Internet of Things and the Economics of Shared Mobility

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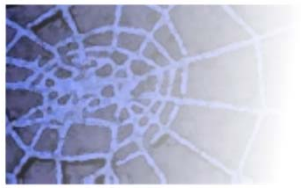
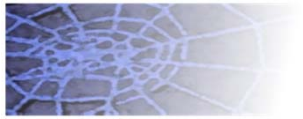


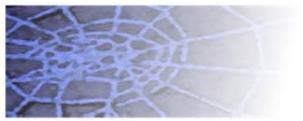
Internet of Things (IoT)

- For intelligent transport systems, smart water, waste management systems, or smart electricity grids the challenge is to cross-fertilize the traditional physical infrastructures with information and communications technology (ICT).
- Significant examples can be found in the organization of microgrids, networked/autonomous driving, low power networks for smart cities, energy efficient buildings, machine-to-machine networking in agriculture and numerous new applications in traffic logistics.
- From a network economic point of view understanding the complementarities between innovative physical network services on one hand and the required virtual networks on the other is of particular importance (Knieps, 2017a, 2017b).



Potentials of shared mobility markets

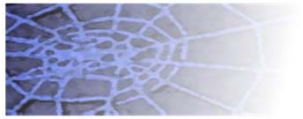
- Shared mobility may be characterized as an “envelope concept” focusing on innovative transportation services provided by a combination of ICT with infrastructures, transportation systems, operator platforms, and fully automated (driverless) vehicles, based on real-time and location-based data logistic management.
- Physical shared transportation services: Car sharing, bike sharing, ride sharing, ride sourcing services/Transportation Network Companies (TNC), microtransit, bus-on-demand services, shared taxis)
- Complementary virtual networks: based on sensor networks, mobile communication, big data analysis and interactive machine-to-machine communication (IoT) gains importance.



Virtual networks for shared mobility

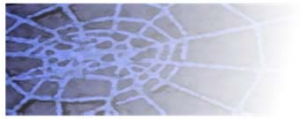
The heterogeneity of virtual networks for different shared (physical) mobility services is based on three pillars:

1) All-IP based real-time and adaptive broadband communication networks
2) global navigation satellite systems and their overlay position correction network
3) the interoperability of ubiquitous sensor network applications, as they form the ICT basis for a multitude of applications that are important in shared mobility



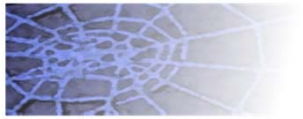
Intermodal shared mobility markets

- An important consequence of shared mobility is the convergence of intramodal transportation markets towards intermodal shared mobility concepts.
- The traditional perspective of considering rail transport, bus transport, and car transport as separate markets is shifting, making way for the concept of markets for shared mobility services.



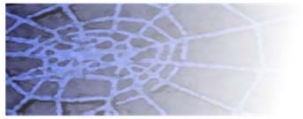
Free entry and competition in shared mobility markets

- Due to app-based ICT innovations services provided by taxis, private-hire vehicles and ride sourcing services/TNCs (commercial transport apps) are converging and they belong to the same relevant market for on demand shared mobility.
- Entry regulations via licenses, geographic restrictions and fare setting for taxis are not only contrary to the general principles of open markets, but also cause artificial regulatory market splits compared to private-hire vehicles and ride sourcing services (OECD/ITF, 2016c, p. 6).



Competition for subsidies of public shared mobility services

- The comparative advantages of different forms of shared mobility services are not only relevant in densely populated urban areas, but also in rural areas with low population density. A major change is that the concept of “public transport” is no longer limited to scheduled services, but can also include on-demand mobility services (OECD/ITF, 2015c).
- In the context of a transparent bidding procedure, the most cost saving public mobility service can be chosen, exhausting the comparative advantages of scheduled mobility services versus on-demand mobility services depending on the local/regional demand circumstances and thus minimizing public subsidies.

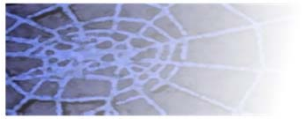


Technical regulations and consumer protection

- Technical regulations in shared mobility markets focusing on health and safety as well as insurance and consumer protection through adequate laws and technical standards are gaining increasing relevance and raise controversial debates to what extent additional rulings are necessary (Transportation Research Board, 2015, pp. 62-71).

