

Searching for the potential of MaaS in commuting – comparison of survey and focus group methods and results

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Abstract

There is abundant statistical data available on commuting behavior and its determinants. However, the existing data on the prospects and the potential of MaaS in commuting is highly limited. To fill the gap we have collected new kinds of commuting data using focus group method and a mobility survey on commuting behavior in Finland. The purpose of this paper is to discuss the kinds of information and conclusions that can be obtained from these two complementary data collection methods.

The study is part of the project Smart Commuting – Smart and Mobile Work in Growth Regions that explores new ways of combining work and life on the move with intelligent and sustainable transport system services. The project aims first, to identify the changing needs of mobile workers. Second, the project aims to increase sustainability of mobility by supporting and implementing new mobility concepts. This helps scale up our business partners' operations, evaluate how these new concepts meet the evolving needs of mobile workers, and discover common grounds for the city planning policies¹.

KEYWORDS *MaaS, mobility, service, commuting, survey, focus group*

1. Background

Mobility-as-a-Service is a new way of thinking and implementing transportation services. MaaS Alliance defines MaaS as the integration of various forms of transport services into a single mobility service accessible on demand (<https://maas-alliance.eu>). Typically, a MaaS includes at least 1) integrated multimodal journey planning, 2) selection of alternative mobility modes and 3) route choices and booking or ticketing (König et al. 2016). Also, different package and subscription discounts and help desk services are often available. In future, transportation of goods and other additional services may become part of MaaS.

In a MaaS network, there is an operator that is responsible for the integration and the provision of flexible services with the customers, and the service providers that offer their transportation services that are integrated in the operator's system. Some of these services are part of the public transportation while others may be offered by private firms. Fast evolving digitalization and new transport services (e.g. Uber) have further increased the possibility to combine different modes of transport into MaaS. These new alternatives are aimed to solve the last-mile problem. (Haahtela et al., 2017)

1 This project is a part of the ERA-NET Cofund Smart Cities and Communities (ENSCC), which was established by the Joint Programming Initiative (JPI) Urban Europe and the Smart Cities Member States Initiative (SC MSI). This two-year project started in April 2016 and will last until May 2018.

To enhance MaaS' development, we collected data on the factors that affect the individuals' choice of the daily commuting mode. Our second goal was to recognize the kinds of changes and future services would be needed by individual commuters to change their present mode of mobility. A special interest is related to the topic of shifting from private car(s) to more sustainable and environmental friendly commuting modes.

The research methods used in our study are a survey and focus groups. The survey data on the daily commuting modes is derived from more than 500 answers in the three countries involved in the Smart Commuting project: Finland, Switzerland and Austria. The focus group were organized earlier and their results were used to get new insights and ideas for the survey. In particular, the purpose was to design the initial survey questions on the basis of the focus group results. If the initial survey question or set of question did not seem to be able to reveal some phenomenon, the survey questions were modified or added in a way that they would reveal these incidents. We also investigated the difference between the results of the focus groups and those of the survey: what kinds of topics could the focus groups reveal that a survey cannot, and vice versa: for what kind of questions is a survey more appropriate data gathering method in comparison with the focus groups. Our goal is to further develop the empirical methods for studying commuting and mobility.

The paper is structured as follows. In Chapter 2, we describe the methodology and the main findings of the country surveys. In a similar vein, the method and the findings of the focus groups are discussed in Chapter 3. Chapter 4 cross-evaluates the main features of the two methods and their ability to generate complementary information related to individuals' commuting behavior. The paper ends with conclusion and discussion in Chapter 5.

2. Survey

Method

By definition, survey methodology studies the sampling of individual units from a population and the associated survey data collection techniques, such as questionnaire construction and methods for improving the number and accuracy of responses to surveys. Survey methodology includes instruments or procedures that ask one or more questions that may, or may not, be answered (Beam, 2012). Our survey aims to highlight the structure and the diversity of the present commuting modes as well the changing needs of mobile workers in three countries: Austria, Finland and Switzerland (Basel). The questions of the questionnaire are focused on the following themes (no. of questions): respondents' background (18), commuting environment (5), present modes of commuting (13), satisfaction and motivations (5), and the future modes of commuting (3). The survey questions and the report are available in www.smartcommuting.eu/publications deliverable D1.2 *Survey results of the mobile workers' needs*.

