
Full Paper: Holistic mobility solutions for urban non-core areas

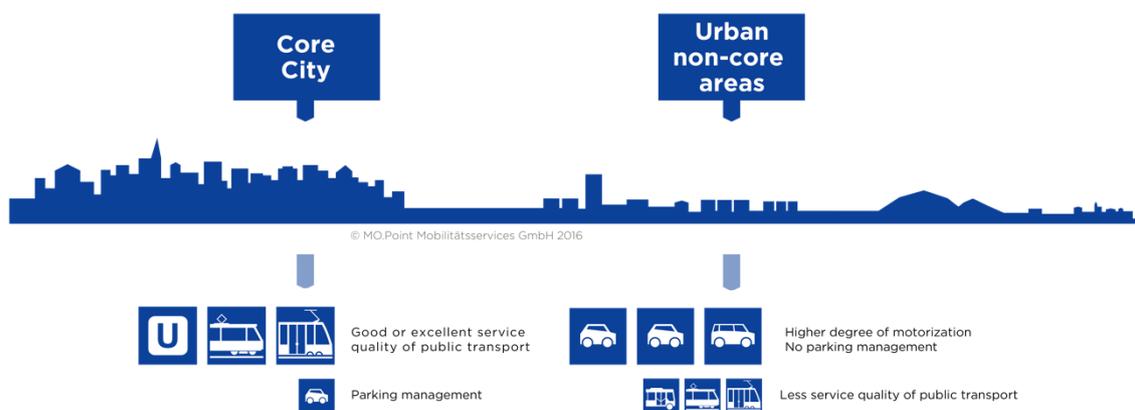
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*A prerequisite to providing attractive MaaS offers is a variety of mobility solutions, which are limited to urban centers in most European cities. There, population density is high and private operators can expect a high frequency of use. In contrast, people living in **urban non-core areas** are heavily reliant on cars, resulting from a low(er) public transport service quality and a lack of alternatives. In this contribution, we argue for an integrated approach. With regard to climate change mitigation and social inclusion, the digital integration of different mobility services for urban non-core areas has to be combined with their physical integration and accompanied by push and pull measures in urban policy and planning. To win inhabitants for alternative mobility services it is important that public and private stakeholders work together in marketing and communication. The insights are based on the European research project “OptiMaaS”¹, funded by [JPI Urban Europe](#)², which focuses on strategies to implement MaaS offers in urban non-core areas.*

1. Purpose & Background

Spatial characteristics of urban core vs. non-core areas

The availability of mobility offers and the predominant spatial structures largely determine citizens’ mobility behavior.³ In particular, urban non-core areas continue to be heavily car dependent. At the same time, we observe a lower service quality in public transport (PT) there, resulting from long distances to the next station, long intervals or shorter operating times. On-street parking is often free of charge and road infrastructure is focused on car traffic, while walking and cycling networks are often interrupted or less direct, impacting the attractiveness of these modes.



Challenges of applying MaaS schemes in urban non-core areas

The prerequisite to providing attractive MaaS offers is a diversity of mobility solutions provided by **transport service providers (TSPs)**. In recent years, free-floating car-, bike- and e-kickboard-sharing have emerged in major European cities. In most cases, their areas of operation are restricted to urban centers, where population density is high, and operators expect high(er) frequency of use and revenues. A recent study showed that trips with free-floating carsharing amends and replaces trips

¹ <https://www.optimaas.eu/>, accessed on 12.11.2019

² <https://jpi-urbaneurope.eu/project/optimaas/>, accessed on 10.11.2019

³ See e.g. Dangschat, Mayr, Segert, et.al, Der Milieu-Ansatz in der Mobilitätsforschung. Ausgewählte Ergebnisse aus dem Forschungsprojekt mobility2know_4_ways2go; Wien, 2013, Beckmann, Hesse, Holz-Rau, Honecker; Stadtleben - Wohnen, Mobilität und Lebensstil, Verlag für Sozialwissenschaften, Wiesbaden, 2006

with PT⁴, pointing to an important issue: In cities' core areas, new mobility services compete with PT, but there is a lack of them in the urban fringe, where they might improve transport service quality.

For the **user side**, numerous studies⁵ on shared mobility show a quite clear socio-demographic picture: Users, especially of car- and bike-sharing, tend to be younger, male and white, with higher levels of education and income than the average population. These user groups are relatively heavy users of PT that walk and cycle more often than others.⁶ Currently, shared mobility seems to be primarily a concept for population groups that already have plenty of mobility options.

For long, **city governments and traditional public transport organizations** (PTO) acted in a stable environment and TSPs were well known. Nowadays, political processes, policy and decision-making hardly keep track with the fast-moving operator landscape. Legal frameworks in urban and transport planning are lagging behind and legal guidelines and steering-instruments only emerge slowly in the highly dynamic field of mobility. Different corporate cultures and development speeds increase the hurdle that private and public stakeholders establish partnerships on MaaS schemes.

