What do we mean by Mobility as a Service?

A Working Note of the MultiCAV Project[1]

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The term Mobility as a Service (MaaS) is in growing use by professional associations, research and governmental organisations, and in academic publications. However, it is clear that the use of the term shows considerable variation across the transport and mobility sector. Hence, this note has been prepared by UWE Bristol to collate and examine some of the definitions. We consider what MaaS is, how it works and what purposes it serves. The aim is to encourage development of a shared understanding of MaaS within the MultiCAV consortium, as a necessary step in clarifying our research objectives in relation to the MaaS components of the project.

What is MaaS?

Among the many available definitions of Mobility as a Service, the simplest one is: *"the integration of various forms of transport services into a single mobility service accessible on demand"*. This phrase forms part of a much longer definition found on the website of the European 'Mobility as a Service Alliance'[3]. The basic concept is that an individual can plan and pay for a trip by public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or some combination thereof, using a single online platform (and user-friendly interface). Implied in this definition is the ability not only to *plan* a multi-modal journey involving the fewest possible changes and shortest waiting/travel times, but also *pay* for the whole journey at one go instead of buying multiple tickets from different transport operators (MaaS Alliance, n.d.; House of Commons, 2018).

The House of Commons Transport Committee Report (2018) describes MaaS as *"a term used to describe digital services, often smartphone apps, through which people can access a range of public, shared and private transport, using a system that integrates the planning, booking and paying for travel*." (HoC, 2018, p9).

We might first consider how new this idea is. Integrated, multi-modal travel planning tools are already commonplace (Google Maps offers the best-known, if not the most sophisticated example). Journey planners have become increasingly powerful over the past twenty years; in this sense MaaS represents *"evolution rather than revolution"* (Lyons et al., 2019, p28). However, it would be hard to find an existing journey planner capable of producing mode combinations across the full range of public transport, walking, bike-share, taxi and car rental/sharing options encompassed by the MaaS concept. Opportunities to *pay* for a multi-modal journey in a single transaction are much more

[1] The present iteration of the working note represents the understandings of UWE Bristol alone, and not an agreed consortium position, or set of definitions.

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[3] The MaaS Alliance is a public-private partnership comprising businesses and a small number of local authorities in the UK and Europe (http://maas-alliance.eu/). The full definition provided by the MaaS Alliance is provided in Appendix 2.

limited in the UK compared to the availability of non-transactional journey planners, not least because of the complexity of integrating ticketing among multiple private transport operators. An existing (limited) example is the combined rail and PlusBus ticket, and TfL's Oystercard.

Given the multiple services available to end users (including the PlusBus and Oystercard examples), the question arises as to when the service constitutes MaaS and when it does not. There are degrees to which different services have embraced the Maas concept. A 'taxonomy' of MaaS, showing the steps which might lead up to full-scale integration of transport services into a single mobility service (Lyons et al., 2019), and including examples relevant to MultiCAV, is provided in Appendix 1.

How does MaaS operate?

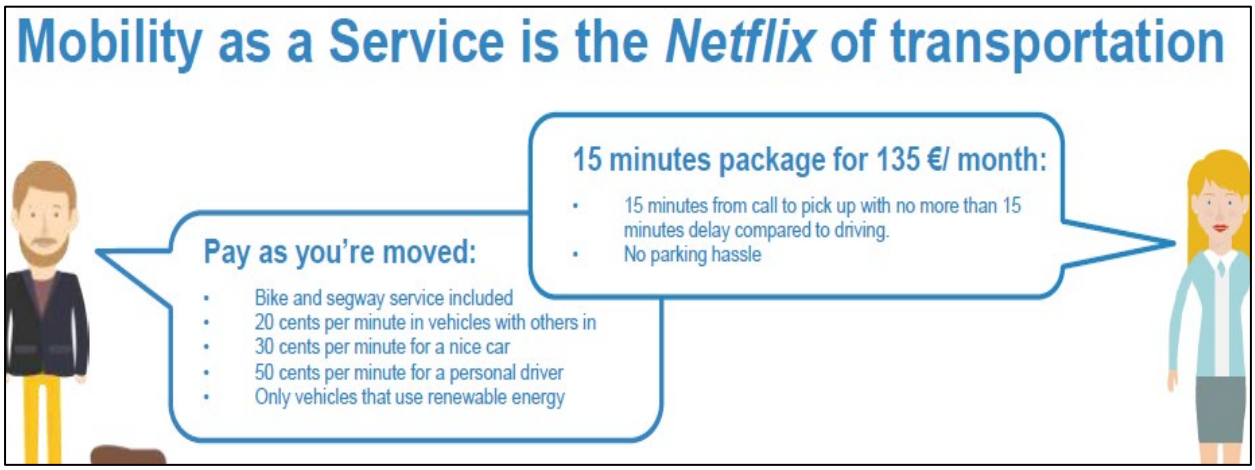
Core to the operation of MaaS is the intermediary company which coordinates and integrates the information and payment systems of multiple transport operators via a single digital platform. These have been identified as 'mobility operators'.