The geographic focus of the survey differs in each country, which in part reflects the policy priorities and needs in developing sustainable commuting. Accordingly, the resulting data is based on three identical (region-adjusted) commuting surveys in Austria (N = 531), focusing the whole country, Finland (N = 523) focusing on the Finnish Growth Corridor and Switzerland (N = 549) focusing on Basel Region. Owing to the large sample size the data enables compare the descriptive statistics across the three regions/countries and - based on the statistical clustering methods - identify commuting profiles within each country/region and across the three countries/regions.

The Finnish data (forced n=521) is collected from the Growth Corridor Finland using the internet panel method of Taloustutkimus in December 2016. Based on representative sampling, half of the Finnish responses were collected from municipalities and small towns, whereas the other half are from the four large cities (Helsinki, Espoo, Vantaa, Tampere) located in the Growth Corridor Finland (see <http://suomenkasvukaytava.fi/briefly-in-english/> for more details on GCF). Along with place of living, representative sampling was applied to other central background variables; age and gender. Owing to the sampling method and the characteristics of the panel almost all responses are correct and completed.

The main survey results

Many of the findings of our survey are consistent with the earlier findings of the national commuting surveys and statistics. The dominant mode of commuting is private car which is used by over 50% of the respondents (see Figure 1). The use of a private car is nearly a de facto in rural areas, while public transport is common in urban areas. Another statistically significant finding was that men use more private car than women in commuting, while women tend to use more public transport. Household income is positively correlated with the use of private car.

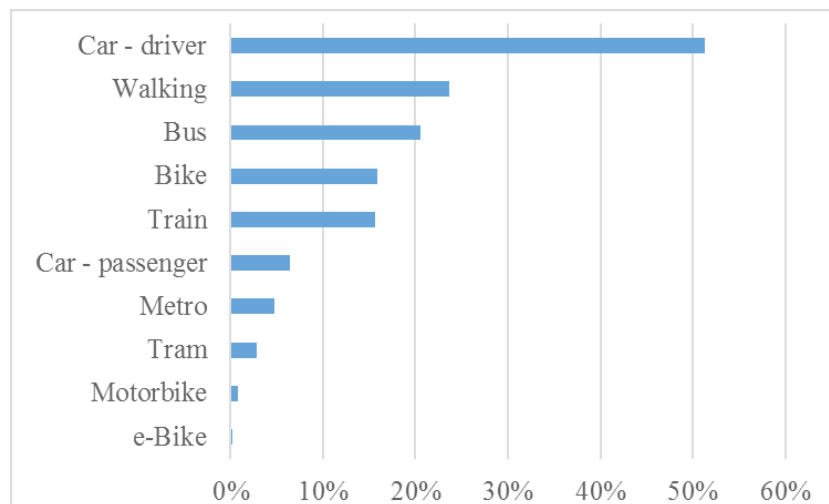


Figure 1: Distribution of the commuting modes in Growth Corridor Finland

While Finland is characteristically a country with low average population density and long distances, the survey showed that the average commuting distances and time are very similar in all three regions. The place of living defines strongly the mode of mobility. Regardless of where people live, most of the workplaces are in cities. While working is generally considered as a useful activity during commuting, it is surprising that only 6 % of the survey respondents actually work during commuting. Using electronic devices for leisure is by far more common (27 %), followed by reading (12 %) and calling (11 %)².

² The open question concerning the kinds of tools, infrastructure or services is needed in during trips gave a number ideas for improvement. Passengers require more quiet spaces for working and soundproof places where they can make company calls. In the buses, people would first need a place to sit. Also, some respondents wrote that their employees should provide them better tools for mobile work. For example, using a laptop while sitting in a bus is not possible while working with a tablet would be. Also, some vehicles lack good internet connections and power sockets. Some employees would require a permission to work during commuting. Also, according to some collective agreements, working during commuting is not regarded as working. Then, some respondents said that they would need some smart alarm system to ensure that they get out the bus or train on the right bus stop.

On aggregate, we found that commuters are satisfied with their present mode of mobility: more than 80 % are satisfied or very satisfied. In general, the satisfaction is higher in Growth Corridor Finland than in Austria and Basel region (see Figure 2). Based on the ANOVA tests, there is no interdependencies between the levels of satisfaction and the modes of mobility. Dissatisfaction is not associated with specific modes of mobility either.

