownership and car mobility.*

Role of governments

When MaaS should indeed be considered as an alternative for individual car ownership, for reaching higher car occupancy rates, for decreasing the parking capacities, and finally for helping in reaching objectives of sustainability mobility the government agencies certainly have a role to play.

At first, in removing barriers on PT, secondly in stimulating MaaS initiatives, by supporting market organisations. Here a restrictive policy on car use on locations that are not made for heavy car traffic, such as very polluted areas and higher density living areas would be helpful, and the same holds for restrictive parking policies (Drut, 2018).

Standardisation would be a task for national governments, certainly in Intermediate MaaS, to avoid different open standards across different regions that will hinder interoperability and thus block the development towards Strong MaaS.

A next step would be to act as launching customer for new initiatives from enterprises, especially when these initiatives lead to the creation of Strong MaaS. The government should take up part of the initial risks of starting MaaS, with its difficult business case at the start. This will most certainly be expensive!

And, as noted in the literature, the actual procurement rules and regulations are often not very helpful in realising MaaS. On this issue a majority of interviewees from Smith, Sochor and Karlsson (2019) believed that public procurement is an ill-fitting method for driving collaborative innovation, as procurement is a method for operating systems and not for innovation.

Smith, Sochor and Sarasini (2017) present a list of actions for governments who like to promote MaaS, of which supporting pilots and implementation with financial capital, experimenting with new institutional arrangements, and creating strong visions and networks seem to me the most important.

Finally, there is a government role in caring for equity issues related to MaaS, with a vision on what creates the efficient and sustained transport mix for the future.

Equity issues

MaaS could lead to greater inequalities in the provision of mobility.

This could be the case when MaaS is priced higher than actual provision, whereas these actual provisions are being lost or diminished. This could hold for weaker parts in the networks of public transport. MaaS could lead to “cannibalization” of public transport, and to a future that is in essence more car-based than the actual situation. The situation that less cars could be on the road (greater occupancy rates of cars, lower car ownership, less parking capacities needed) creating better results from ecological and congestion perspectives should not obscure the possibility that MaaS could lead to worsening conditions for poorer households without driving licenses as governments could see the emergence of MaaS as an opportunity to reduce public spending on subsidies to public transport services (case in Finland, see Li, 2019).

Concerns have also been raised over MaaS’ potential for increasing inequality, when premium service levels are offered to users who pay more (Li, 2019). In this respect also the position of Demand Responsive Transport (or Community Transport) in relation to MaaS is interesting; could this be integrated in some way (on this issue ; Mulley, Nelson and Wright, 2018)?

As Akyelken, Banister and Givoni (2018) state; *‘the focus on whether sharing schemes are replacing or complementing the public transport is now evident in current policy and market discourse’*. A first contribution to this actual debate is presented by Jin et. al (2018) when they conclude: *“even though ridesourcing improves the availability of transportation in poor and remote areas, it does not seem to provide equal access to all community members- people without a smartphone or a credit card, or at least a banking account are excluded from this transportation option “*

Final remarks

Mobility as a Service is a hype, as the number of publications and plans is now far higher than real-life experiences and organisations. Where on earth is an actual mobility provider in the sense of MaaS to be found. Take note of the fact that we are already 7 years discussing MaaS! Giesecke, Surakka and Hakonen (2016) call it a *“hyped” socio- technical phenomenon, with some successful services, optimistic political dogma and activists’ enthusiasm, whereas investors believe in Uber’*. And Kamargianni and Matyas (2017) write; *“practitioners point out that it is rather easy to come up with new ideas, but the real challenge is putting them into practice”*.

MaaS is very difficult to realise, certainly in its Strong alternative, the only alternative that could act as a substitute for ongoing individual car mobility with nowadays very low occupancy rates per car. In the core MaaS is about inter-organizational trust among transport operators and the MaaS – providers, and trust is not easily found in the world of transport! It is clear that organizational inertia should be overcome. Nice words are not enough, interesting visions help, but in the end it is all about practice.

And governments should do far more than just endorse, so much is clear!

STATEMENTS

1. Until now, MaaS is just complete fiction: everybody writes and thinks about it, but no appropriate services are created
2. Grassroots Maas (biking schemes, car clubs etc.) is nice, but will not be able to create disruption in mobility towards the objectives on fighting global warming
3. The only Maas options that could substitute the regime of individual, low- occupancy car use and car ownership, are the most difficult to realize, due to scale, logistic challenges and institutional inertia
4. Governments have huge role in realizing MaaS, by acting as launching customers, creating breakthrough in mobility inertia. **Starting Maas in magnitude will come at a cost!**

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