

Feasibility study MaaS

A business case for EC2B



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Preface

This feasibility study was funded by Climate-KIC's Pathfinder programme. Partners in the project were Trivector, represented by Christer Ljungberg, Björn Wendle and Emma Lund; Movia, represented by Anette Enemark; the city of Malmö represented by Christian Resebo; and the municipality of Copenhagen represented by Tanjamaria Ballhorn and Helene Albinus Soegaard.

Trivector was lead partner of the project and had recurrent communication with the other project partners. The project kick-off was a working meeting in Malmö with representatives from all four partners. Within the project, two workshops also including other stakeholders have been held to discuss the potential for MaaS and EC2B; one in Malmö hosted by the city of Malmö, and one in Copenhagen hosted by Movia and the Municipality of Copenhagen. Trivector also held three workshops with experts in business model development discussing EC2B. Contact person from Climate-KIC Nordic has been Peter Normann Vangsbo. The report was written by Emma Lund, Trivector, with assistance of Johan Kerttu, Lovisa Indebetou and Björn Wendle, also Trivector. Jonna Milton contributed with illustrations.

Summary

Mobility as a Service (MaaS) has received a lot of attention recently, and is generally seen as an innovation with large potential to be part of the solution to problems like urban congestion and carbon emissions related to transport. In this report, the feasibility of introducing Trivector's MaaS concept EC2B ("Easy to B"/"Easy to be") on the market in the cities of Malmö and Copenhagen is studied. The EC2B concept has unique business model that integrates a range of mobility services, including public transport, into an attractive offer which is connected to accommodation, as most trips start and/or end where people live. The connection to accommodation also creates a value to property developers, who can offer EC2B as part of an innovative accommodation offer, and who may also be able to save money through reducing the number of parking spots they need to provide.

In Malmö, the implementation of EC2B in a first pilot is highly feasible. The city is willing to create supporting conditions through accepting EC2B as an alternative measure that can be used to reduce parking requirements, and negotiations are ongoing with two interested property developers. A dialogue has been initiated with key transport operators, and both public transport operator Skånetrafiken and car-sharing firm Sunfleet have expressed an interest in the concept. In Copenhagen, the implementation of an EC2B pilot seems less likely in the near term. Although the municipality of Copenhagen as well as the three public transport operators are interested in MaaS as such, the idea of connecting MaaS to accommodation is less feasible in the context of Copenhagen, as the necessary preconditions for working with flexible parking requirements are not in place.

Given that this feasibility study shows promising results for the potential implementation of an EC2B pilot in Malmö, Trivector intends to continue the work with the aim of turning EC2B into a start-up. Before being able to implement the first pilots, however, we need to further validate the business model, get the key transport operators on board, and solve the remaining technical details in order to create a "minimum viable product" that can be brought to the market.

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1. Introduction

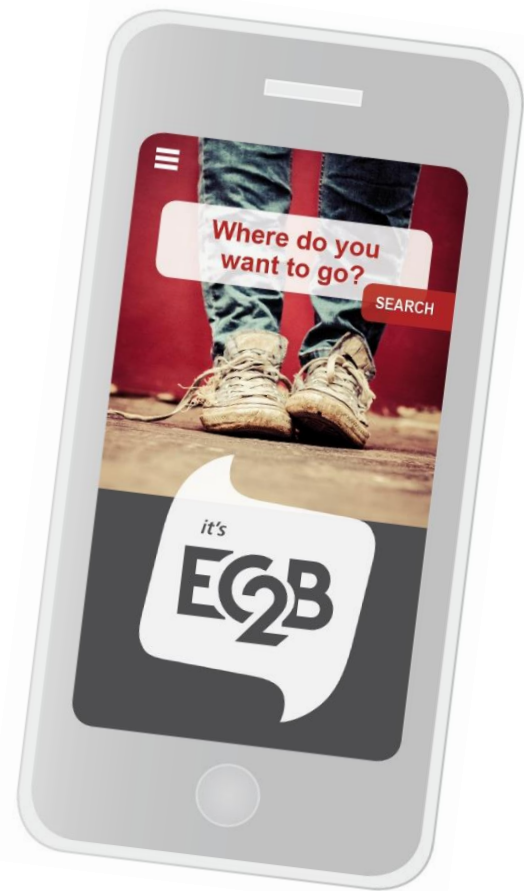
Urbanisation is increasing globally and many cities suffer from congestion and a poor urban environment. Furthermore, 15 % of global carbon emissions are attributed to transportation. This means that alternative solutions to increased car traffic are required. Mobility as a Service (MaaS) has received a lot of attention recently, and is generally seen as an innovation with large potential to be part of the solution to these problems. MaaS offers customers an attractive alternative to owning one's own car, allowing easy access to a variety of transport modes such as public transport, car sharing facilities, rental bikes etc. MaaS hence has a potential to reduce car use and related emissions. However, real world MaaS demonstration projects have been few, and have encountered various problems.

In this report, the feasibility of introducing Trivector's MaaS concept EC2B ("Easy to B"/"Easy to be") on the market in the cities of Malmö and Copenhagen is studied. EC2B has unique business model that integrates a range of mobility services into an attractive offer which is connected to accommodation, as most trips start and/or end where people live. Furthermore, the connection to accommodation creates a value to property developers, who can offer EC2B as part of an innovative accommodation offer, and who may also be able to save money through reducing the number of parking spots they need to provide. To provide a mobility service as part of the accommodation is innovative and unique for EC2B.