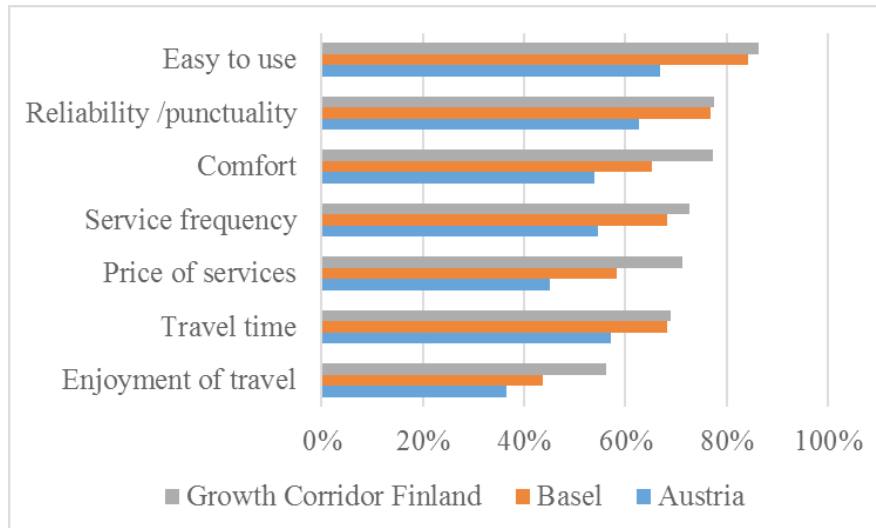


Figure 2: Commuting satisfaction in different case areas.

The most significant drivers to encourage commuters to use more public transport as 1) more frequent service, 2) decreased travel time, 3) cheaper tickets, 4) better connecting services, 5) tickets provided by employer and 6) improved reliability of public transport. It is very common to combine other activities to commuting. Shopping is by far the most common: nearly 80 % of the respondents combine shopping with commuting often or sometimes. Also, social activities, leisure or sports or using public services are combined with commuting trips at least sometimes. Education (17 %) and picking-up someone (15 %) are less common activities.

We also asked motivations for using different modes of mobility. Car users prefer flexibility, speed, reliability, privacy and the opportunity to transport goods. Also, bad access to public transport and good availability of free parking motivate car users. Commuters using other modes – public transport, cycling and walking – have very similar motivators. They justify modal choices by environmental concerns, price, flexibility, health, speed and flexibility.

3. Focus groups

Method

Focus group is a form of qualitative research data collection method consisting of interviews and discussion in an interactive group setting in which a group of people are asked about their opinions, beliefs, and attitudes towards a selection of topics. A typical size for a focus group is six to ten people led through open discussion by moderators. The optimal size of enough participants is needed to generate rich discussion, but the number has to be limited so that none of the participants and their ideas are left out. When well executed, a focus group creates an accepting environment that puts participants at ease allowing them to thoughtfully answer questions in their own words and add meaning to their answers. Also, in comparison with the individual

interviews, the discussion between other participants enriches others' thoughts. While surveys are good for collecting information about people's attributes and attitudes, focus groups provide understanding at a deeper level (Fern, 2005).

We arranged six focus groups in autumn 2016 in the growth corridors of Finland: two in October in Hyvinkää in the Growth Corridor Finland (a region between the capital area and Tampere region) and four in Turku in November in the southern growth corridor (region along the southern coast from Turku to capital area and Hamina). All 37 participants of these focus group sessions were selected by invitation. In Hyvinkää, participants were selected so that they work in the Growth Corridor Finland and commute from a distance of at least 50 km either by car or by different modes of transport. The participants in Turku, invited by the city representatives, were more heterogenous in terms of the commuting distance. In all six focus groups, the participants had higher education level than the population on average. Participants also had more children and larger family sizes than average Finnish population or those answering the survey.

The description of the focus group sessions

Each focus group session was divided into two sections. In the first section, we gathered information about the present daily commuting habits of participants. In the second section, we investigated how the forthcoming Mobility-as-a-Service and other similar concepts could change their personal and family commuting and mobility behavior. Each focus group lasted between 30 to 60 minutes.

In the first section of the focus group, each participant was asked to illustrate and draw a simplified picture of his/her typical daily commuting. The reason for using a drawing was to make people feel more relaxed when describing their commuting. It was also easier to discuss and share the own contribution with others if the picture can be used as a framework for explanation. To encourage the participants, a simple illustration model picture was shown to the participants as an example. The picture was supposed to show 1) the modes of transportation, 2) the distance and 3) time taken by the commuting mode, and also to illustrate 4) what other activities (e.g. shopping, dropping kids to school, sports and social activities) were combined with commuting.