> *"MaaS aims to restructure the mobility distribution chain, by creating mobility operators who integrate all the offerings of providers and supply them to users as a single service"* (Heikkilä, 2014, p8).

In other words, a mobility operator is *"a company, which buys mobility services from service producers, combines them as a service supply and provides the services to customers"* (Matyas and Kamargianni, 2018).

A leading figure in this field is Sampo Heitanen, CEO of the Helsinki-based company MaaS Global. MaaS Global has developed an app-based service called *Whim,* which claims to be the 'world's first MaaS operator' (http://whimapp.com/uk/). This was launched in Helsinki and subsequently trialled in the West Midlands starting in 2018 (although with subsequent indications of limited take up and the withdrawal of its two monthly packages available to prospective users). Heitanen's vision is that customers choose from a range of different 'bundles of transport services' at different prices, which might work as a monthly subscription - rather like a mobile phone contract. Bundles could comprise a certain number of km travelled by certain modes, or a maximum number of hours for which a particular mode might be used.

The following excerpts from a slide presentation by Hietanen and Sami Sahala of Forum Virium, Helsinki, describe MaaS as the *'Netflix of transportation'*.



Hietanen, S. and Sahala, S. (n.d.). Slides available at: https://www.itscanada.ca/files/MaaS%20Canada%20by%20Sampo%20Hietanen%20and%20Sami%20Sahala.pdf

The European Mobility Management organisation, EPOMM, also includes the idea of the 'bundle of services' in its definition of MaaS: *"[MaaS] 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"* (EPOMM, 2017, n.p.). Alternatively, payment could be on a pay-as-you-go basis (HoC, 2018).

What does MaaS offer the user?

The definitions of MaaS outlined so far have emphasised its potential as a new business model, placing particular importance on the role of the mobility operator (intermediary), whilst also indicating the benefits to the traveller in the form of a simplified way of planning, booking and

paying for services. The idea here is that MaaS puts the user at the heart of the system by facilitating multi-modal journeys, such that they can be considered to be 'on demand' (in the same way as calling a taxi or getting into one's own car). It should *"put the users, both travellers and goods, at the core of transport services, offering them tailored mobility solutions based on their individual needs."* (EPOMM, 2017, n.p.). MaaS systems must be desirable to users if they are to be successful.

Lyons et al. (2019) stress the importance of the user by placing them at the top of a 'hierarchy of need', showing that: "…..*the mobility intermediary (the digital platform provider) is only one layer in what can be seen as the (prospective) users' hierarchy of need:"*[4].

