

# A topological approach to Mobility as a Service:

## A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals

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# What is Mobility as a Service Anyway?

Purpose of paper:

- shed light on concept and on what characterizes a MaaS service
- propose a topology to:
  - facilitate discussion
  - enable 'comparison' of services
  - understand potential effects

Method:

- literature review analyzing existing terms and definitions
- expert workshop identifying key aspects and service differentiations
- topology development and discussion



# Terms/Definitions: Combined Mobility (CM)

Used by e.g. UITP, Västtrafik, Samtrafiken

**Definitions tend to focus on combining *modes* in general, perhaps with the facilitation of planners, purchasing functions, etc.**

Definitions typically broad – along the lines of ‘smart services, from planning to purchasing’ which may complement public transport (PT) or which may entail not needing to own a private car – leaving open what such services can entail, and thus lacking guidance as to *how* to achieve such services, e.g. how to combine modes.

# Terms/Definitions: Mobility as a Service (MaaS)

Used by e.g. MAASiFiE project, MaaS Alliance, Trafikverket (Swedish ITS Action Plan), Transport Systems Catapult, Kamargianni, Hietanen

**Definitions tend to focus on the (aspects of the) *service* and not the modes, and sometimes bring in the term 'integration'.**

Definitions of the 'new' MaaS concept (vs well-established phenomena e.g. carsharing and taxis) also include other significant elements, such as customers' needs, personalized/tailored and comprehensive solutions, an interface, a mobility platform, integrated payment, a contract, a service offer, a business model, a service provider, etc.

Aspects of **goods** transport (MaaS Alliance) and **sustainability** (MAASiFiE project) do appear, albeit rarely.

# Terms/Definitions: Integrated Mobility Services (IMS)

Used by e.g. IRIMS project, K2 Swedish Knowledge Center for PT

IMS is often used in *limited* reference to integrated *information* services, i.e. services that integrate information about different modes and from different service providers.

This is unfortunate, as this concept could potentially best capture the central elements of these 'new' mobility concepts (cf. MaaS).

**Broader definitions of IMS tend to emphasize *integration of various services* in terms of e.g. multimodality, information, payment, and even other related services (deliveries, repairs) via a single/common interface.**

# Terms/Definitions: Summary

Currently no established definition, and it is likely premature to provide 'one definition'. No matter the term, it is about:

- Offering a **service** with customer/user/traveler transport needs as the main focus
- Offering **mobility** rather than transport
- Offering **integration** of transport services, information, payment and ticketing

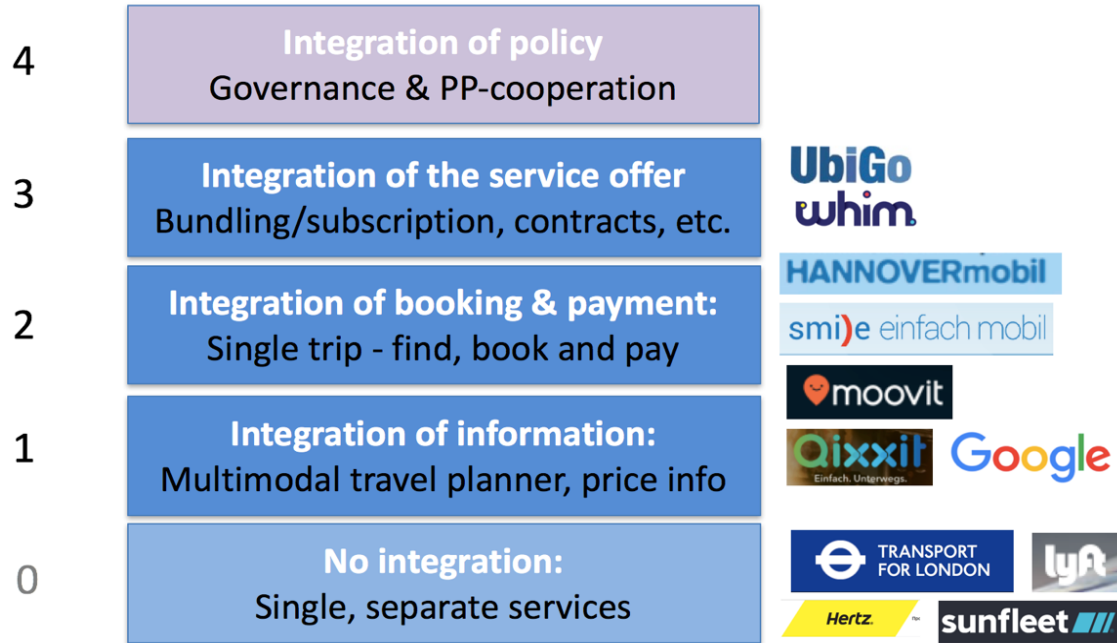
Integration can, for example, comprise:

- **Integrated information services / multimodal travel information.**  
This + integrated payment services = MaaS' 'core'
- **Integrated booking or ticketing,**
- e.g. a 'smartcard' or a mobile app that can provide access to different modes
- **Integrated payment or invoicing**
- **Organizational integration** –  
Collaboration between providers a prerequisite, but how it occurs will differ
- **Bundling**, e.g. a subscription to trips with different modes –  
This has so far been the exception rather than the norm, but this may change

# Workshop: Identifying key aspects and service differentiations

<i>Service</i>	Quixxit	Moovit	Hann. Mobil	Smile	Moovel	Whim/ UbiGo	Uber*
<b>Integration</b>							
Policy / goals: a) information b) collaboration & incentives c) procurement							
Information: a) centralized b) multimodal c) assistant	X X	X X	X X	X X	X X	X X (X)	X
Booking, ticketing, authentication		X	X	X	X	X	X
Payment			X	X	X	X	X
Responsibility, support, etc.			?	?	?	X	X
Pricing models, etc. a) Rebates, etc. b) Bundling / subscriptions			X	X?		X X	
Brand / customer relationship					(X)	X	(X)
Breadth (nr of services = n)	?	1	5	5+park	5/x	3/5	1
P2P - producer & consumer							X

# Proposed topology





# Achieving a transition to a MaaS-based transport system

MaaS has the potential to be a socio-technical transition

“...a gradual, continuous process of change where the structural character of a society (or a complex sub-system of society) transforms” (Rotmans et al., 2001)

Transition management outlines four activities that are key to governing sustainable transitions:

- **Strategic** activities are collaborative, multi-stakeholder processes, which aim to ensure that long-term visions (i.e. societal goals) are shared and embedded among collectives
- **Tactical** activities link individual actor strategies to shared long-term visions created via strategic activities. They aim to overcome short-termism and to tackle the difficulties in implementing solutions by acknowledging complex sources of inertia within regimes, and by directing activities towards the reformation of such structures.
- **Operational** activities aim to link everyday activities such as innovative experiments to long-term visions, broader policies and change agendas.
- **Reflexive** activities include the ongoing monitoring, assessment and evaluation of policies and practices as a means to revise overarching visions and plans where necessary



# Practical use of topology

## Swedish national roadmap for Mobility as a Service (KOMPIIS)

Färdplanen för Kombinerad mobilitet som tjänst i Sverige



- Help to describe ambitions and steps in collaborative effort
- Help to describe differences in prerequisites for infrastructure, regulations and policy

# Concluding Remarks

Lumping all mobility services together under one concept creates confusion and potentially undermines the concept.

Not all services are 'equal' in the MaaS topology.

The innovation, but also the challenge, likely lies in the integration entailed, as well as in the organizational integration (public – private) and the bundling.

Understanding the MaaS topology and its implications can:

- help nuance the conversation
- deepen the understanding of barriers and enablers for different levels
- facilitate service development, e.g. action plans tailored to the intended level and goals

# Reflections and Potential Developments

Too 'simplistic'? Not the purpose to present an exhaustive and static description of MaaS, but rather a straightforward and dynamic tool.