After that, participants presented their daily commuting patterns to others and told *why* they had chosen the alternative or alternatives they were using. This discussion was recorded so that both the drawn illustrations and their explanations could be combined for the analysis. These explanations also revealed the motivational aspects affecting individuals' choice of commuting mode.

The second section started with a short video that explained the Mobility-as-a-Service concept to the participants. After that participants draw and wrote in their pictures the possible changes that MaaS could have in their commuting patterns. The participants were encouraged to discuss different alternatives. During the second section we also applied a threshold method (See figure 3). We asked what kind of services participants would like to have in future that could change their mobility patterns. To stimulate their thinking, we suggested several different new services and ideas, e.g. car sharing services, ride sharing, grocery home delivery and using electric bikes. The purpose was to find out what kinds of services would be the 'threshold services' that would make them change their commuting patterns. Of special interest was the kind(s) of solutions that would be needed to change from using private cars to for more sustainable alternatives.

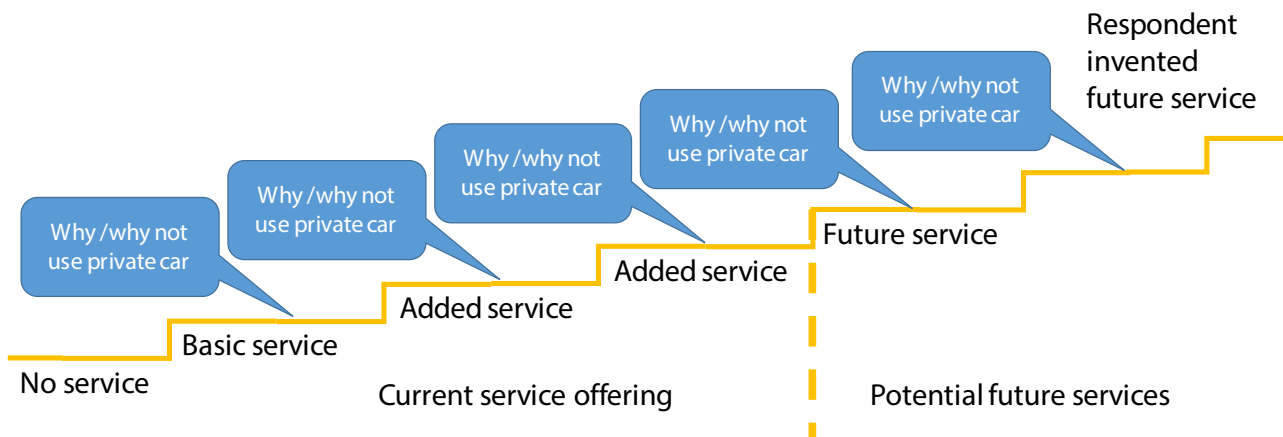


Figure 3: Threshold method highlighted

We recorded each focus group session and collected the participants' drawings. Then, we linked together the drawings and recordings. In the last stage, we analyzed and summarized the findings.

Focus group findings

Commuters seem to choose either walking or bicycle for their daily commuting if the travelling distance is at most 3 - 4 kilometers. In Finland, usually after the distance of 2 kilometers, half of the trips are already made by car (Liikennevirasto 10/2015). If the commuting distance was longer than 3 - 4 km, commuters used public transportation or private car. Typically, private car users told they save significantly time, half an hour or more, when using their own car instead of public transportation.

Commuters' children saved time when the parents either took them at school or picked them up by car. If the family had not used the car, their children would not have enough time to come home, eat something, do the homework and go to their leisure activities: using private car simply saves so much time. Also in the outskirts of the city, the headway between the buses was considered too long.

It was noticed that there are significant annual fixed costs related to owning a car, but the variable costs of driving additional kilometers is low. Once the car is bought, it is used also for those trips that could be made by other modes. Using a private car is even in some cases less expensive than public transport. For example, if someone needs to buy two different monthly local public transport tickets and then also a monthly ticket for train, using own car is not only faster and more flexible but also less expensive.

There were also different work-related topics that supported use of the private car. A common reason for commuting with a car was that participants needed it in their work. Different external meetings and sites were not easily accessible without own car. Sometimes a private car is the only mode of commuting allowing work related phone discussions or joining in teleconferences.