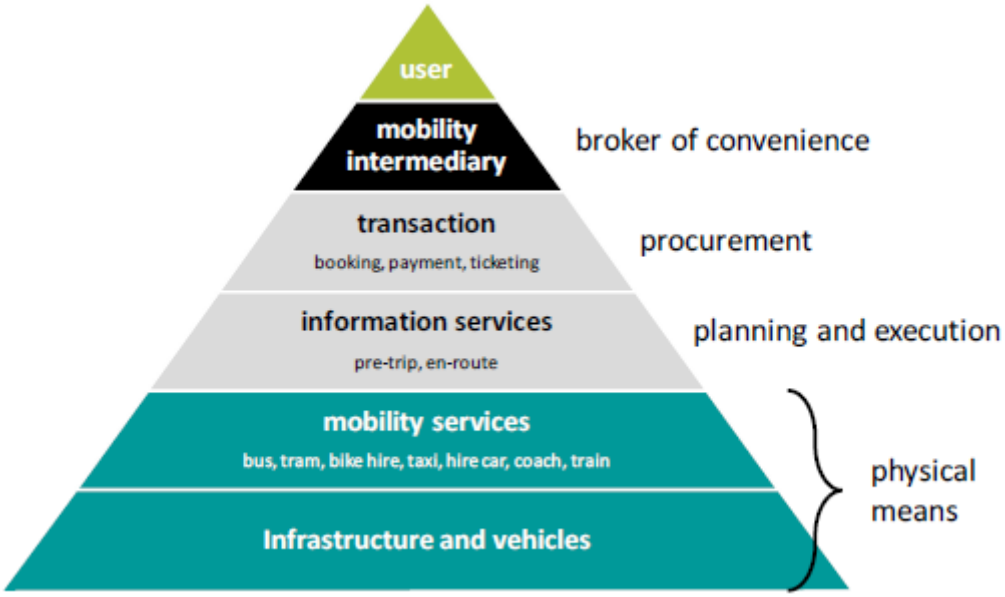


Figure 1: The mobility system beyond the private car (Lyons et al. 2019, p.24)

According to this perspective, there is a risk of too much emphasis (and hype) being placed on the role of the mobility operator (intermediary), the digital platform and the smartphone app distracting from priority being given to what members of the public actually want and need. Moreover, by placing transport infrastructure and mobility services at the base of the pyramid, the Figure above reminds us that *"A smartphone app alone does not create a viable alternative to the private car. Such alternatives (physical means) themselves must first exist before higher layers in the hierarchy can potentially add benefit for the user*" (Lyons et al. 2019, p1). Although an obvious point, there is a risk that the MaaS concept under-estimates not just the user perspective, but also the requirement for appropriate infrastructure and service to be in place before anything else can happen. Furthermore, there is also a risk that the complexity inherent in coordinating the transport operators (e.g. bus and rail companies) is under-estimated. In places with a plethora of different privately-run transport operators, integration of services and ticketing is extremely challenging.

What benefits can it offer society?

Finally, we consider why MaaS is being promoted enthusiastically by policy-makers and funding bodies. Aside from the business benefits to UK plc, MaaS would appear to offer new opportunities to encourage travel behaviour change and reduce the dominance of the private car. Indeed, MaaS is portrayed as offering the user an appealing alternative to owning and using a private car (Lyons et

[4] https://www.linkedin.com/pulse/importance-user-perspective-evolution-maas-glenn-lyons/

al., 2019). As such, it echoes the policy discourse of 'seamless' journeys (by public transport) which emerged in the late 1990s (DETR, 1998), and the 'smarter choices' discourses which followed.

> *"MaaS may be perceived by travellers as a 'better choice' and may change how we currently travel. In the future the private car may not be perceived as such a popular choice for getting from A to B."* (Transport Systems Catapult, 2016, p.9).

Lyons et al. (2019) argue in favour of this interpretation: *"MaaS should be interpreted as the 'mobility system beyond the private car"* (Lyons et al., 2019[5]). However, it is not yet clear whether this will reduce car travel overall. On the contrary, if MaaS makes it easier to use shared cars and taxis, this may well attract people from other public transport modes. Hence, to the extent that MultiCAV can provide empirical evaluations of MaaS in use, it potentially can make an important and novel contribution to knowledge regarding the concept's actual influence on behaviour change.

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[5] https://www.linkedin.com/pulse/importance-user-perspective-evolution-maas-glenn-lyons/