MaaS and multimodality in Vienna

According to the Urban Mobility Plan 2025⁷, the goal of the City of Vienna is to reduce the share of car traffic in the modal split to 20% by 2025⁸. Besides the emphasis on PT, walking and cycling, the City of Vienna recognizes that shared mobility broadens transport options and decreases the dependency on privately-owned cars. In recent years, there have been many activities by the municipality to push for multimodal offers and mobility points (the physical alignment of different mobility services), public charging infrastructure as well as station-based car- and bike sharing. The objective is to create and sustain a vivid market for a variety of mobility services and at the same time having the options to steer the market according to public needs and policy objectives. In 2017, Wiener Linien, the city owned PTO, has launched the mobility platform 'Wien Mobil', where PT, the city's public bike sharing scheme, different car- and kickboard-sharing services as well as rental car-, taxi- and parking services are integrated in routing information. Only few services can be booked directly on that platform yet, but it is planned to deepen the levels of integration. At the same time, legal frameworks changed and allow the resales of non-personalized PT-tickets by third parties, under the precondition of using the APIs of the Wien Mobil platform in order to access information, booking and payment services of the PTO. The centralized access is expected to guarantee control on tariffs, cooperation depth between the PTO and private resellers and mobility-related data. When it comes to MaaS schemes, the City of Vienna takes the role as a mobility integrator and at the same time attempts to open the market for others.⁹

2. Methodology

The OptiMaaS project team brings together the diverse **stakeholder** groups, like urban planners, mobility operators, IT-integrators and researchers and provides foremost opportunity for **dialogue**. In addition, an international expert panel, consisting of mobility experts from city governments, public and private operators and IT-experts meets twice a year to discuss key aspects of the project. Further, the OptiMaaS project team has conducted semi-structured interviews among stakeholders on the national and local level for Vienna and the Oslo region, in order to get detailed information on the legal framework conditions for MaaS schemes.

⁴ ISOE – Institut für sozial-ökologische Forschung (ed.), Share, share - Wissenschaftliche Begleitforschung zu car2go mit batterieelektrischen und konventionellen Fahrzeugen, p.57, Berlin, 2018

⁵ E.g.: ACEA, Carsharing: Evolution, Challenges and Opportunities, London 2014, infas GmbH, multimo-Vertiefung Carsharing, Bonn 2015, City of Vienna, Carsharing Wien – Evaluierung, Vienna 2015

⁶ Le Vine, Zolfaghari, Pola, Carsharing: Evolution, Challenges and Opportunities, Centre for Transport Studies, Imperial College London in 22nd ACEA, London, 2014

⁷ <https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008443.pdf>, accessed on 31.10.2019

⁸ In 2013 the share of car traffic in the modal split of the City of Vienna was 28%

⁹ Compare: Smiths, Sochor and Karlsson, Mobility as a Service: Development scenarios and implications for public transport in: Research in Transportation Economics, September 2018

To identify potential target areas, suitable for sharing- and on-demand services in urban non-core areas, a geographic information system (**GIS**) **analysis was performed** for Vienna, intersecting data on the density of housing and the Public Transport Service Quality Levels. Similarly, the methodology was applied for the Oslo Region. On the **supply side MaaS offers** have been classified into the roles of operator (mobility service provider), integrator and transport service provider. The underlying **types of business models were analyzed**. The approach was further investigated, combining the roles within the MaaS scheme with the different types of areas (Core- / Non-core / rural areas). Besides the digital integration, business models for mobility points were investigated.

Desk research on **mobility behavior and user needs, policies and planning guidelines**, in combination with results from surveys conducted in previous research projects in Vienna¹⁰, builds the basis for the OptiMaaS Project. Based on the insights, personas methodology was applied to better understand specific characteristics and needs of target groups and to deduct user requirements for a multimodal mobility solution. A simulation model for mobility demands and effects is being set up, based on data on the transport system in Vienna. To test all the tools and processes that are developed in the project, different user labs will be set up, in which a wide range of different methods, like co-creation workshops, customer journeys, surveys, back-casting and thinking loud will be applied. The integration of user labs will be performed in 2020 within the OptiMaaS project.

3. Findings

Business models and cooperation

The value propositions of merely digital integrators and the MaaS service providers are independent of physical locations and can be applied for urban non-core areas too. In contrast, the value proposition of TSPs is always dependent on the access and availability of vehicles. Revenue models of TSPs based on vehicle utilization are economically less attractive in less densely populated areas. Based on the GIS data analysis, those areas were identified that are more attractive for operators and where additional mobility services could improve PT quality. Nonetheless, incentives, alternative revenue models or other forms of organizations are needed to put shared mobility and on-demand services in urban non-core areas in place.