Some participants said they *like* driving a car and would therefore anyway prefer it as a way of commuting. Driving a car and listening to their favorite music gave them some free time to relax. Some commuters also considered the health benefits of walking or using a bicycle as part of the transport chain. For them, also safety and aesthetics determined the chosen route.

Another finding was that commuters having children combined often other activities with their commuting. The two most common tasks were bringing kids to kindergarten or school and doing groceries. The third

most common activity was sports. Without these 'side-tracks' some of these people would have used public transport as their main mode of transport.

When discussing their daily commuting and choice of transport mode, it became clear that choosing the place of living and the choice of commuting are related to each other. Some families rather live outside the city area in a larger house and use cars for daily commuting and other activities. There are families who live in smaller apartments closer to the city center and use public transportation for daily commuting. Both commuter groups justified their choices by their values: some prefer more space and freedom while others want to live closer to the services and to support green values.

The satisfaction to the chosen mode of transport was on average good. For longer distances, train was considered a good alternative as the time spend on train was often used either for working or used as spare time. The most significant challenge for long distance commuters in the growth corridors was the last mile problem and matching the timetables of different commuting modes. The latter is partly due to the fact that train and bus stations are often not in the same location, nor even in the city center. Also, buses leave the passengers to the bus stops at highway instead of driving to the city center. Therefore, travelling between two cities in the corridors is difficult unless at least another end of the trip is close to the bus or railway station.

Another obstacle is that to speed up trips between larger cities, trains pass often the smaller cities. Some growth corridor commuters must take a car to get to the train station, and sometimes even drive to the opposite direction of their final destination. In these cases, it becomes easier to drive directly to the destination.

Needs for future commuting and MaaS

When thinking about future commuting possibilities and MaaS, participants mostly had very limited views of the future and how their mobility patterns would change. Most of the ideas were related to the improvement of some present modes of transport, for example, having smaller headways in public transport. Also, many of the ideas presented were already implemented by some public transport authorities.

The most common need was to have a mobile application that would integrate all the different modes of transport, show different vehicles in real time and allow buying ticket for the whole trip. Also, possibility for re-routing in case of delays was high in the list. Other typical suggestions were:

- Real-time information on the location of the public transportation vehicles (buses, trams, trains etc.). This information could be shown in the bus stops and when the following buses are expected to arrive.
- Enhanced travel chain optimizer application that would dynamically suggest alternative travel chain alternatives if the original one is not feasible anymore, e.g. due to delays. The same application could also announce when it's time to leave the vehicle.
- A service that would tell different alternatives between the destination and current location. User could choose between different alternative travel chains based on price, travel time, CO₂ emissions etc. Also, the ability to buy the ticket for the whole travel chain from the mobile application would ease using public transportation.

Commuters hoped that buses would stay more on schedule and that the headways were shorter. Railway commuters suggested 1) silent cars for sleeping or working purposes, 2) better internet and electricity connections, 3) possibility to have a cup of coffee and a snack in trains and stations (at least a vending machine) and 4) having a gym or exercise bikes in the train. Commuters using bicycles were mostly satisfied

with the present situation. They recommended 1) better cycling opportunities and roads, 2) more and better bicycle parking lots next to the stations, 3) possibility to take bicycle into the train for a reasonable fee, and 4) use of different gritting sand in the winter to lower the risks of tire punctures.

A new national level ticket pricing system was also considered to be a necessary. The price should be based on the distance instead of the somewhat artificial zones used (or there should be more smaller zones so that the payment would be based on the price of the zones travelled). The present monthly ticket pricing should also be changed so that those travelling only three times a week would also get discounted prices. This would encourage commuters to use public transportation instead of a private car.

Brining kids to their hobbies was considered demanding and time-consuming tasks. Several parents suggested that a good new service would be to ease the transportation of kids to their hobbies. Some company could take that responsibility of that, or it could be an application or a service where people could interact and share the transportation related costs. Some parents also suggested that similar concept could be used for school transportations in the morning. The school buses common in the USA were also suggested. Another benefit would be safety, as some parents considered the way to school to be quite dangerous because of the traffic.

Commuters were not eager about ride sharing. Some argued they would feel uncomfortable in a car with a stranger. In that case, their schedule would be more dependent on others' travelling times. Ride sharing would be a viable alternative only if there were many commuters people offering rides via some mobile services. On the other hand, different car sharing models (floating or fixed stations, peer-to-peer or company cars) were seen as viable options if the prices are competitive.