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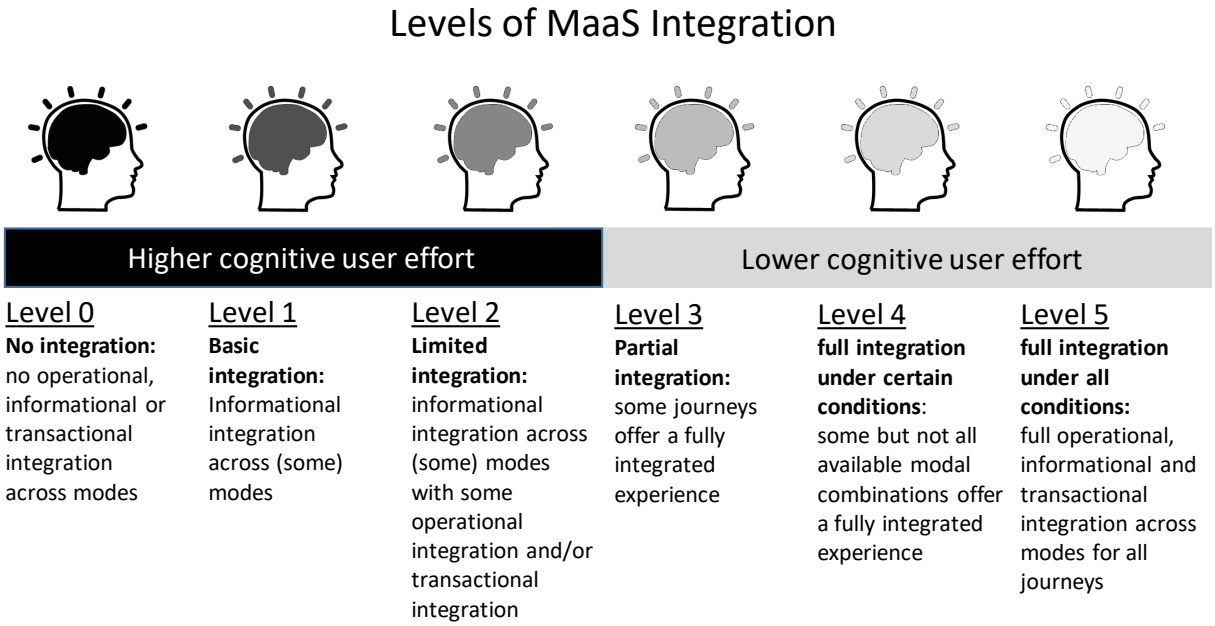
Appendix 1

Lyons et al. (2019) have developed a 'Levels of MaaS Integration (LMI) taxonomy', analogous to the level 0–5 SAE taxonomy for automation of road vehicles. The LMI taxonomy is "*user-centric, suggesting that the value offered to (prospective) users by MaaS is governed by operational, informational and transactional integration and in turn the cognitive effort required of the user to fulfil their mobility goal".*



Levels of MaaS Integration (reproduced from Lyons et al. 2019)

Examples of how the LMI might be interpreted within MultiCAV:

Level 0 – A journey including train and (conventional) bus legs: requires service information to be gained from different sites, tickets for the two modes to be brought separately, and potentially long waiting times as train and bus timetables are not synchronised.

Level 1 – Train and bus information can be accessed on the same site/app, but information around AVs cannot. Tickets for each mode need to be bought separately.

Level 2 – Access to information and purchase of tickets for trains and buses can be achieved on one site/app, but information and tickets for AVs have to be found elsewhere.

Level 3 – For some journeys, trains and buses are fully integrated (but AVs are not). This includes information and tickets for both modes being available in same place. Some degree of train-bus service coordination to minimise waiting times.

Level 4 – For train, bus and AVs, at peak times, information and tickets are in one place, and waiting time/walking distances are minimal. However this is not so for all modes, at all times of day.

Level 5 - Information, and tickets as necessary for bus, taxis, AVs and bikes can be found in the same place. Thus cognitive effort in planning, booking and undertaking journey are minimal. Travellers don't wait significant amounts of time nor are required to walk significant distances at any point in journey.

Appendix 2

From "Mobility as a Service" on the MaaS Alliance website.

"What is MaaS?

Mobility as a Service (MaaS) is the integration of various forms of transport services into a single mobility service accessible on demand. To meet a customer's request, a MaaS operator facilitates a diverse menu of transport options, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. For the user, MaaS can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations. For its users, MaaS should be the best value proposition, by helping them meet their mobility needs and solve the inconvenient parts of individual journeys as well as the entire system of mobility services.

*A successful MaaS service also brings new business models and ways to organise and operate the various transport options, with advantages for transport operators including access to improved user and demand information and new opportunities to serve unmet demand. The aim of MaaS is to provide an alternative to the use of the private car that may be as convenient, more sustainable, help to reduce congestion and constraints in transport capacity, and can be even cheape*r."

http://maas-alliance.eu/homepage/what-is-maas/