Reflections and potential further developments:

- hybrids between levels
- issues of interpretation, e.g. multimodal public transport + travel planner + integrated ticketing/payment = Level 0 or Level 2?
- may exist additional aspects not applied to the levels, e.g. geographical context (urban, suburban, and rural MaaS)
- Level 4 could potentially be broken down into the three types of sustainability
- Level 4 could potentially be applied across all levels, including trade-offs between types of sustainability

Further analysis is desirable regarding the possibilities and problems linked with the different levels, preferably based on thoroughly evaluated case studies.

Such an analysis is key to evaluating and understanding which impacts and effects can be achieved via the implementation of different levels of MaaS services in terms of e.g. social, economic and ecological sustainability, as well as business potential.

# Thank you! Questions?



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## MaaS RESOURCES – JOURNALS

- **Sochor, J.**, Karlsson, I.C.M., Strömberg, H. (2016) "Trying Out Mobility as a Service: Experiences from a Field Trial and Implications for Understanding Demand". In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2542, Vol. 4, pp. 57-64, Transportation Research Board of the National Academies, Washington, D.C.  
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## MaaS RESOURCES – REPORTS AND WORKING PAPERS

- Eckhardt, J. Aapaoja, A., Nykänen, L., **Sochor, J.**, Karlsson, M., König, D. (2017) Deliverable 2: European MaaS Roadmap 2025. MAASiFiE project.
- Karlsson, M., **Sochor, J.**, Aapaoja, A., Eckhardt, J., König, D. (2017) Deliverable 4: Impact Assessment of MaaS. MAASiFiE project funded by CEDR.
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- König, D., Eckhardt, J. Aapaoja, A., **Sochor, J.** & Karlsson, M. (2016) Deliverable 3: Business and operator models for MaaS. MAASiFiE project.
- Mukthar-Landgren, D., Karlsson, M., Koglin, T., Kronsell, A., Lund, E., **Sarasini, S., Sochor, J.** & Wendle, B. (2016) Institutional conditions for integrated mobility services (IMS). Towards a framework for analysis. K2 Working paper 2016:16.  
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## MaaS RESOURCES – OTHER

<http://www.vtt.fi/sites/maasifie/results> (including downloadable deliverables and webinar link+pdf)

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## MaaS RESOURCES - REFERREED CONFERENCES