Finally, there is a distinct lack of MaaS-related services, especially for the last miles. To improve the present situation, the participants using buses for longer distances suggested a service, continuous shuttle bus to city center, or some other alternative. Even in the cities new mobility solutions are needed outside the rush hour, especially in the outskirts.

4. Analysis and results

In this study, we have employed two complementary data collection methods to examine the patterns and motivations in commuting. Survey can be used to show the overall structures and phenomena of commuting related issues that can be generalized to a larger population, whereas focus groups are more appropriate for examining the motivations, complexity, and the social interdependencies of commuting at the individual levels, and in real contexts.

Both methods show that commuters are highly satisfied with their present modes mobility. Regardless of the mode, commuters prefer the same dimensions of satisfaction: flexibility, speed, reliability and ease of use. What mostly seems to determine the mode of transport is the *time difference between using a private car and other transport modes*. This became quite evident especially in the focus groups. Furthermore, if there are children in the family, and therefore more mobility needs, it is more likely that the family uses a private car to save time.

According to our survey, 51% of the commuters still use car as a primary mode of transport. While owning and driving a car has lower status than earlier, our focus group revealed that car driving in commuting is motivated by enjoyment, particularly among middle-aged and older men. Furthermore, commuters would be willing to change to shared cars if the prices and service level were right for their needs. The propensity

to increase the use of public transportation is higher among the car drivers in comparison with the whole sample. public transport a specific advantage of allowing other activities during trips: reading, working or enjoying digital entertainment during the trip. Contrary to our expectations, working during commuting is relatively uncommon.

None of the 37 participants in the focus groups had ever used car sharing or shared ride services in Finland. Only a few had ordered groceries to home. According to the survey results, commuters use less internet for seeking commuting information, booking and paying than in Austria and Switzerland. On the whole, Finnish culture is not very service-oriented. If customers bought more groceries on the web, as many already do in case of music, books, electronics and clothes, a private car would become unnecessary and time would be saved for other activities. Hence, if commuters had more experience on the different new mobility services, it would be easier to adopt and take full advantage of the 'MaaS concept'.

Overall, our separate findings show a significant potential for MaaS services. Commuters are willing to shift to public transportation, and some user groups in the families, particularly children, are unable to drive a car. MaaS with rich selection of services would provide them better opportunity for mobility. Therefore, it should be of significant public interest to enhance MaaS and simultaneously guide mobility towards more sustainable solutions.

Complementary data collection methods

In this study, qualitative and quantitative methods are combined to highlight the multiple facets of commuting. Focus group was used for exploratory purposes to understand what commuters think, and also how and why they think that way. Focus groups allow flexibility to make changes and dive deeper into more interesting topics and phenomena that arise during the conversations. The advantage of focus groups is that it provides in-depth knowledge of commuting in individual cases. This helps understand the user needs both on the individual and the household levels. Focus groups revealed several options for innovations and improvement.

Survey was used to make conclusions on the larger population of commuters. We reflected the background factors with the commuting environment, the present modes of commuting, satisfaction and motivations, and the future of commuting. For that purpose, we included multiple choices, rating scales and open-ended questions. In terms of budget, timing and the quality of data, internet panel survey proved highly effective. A distinct drawback of the survey method is inflexibility; once you have started running a survey, you cannot make changes or additions to improve it. For instance, we realized that the survey cannot go into the complexity of motivations, why families prefer private car to other modes of mobility.

Originally, our aim was to use focus groups as a tool for design of survey questions, which is also the standard handbook recommendation. The findings of the focus groups suggested that the relevant topics could tackled with highly detailed questions in the survey. This would have made the questionnaire too extensive and burdensome for the respondents, which necessitated some compromising with the research questions. Moreover, we concluded that it may be more practical to use both methods in parallel to investigate different but complementary issues of commuting.

According to our survey, only 15-25% of commuters could imagine of using the 'new modes' of commuting (car sharing, shared on-demand transport service, on-demand service or bike service). In contrast, when the same questions were asked in the focus groups, most of the participants were favorable towards them. This highlights the fundamental differences of the two methods.

When the questionnaire deals with unfamiliar and novel concepts, the respondents rather than stopping to think about the question further, tend to skip the questions or answer negatively. The context is different in the focus group sessions; participants have more time and they can be guided to think the topic from their own perspective. In our focus groups for instance, the participants first thought of and visualized their commuting patterns with a picture and text. This enabled imagine how the new concepts could be used in their own contexts. Moreover, if some service concepts were unclear, it was possible to have clarification and further information from the moderator.