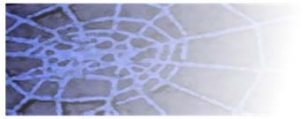
- Other issues regarding the interaction of public and private spheres are parking and access to public space, both for private businesses and for non-profit purposes with competing operators and transportation services as well as taxation on shared mobility.

- Data sharing (open data), data privacy protection and cybercrime protection are also becoming more relevant. Of particular relevance is safeguarding privacy in the context of location-based mobility data (OECD/ITF, 2016b, pp. 21-26; OECD/ITF, 2015b, pp. 33-58).



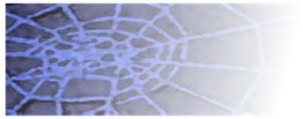
Shared mobility simulations studies (1)

- Shared mobility simulations were carried out for Auckland, New Zealand's largest city (OECD/ITF, 2017a), for Lisbon, a mid-sized European city (OECD/ITF, 2015a, OECD/ITF, 2016a) and a follow up study for the greater Lisbon Metropolitan Area (OECD/ITF, 2017b), and for the Helsinki Metropolitan Area in Finland (OECD/ITF, 2017c).
- Different scenarios are considered, differentiating according to whether all private cars are being replaced or only a subset, whether all public transit trips with busses and rail continue or whether bus trips also are replaced by shared on-demand mobility services.



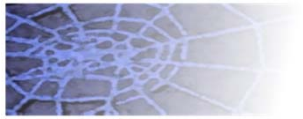
Shared mobility simulation studies (2)

- In a scenario where all private car trips are replaced by shared taxi or taxi bus and all other trips are taken via public high capacity transit, walking and cycling, the simulation studies all arrive at the same conclusion: congestion is strongly reduced or disappears completely, and pollution is also strongly reduced.
- But even if only 50%, or, respectively, 20 % of private car trips are replaced by on-demand shared mobility services and the bus services continue, there is still a significant reduction of congestion and CO_2 to be expected



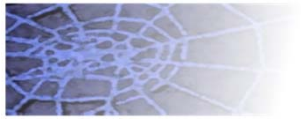
Get the bandwagon rolling: The role of pilot projects

- “Kutsuplus”, the world’s first pilot project providing a fully automated, real-time on-demand public minibus service with flexible routes and virtual stops started in 2012 in Helsinki.
- In the meantime potentials for Kutsuplus-type bus-on-demand services are also considered in other towns; examples are St. Louis and a ride-pooling-project in Hamburg, starting on January 2019
- Two topical initiatives in Switzerland are the ride sharing systems “Taxito” and “Publiride” enabling non-profit oriented peer-to-peer car sharing based on publicly subsidized app or SMS activated electronic display boards located at bus-stops (Publiride), or, respectively, a registration system operated by the Publiride platform provided by the public “PostBus Switzerland”.



Conclusions

- For the US O`Toole (2017) expects that during the next decade shared driverless cars will become a superior alternative for publicly funded transit services in most areas outside the big cities.
- Although the future of shared mobility markets is unknowable, it can be expected that path dependency of traffic infrastructures, differences between topography, the interrelations between urban and rural areas etc. will result in various shared mobility concepts.
- The differences between dense urban areas with high quality public transport and non-existing demand for high capacity public transit in rural areas will lead to a variety of different mobility concepts (OECD/ITF, 2018, p. 31).
- But the differences between urban and rural areas are beginning to blur where urban services are expanded to serve wider metropolitan areas around the cities (OECD/ITF, 2017b). Thus the focus shifts to scaling up shared mobility services to the whole of the Metropolitan area, and new types of shared services arise. Shared taxis or taxi buses can provide feeder services complementary to existing high-capacity public transport networks (e.g. metro and rail lines).



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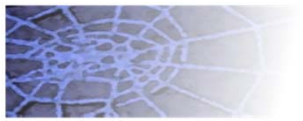

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