Automated Vehicles and Mobility as a Service:

Implications for transport behavior, models and policy

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It has been almost a century ago, that our transportation systems were being affected so rapidly and so profoundly by technological revolutions. Mostly triggered by steep advances in IT, a wide range of new transportation technologies and services are flooding the market. The ones which will likely have the most deep impact on transportation are the concepts of automated vehicles (AVs: think Tesla's and Google's self-driving cars) and mobility as a service (MaaS: think Uber and the Whim app). Each in their own right, but especially in combination – and together with the ongoing electrification of cars – these developments are expected to turn our understanding of transportation systems on its head.

This revolution in transport technologies and services raises very profound questions regarding travel behavior, that industry players and governments at all levels are struggling to address. To cite just a few of these:

- What are user preferences, and how large is the potential market demand, for various types of AVs and MaaS-applications? How many cars are needed to meet a population's mobility demand under AV/MaaS conditions? What are the effects of possible government interventions (e.g., taxes, regulations) on demand for conventional cars, AVs, and MaaS? Given user preferences and other factors, that is the right business model for various industry players, including incumbents (e.g., large automotive companies) and start-ups?

- Assuming that the transition to a largely AV- and MaaS-based transportation system will take place to a certain degree in the relatively near future, what does this mean for:
  - *Public transportation* – will it still have a viable business model? And if not, should it still be supported by governments?
  - *Land use* – will people still live in densely populated cities, or will they rather want to live in the countryside, knowing that they will be able to use their long commute time effectively in their AV?
  - *Inequality* – will MaaS enable higher mobility levels for people that are currently unable to afford a car? Will AVs help meet the mobility needs of disabled and elderly persons?

- *Energy systems* – if most people travel by means of electrified AVs, using cleverly designed MaaS; does this enable the development of a smart and clean energy grids where cars serve as power plants and back up storage of energy?
- *Congestion* – AVs enable a more efficient usage of roads than conventional cars do. But as AVs become popular, this may attract travelers from Public Transport and entice them to travel longer distances (see *Land use*); what is the resulting effect on congestion?
- *Infrastructure investments* – should the government still invest in highways and other roads, given that even if congestion persists in the AV/MaaS era, people may not care that much, since they will be able to use their travel time effectively?
- *Transport policy* – should the government adopt a 'laisser-faire' attitude regarding AV/MaaS-technologies, or should it take the lead in designing new rules and regulations for these technologies and for the transport system at large?
- *Models* – currently, an interconnected series of transport models is used by governments to predict traffic flows, mobility patterns, and the effect of transport policies. These models do not yet incorporate AVs and MaaS. Can we adapt these models to make them useful for the AV/MaaS-era (and: how?), or do we need a completely new model system?

As said, this is just a sample of the types of questions that industry players and policy makers – and of course scientists – ask themselves. And you can help answer them! To be honest, there has not been a more interesting time to do your graduation work in Transportation than today. In case you are interested in this topic, we have the supervision capacity to enable you to do important work on a fascinating subject, in a group that has considerable international visibility in this area. We have recently supervised graduate students working on these type of projects while doing internships at SITO (a Finnish MaaS start-up), the Netherlands Institute for Transport Policy Analysis, and other parties.

We have connections with external parties that have great interest in this type of work (e.g. Ministry of Infrastructure and the Environment, Dutch Railways, the Rotterdamse Mobiliteits Centrale, Significance consultancy); and of course you are free to contact relevant parties yourself. (note that it is not necessary to have an outside party involved, if you'd rather do an internal project.)

You are especially invited to contact us if you plan to do a research project with a (partly) quantitative scope. With this we mean that we are particularly interested in work that has an empirical, statistical component and/or some form of mathematical analysis (not necessarily choice modeling!). But also if you have other ideas, you are more than welcome to contact us.

We look forward to hearing from you!