The focus groups also benefit from social interaction and group dynamics. Typically, the groups seem to compose of different types of characters between 'proactive innovators' and 'passive followers'. The former generates multiple ideas and possibilities on the smart traffic services. Through their example and enthusiasm, the innovators stimulate the latter to imagine and discuss how the new services and solutions could help their commuting and life.

We notice that after three to four focus groups, the generation of new information starts to saturate. Therefore, if statistical accuracy is not needed, which is often the case with focus groups, there is no need to organize additional focus groups with similar topics and participants. If there is an opportunity and resources for higher number of focus groups, it is more productive to focus on specific user groups and themes in commuting.

Another potential use of focus groups would be to test and brainstorm some specifically targeted MaaS-related service idea with a test group. Then, after a pilot launch and test use of the service, focus groups could be used to get feedback for further service development.

5. Conclusions and discussion

This paper investigates the kinds of information and conclusions that can be obtained from two complementary data collections methods in estimating the potential of Mobility-as-a-Service in commuting. For that purpose, we examined the commuting patterns and behavior through the empirical data collected by a survey and focus groups.

According to the survey and focus group results, the commuter cannot yet identify the usability and value added of the new emerging modes and services like MaaS. However, focus group method revealed latent needs of the participants that can be solved with MaaS and related concepts. Moreover, both methods showed that the most relevant unit of analysis is not an individual commuter but the family and household which determines the prerequisites for travelling of the family members.

For future improvement and development of MaaS systems and the related services, we need more detailed information on the mobility behavior of the family members: In practice, collecting such a comprehensive data requires a mobile application that registers the log automatically. Once this data is available, it is possible to assess suitability of different modes of commuting and mobility for the households. For instance, log data enables modelling and simulating how much different existing MaaS-related services could possibly save time and ease the life in the families. Then, it can be estimated what could be the value, benefit and costs of a new services both to the customer, service providers and the society.

We conclude that survey and focus group methods complement each other. Both methods reveal that there is a demand for MaaS and new innovative Maas-related services among the users. Furthermore, the methods show that the reasons why private cars are used in commuting, are highly rational. In particular, commuting

modes and the places of living are interdependent “value issues” decided jointly within families. This interdependency also explains the high levels of satisfaction with their present modes of commuting.

The survey does not provide sufficiently in-depth knowledge that would help understand user-specific mobility needs on individual and household levels. Focus group method is more appropriate in this sense. Such knowledge on user needs and motivations are of high importance for decision makers – e.g. municipal authorities, city planners, traffic planners, transport authorities and MaaS-related service providers - when planning the sustainable future mobility with MaaS and MaaS-related services.

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From a Marketplace for Mobility towards MaaS in an inclusive region

HANS STEVENS & MARTIJN VAN DE LEUR

De Verkeersonderneming

De Verkeersonderneming (VO) is a public private cooperation of the municipality of Rotterdam, the metropolitan region Rotterdam-The Hague, the national Ministry of Infrastructure and Water Management and the Port of Rotterdam. In the national program Beter Benutten (Optimizing Use) industry, science and government work closely together to implement smart solutions: improving traffic flows, reducing congestion and making smooth travel safer, less time-consuming, cheaper and more comfortable. De Verkeersonderneming is the executive organisation for running this program in the region of Rotterdam.

An important role for MaaS in our Smart and Sustainable Mobility program

Due to the continuing popularity of urban environment and the economic strength of this region, the demand for mobility continues to rise. The current modal split, with a dominance of private car use, will have a negative impact on the accessibility and livability of the urban area in the short term. And even now, for example, the city center of Rotterdam does not have enough space for all citizens, employees and visitors, despite the increasing attention for spatial planning and infrastructure in the city. On the other side, there are problems of transport poverty. About 5 to 10 percent of the population, concentrated in some parts of the city, are more or less immobile, which means that not all people have full access to jobs, access to care, access to education and access to their social network, factors that contribute to social deprivation and loneliness.

Both issues require that a larger proportion of mobility will be filled in with other forms of mobility. These forms mainly involve modalities that require less space and less environmental impact, such as walking, cycling, clean vehicles and public transport. This will make an important contribution to friendlier living space in the inner cities, which can be used better by more people of all ages, and will make more opportunities for everyone who wants to participate in society.