Cities or public management can offer incentives to private TSPs within MaaS-schemes. These can be the access to a larger customer base, marketing and communication, integration into (public) digital platforms, subsidies in form of assets or financial support and/or access to public spaces (e.g. via concession agreements). **Alternative revenue models for TSPs** are fixed utilization rates (e.g. company car-pooling), loss guarantees (e.g. municipality pays the operation costs not covered by tickets) **or to operate** mobility services on behalf of contracting bodies (e.g. real-estate developer, building operator, hotels). Another approach is, to decide that sharing and on-demand services are **part of public services** and mandate operators via public procurement and tendering (e.g. bike-sharing schemes), or the PTO operates the services itself (e.g. TIM Graz, Austria¹¹). **Alternative organization forms** such as e.g. peer-to-peer carsharing, non-profit or voluntary work (e.g. carsharing-clubs) and collective vehicle ownership (e.g. co-housing) can improve mobility options in non-core and rural areas, but due to their lower degree of organization they are less suitable to be integrated into MaaS-schemes. To overcome the hurdle of small(er) revenue streams, close cooperation between public bodies and private TSPs is recommended, using the above-mentioned incentives and revenue models. Investments, revenues and risks can be shared between public and private partners.

Framework conditions and policies: Push-measures

¹⁰ [pro:motion, https://www.smartertogether.at/](https://www.smartertogether.at/), accessed on 30.10.2019

¹¹ <https://www.tim-oesterreich.at/graz/>, accessed on 30.10.2019

The acceptance of MaaS offers by the users depends to a large extent on the attractiveness of the alternatives to private vehicle ownership: they will be accepted, if privately owned cars are equally or less attractive compared to other means of transportation. The availability or absence of car parking has a strong influence on mobility behavior.¹² Therefore, it is recommended to implement parking management and regulations and to decrease the capacities of free on-street parking in urban non-core areas. The incomes from parking management could be earmarked and used for the basic financing of more sustainable modes of transport in the same area. One leverage in urban development areas is to decrease the amounts of parking to be constructed and use the released investment costs to finance alternative mobility services (e.g. mobility funds of the City of Vienna¹³). Another measure is centralized, shared garages that create equal distances for all inhabitants to reach different modes of transport. Other strong push-measures for existing urban areas are car-free zones (e.g. following Barcelona's superblocks model) or congestion charges respectively city tolling, which are successfully implemented in many Scandinavian cities.

Addressing user needs: Pull-measures

Although the population of urban non-core areas tend not to be the most active users of shared mobility services yet, research showed¹⁴ that many people are willing to use other modes than the private car given that there is an alternative opportunity. Alternative transport modes are accepted for most journeys if they are easy to reach, convenient and do not lead to unnecessary delays. Unfamiliarity of users with certain shared mobility schemes appears as a big obstacle. The digital integration of different services into MaaS platforms makes the services accessible and easy to use for technologically adept people. Nevertheless, it does not compensate the need of attractive physical mobility offers. The physical bundling of different services in one place, so called mobility points, simplifies the access and improves the convenience when changing from one mode of transport to another. However, shared mobility offers are sometimes perceived as unnecessary, because people already have a vehicle in the household. Therefore, they fear the lack of availability or additional costs. **Awareness building** for sustainable mobility modes should already start in (pre-)schools. **Mobility marketing** is needed to promote MaaS services and to make customers aware of the availability and benefits of alternative transport offers. Besides money savings, reduction of travel time and increase of travel convenience are most important arguments.

4. Implications

Stakeholder dialogues enable a holistic approach to MaaS.

In order to identify the most efficient way of managing, financing and distributing mobility offers for urban non-core areas, we suggest a broad dialogue between city management, public and private TSPs, mobility service providers and integrators. Costs, risks and revenues can be shared. The weak point in urban non-core areas is mostly the missing diversity of mobility services. To amplify the offered mobility services, it is necessary to incentivize private TSPs and/or to subsidize services. At the same time, the strong integration of shared mobility and on-demand services with PT can raise the attractiveness of public transport, making it more efficient and flexible.

It is key to embed MaaS offers in the overall urban and transport planning.

To enhance the dissemination of MaaS offers in non-core areas, they should be combined with push and pull measures of city governments. It is recommended to align push measures, such as parking management, car-free zones or city tolling with the implementation of multimodal mobility services. On the other hand, incomes from parking management or savings in the construction of parking spaces could be earmarked and used to finance more sustainable mobility services. If it is the public

¹² <https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008443.pdf>, accessed on 31.10.2019

¹³ <https://www.wien.gv.at/verkehr/mobilitaetsfonds/>, accessed on 31.10.2019

¹⁴ <https://www.smartertogether.at/>, accessed on 30.10.2019

interest to guarantee fair access to mobility offers at affordable costs and to reduce traffic related environmental impacts, every city must define its guidelines and boundary conditions for all actors in the MaaS scheme to steer mobility development accordingly.

Get into dialog with citizens.

Dialogs with citizens are important to understand the needs, fears and wishes of users and non-users. Often people are not aware of alternative mobility offers and often they are not easy to use. To optimize user experience, we recommend combining digital service integration (MaaS platforms) and physical integration (mobility points). The main challenge is to communicate MaaS offers constantly in order to raise awareness and to promote the availability and benefits to a broad range of different target groups. To strengthen the position of MaaS as a concept, it is recommended to integrate offers on all levels and to cooperate especially in marketing of different mobility services available in the city.