- Strömberg, H., Karlsson, I.C.M., **Sochor, J.** (2018, forthcoming) "Inviting travelers to the smorgasbord of sustainable urban transport: Evidence from a MaaS field trial". Proceedings of the 97th Annual Meeting of the Transportation Research Board (Washington, D.C., January 7-11, 2018).
- **Sochor, J.**, Arby, H., Karlsson, I.C.M., Sarasini, S. (2017) "A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects and aiding policy integration". 1<sup>st</sup> International Conference on Mobility as a Service (Tampere, Finland, November 28-29, 2017).
- Sarasini, S., **Sochor, J.**, Arby, H. (2017) "What characterises a sustainable MaaS business model?". 1<sup>st</sup> International Conference on Mobility as a Service (Tampere, Finland, November 28-29, 2017).
- Smith, G., Sarasini, S., **Sochor, J.** (2017) "Mobility as a Service: Comparing developments in Gothenburg and Helsinki". 1<sup>st</sup> International Conference on Mobility as a Service (Tampere, Finland, November 28-29, 2017).
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- **Sochor, J.**, Arby, H., Karlsson, I.C.M. (2017) "The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technological requirements". 24th World Congress on Intelligent Transportation Systems (Montreal, October 29-November 2, 2017).
- Smith, G., **Sochor, J.**, Karlsson, I.C.M. (2017) "Procuring Mobility as a Service: Exploring dialogues with potential bidders in West Sweden". 24th World Congress on Intelligent Transportation Systems (Montreal, October 29-November 2, 2017).
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- Karlsson, M., Koglin, T., Kronsell, A., Mukhtar-Landgren, D., Lund, E., Sarasini, S., Smith, G., **Sochor, J.** & Wendle, B. (2017) "Mobility-as-a-Service: A Tentative Framework for Analysing Institutional Conditions". 45<sup>th</sup> European Transport Conference (Barcelona, October 4-6, 2017).
- **Sochor, J.** and **Sarasini, S.** (2017) "More than the sum of its parts? The Finnish Public's Perspectives on Mobility as a Service and ITS". 12th European Congress on Intelligent Transportation Systems (Strasbourg, June 19-22, 2017).
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- **Sochor, J.**, Eckhardt, J., König, D., Karlsson, I.C.M. (2016) "Future Needs and Visions for Mobility as a Service: Insights from European Workshops". Proceedings of the 23rd World Congress on Intelligent Transportation Systems (Melbourne, October 10-14, 2016).
- König, D., **Sochor, J.**, Eckhardt, J., Böhm M. (2016) "State-of-the-art survey on stakeholders' expectations for Mobility-as-a-Service (MaaS)". Proceedings of the 23rd World Congress on Intelligent Transportation Systems (Melbourne, October 10-14, 2016).
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- **Sochor, J.**, Karlsson, I.C.M., Strömberg, H. (2016) "Trying Out Mobility as a Service: Experiences from a Field Trial and Implications for Understanding Demand", Proceedings of the 95th Annual Meeting of the Transportation Research Board (Washington, D.C., January 10-14, 2016).
- **Sochor, J.**, Strömberg, H., and Karlsson, I.C.M. (2015). "An Innovative Mobility Service to Facilitate Changes in Travel Behavior and Mode Choice". Proceedings of the 22nd World Congress on Intelligent Transportation Systems (Bordeaux, October 5-9, 2015).
- **Sochor, J.**, Strömberg, H., and Karlsson, I.C.M. (2015). "Challenges in Integrating User, Commercial, and Societal Perspectives in an Innovative Mobility Service". Proceedings of the 94th Annual Meeting of the Transportation Research Board (Washington, D.C., January 11-15, 2015).
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- **Sochor, J.**, Strömberg, H., and Karlsson, I.C.M. (2014). "Travelers' Motives for Adopting a New, Innovative Travel Service: Insights from the UbiGo Field Operational Test in Gothenburg, Sweden". Proceedings of the 21st World Congress on Intelligent Transportation Systems (Detroit, September 7-11, 2014).



# Chalmers – Design & Human Factors

Research with a user perspective (~25 researchers)

Urban mobility and transport systems one of three application areas

MaaS (Mobility as a Service) projects & activities (selected)

- IRIMS Institutional frameworks for integrated mobility services in future cities (2016-2018); partners Victoria Swedish ICT, Lund University, Trivector, Samtrafiken, K2
- PhD Candidate project (2016-)  
Integrated Mobility Systems: creating favorable conditions for procurement, development and use; partners Västtrafik and the region of Västra Götaland (VGR)
- Integrated mobility services “strategic case” (2016-)
- Jana Sochor coordinating the End-User Perspective WG (MaaS Alliance) (2015-)
- MariAnne Karlsson coordinating Impact Analysis within KOMPIS, the Swedish government initiative on Combined Mobility as a Service (2017-)
- MAASiFiE Mobility as a Service for Linking Europe (2015-2017); partners VTT and AustriaTech
- Go:Smart / UbiGo Field Operational Test (2012-2014); quadruple helix project (public and private sectors, academia, users)





# RISE Viktoria

MaaS (Mobility as a Service) projects & activities (selected)

- Per-Erik Holmberg, project leader for KOMPIS, the Swedish government initiative on Combined Mobility as a Service (2017-)
- IMOVE EU H2020 (2017-19)
- IRIMS Institutional frameworks for integrated mobility services in future cities (2016-2018); partners Chalmers, Lund University, Trivector, Samtrafiken, K2
- Integrated mobility services “strategic case” (2016-)
- SHIFT Sustainable Horizons in Future Transport
- DenCity
- Go:Smart / UbiGo Field Operational Test (2012-2014); quadruple helix project (public and private sectors, academia, users)