In the opinion of De Verkeersonderneming, MaaS is a concept that offers a mobility solution that is seen by travelers as a full-fledged alternative of travel by car. With MaaS, travelers are able to fill in a larger part of their mobility needs by modalities that reduce the need of spatial impact and the infrastructure, because the proportion of walking, cycling, PT and car sharing will increase. The expectation of De Verkeersonderneming is that when a substantial proportion of people living and working in the urban area uses MaaS, this, accessibility and livability will improve, or at least not deteriorate. Because research shows that a positive business case for MaaS is possible (Decisio, 2017), MaaS can also offer mobility opportunities for people with less access to mobility. In this way, MaaS also increases opportunities for more people, which contributes to an inclusive city. Therefore, in the Smart and Sustainable Mobility program 2018-2021 of the VO, an important role is given to Mobility as a Service.

The prospective perspective of MaaS

The VO believes that the future situation with MaaS in the Rotterdam region will look like this:

- Residents of the urban area do not need their own car anymore to meet their mobility needs.
- Residents of the rural and low-urban area have more mobility options than their own car to meet their mobility needs, even in peak hours.
- A clear number of MaaS providers are actively offering mobility options.
- A large proportion of residents and employees use a MaaS provider to meet their mobility needs.
- Roaming enables MaaS customers to use services from other MaaS providers, allowing national and internationally travel from door to door via MaaS.
- There are MaaS bundles available for different groups with different mobility needs, including people who currently use special traffic services.
- The MaaS providers work together with traffic management authorities to make optimum use of the available mobility network.
- In urban area, space pressure has decreased sharply by a reduced number of parking spaces, made possible by a high-quality range of mobility services. MaaS helps people and businesses to settle in the urban region because of the good accessibility there is an attractive traffic and transport system and the public space has a high quality.
- A 'social return of investment'-system increases mobility chances of those groups in the city that face exclusion.

On the way to the prospective perspective

To reach this future situation, De Verkeersonderneming has developed the Marketplace for Mobility. On the basis of described needs of customer groups, in a tender the market was asked to offer mobility services, whereby they receive a reward per (verified) realized structural excitement. This resulted in a wide variety of mobility services. In the last tender, services that allow door to door mobility were offered. This tender has resulted in a consortium of service providers operating in a large part of the region, providing a (developing) MaaS platform with planning, booking, traveling, supporting, adjusting and paying functionalities. Passenger cars, e-bikes, ferry, water, taxi and public transport are offered in the platform.

This Marketplace for Mobility has made possible an important step towards the prospective perspective described before, but this perspective is not realized yet. That is obvious, because the tenders did focus on finding solutions for traffic jams in rush hours, while the MaaS perspective is broader. On the way to the prospective perspective, it is necessary to set up both small and largescale experiments and projects, in which De Verkeersonderneming will learn what is needed precisely, what barriers should be eliminated and what preconditions should be created, moreover to not only generate effect on traffic fluidity, but also on spatial, climate and social efficiency

At the moment, it is not clear what MaaS exactly will look like. The above-described perspective will therefore be adjusted and sharpened in practice. De Verkeersonderneming has developed a plan of approach in which the first concrete projects are mentioned which will bring the prospective perspective closer. In this plan concrete short-term needs and issues are included (such as improving accessibility of the airport, or providing mobility services at urban densification sites). In addition, the VO examines which issues need to be solved to increase MaaS services in general, in cooperation with other urban regions and the national government (to enable MaaS trips throughout the Netherlands and internationally).

On the way to MaaS via three tracks

To reach the prospective perspective, on the short-term favorable conditions have to be created, so market parties can offer strong MaaS services. The plan of approach has therefore been set up as a three-track plan:

- 1. Cooperation with the market.** Organizing collaboration with the market, in the form of procurement, contests, pilots, experiments, etc., aimed at scaling up MaaS and realizing and optimizing social (mobility) goals.
- 2. Research projects.** To get a good MaaS service, first answers must be found on numerous questions, for example questions about data use, technology, effects on spatial-, climate-, social- and traffic-fluidity efficiencies, and especially traveler needs, an often underestimated aspect of Mobility as a Service.
- 3. Connect MaaS initiatives.** In the Rotterdam region, several parties work on the development of Mobility as a Service. Consideration must be given to the extent to which scaling is desired, within the region, within the province and beyond, and to what extent stakeholders want and can collaborate in the development of MaaS. In addition, it is important to co-operate with regional, national and international MaaS initiatives.