The report is structured as follows: In the following chapter, the concept of EC2B is described, as well as its climate relevance. In chapter 3 an overview is given of MaaS development across the globe, with the purpose of providing a context for EC2B and mapping the market. Chapter 4 provides information about the local context, with details on the transport services available in Malmö and Copenhagen as well as current travel patterns. In chapter 5, the feasibility of implementing EC2B in Malmö and Copenhagen is assessed, whereas chapter 6 concludes and looks forward.

2. EC2B – the concept

Trivector’s MaaS concept EC2B offers customers an attractive alternative to owning their own car, allowing easy access to a variety of transport modes such as public transport, car sharing facilities, rental bikes etc. Good information, booking services, and access to specific measures where customers live and make their everyday choices for transport, are included in the offer to provide “better than car mobility” which is needed to achieve a shift from car to other modes of transport. To provide a mobility service as part of the accommodation is innovative and unique for EC2B. A digital platform is used for providing information, bookings and payment, also including a social function where a community for interaction and value creating activities amongst the users is created. Another innovative feature of EC2B is that the platform is also used to support behavioural change towards sustainability and reduced carbon emissions. EC2B hence includes a “personal trainer” function for mobility, that gives advice on sustainable transport options and nudges users towards more sustainable habits. The digital platform will most likely be an integration of several existing platforms, and the main innovation is not the platform as such, but rather the integration of a wide range of mobility services into an attractive package, the integration of a social function as well as the close connection to accommodation.



2.1 Value proposition(s)

Key to the business model is that EC2B takes on the role of *transport agent*, which is a new role in the eco-system of mobility. EC2B’s customers are hence not only the end-users of the transport services, but also the *property owners* who include EC2B as a part of an attractive and innovative accommodation concept. Through using accommodation as a base for the business model, the possibility for a long-lived relationship with users is created. Since EC2B potentially reduces car ownership it also reduces demand for parking space, which creates value for property developers as building parking lots and underground garages is very expensive. Key partners for realising EC2B are the *transport operators* whose services are included in the offer (Public transport, car-sharing firms, taxi firms etc) and who benefit from acquiring new customers. Another key partner is the *city*, who can create supporting conditions for EC2B through allowing property developers to integrate EC2B in their properties instead of providing parking spots, and in return gets a more liveable city with less car traffic. A provider of the *technical platform* is also needed to make the EC2B service offer complete, see Figure 2-1.

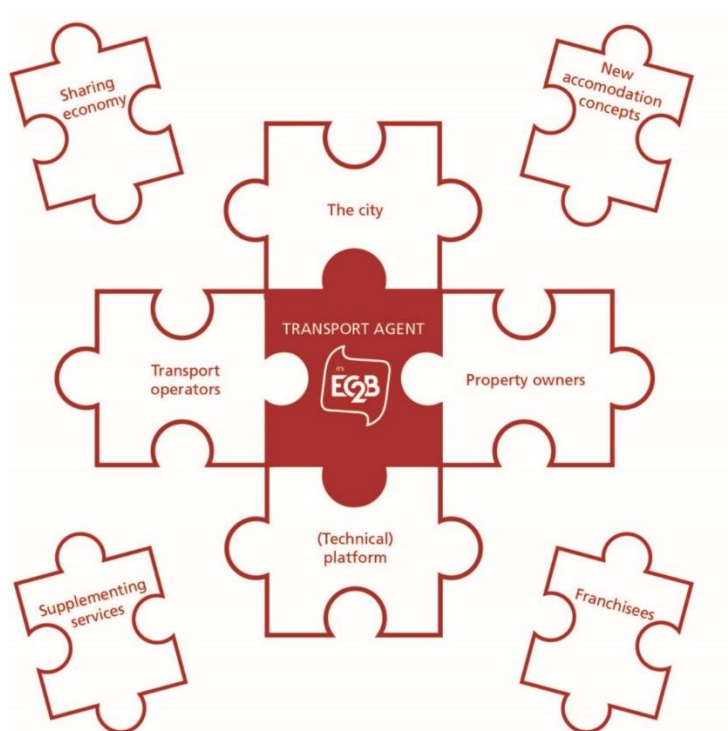


Figure 2-1 The EC2B ecosystem

As illustrated in Figure 2-1, the EC2B ecosystem can be complemented and further strengthened by features such as sharing economy, new accommodation concepts, supplementing services such as goods delivery etc., and potentially franchising solutions that bring the concept to new and larger markets. EC2B is built so that it can be developed over time both through adding service providers and developing other supporting systems in the platform.

2.2 Climate relevance

According to previous studies, people who do not own a car have a more sustainable travel pattern than car-owners. In a study for car-sharing company Sunfleet, it was concluded that 35 % of the individuals who joined Sunfleet in Malmö had access to one or more cars at household level before they joined the service. Among active car-sharing service users, car ownership was reduced to 11 %. In average, each car-sharing car replaced 5 privately owned cars. Also the total car mileage per year was reduced for those joining Sunfleet; in Malmö the average reduction was about 24 %.¹ If EC2B succeeds in combining car-sharing with access to public transport, bike-sharing, taxi and goods delivery solutions, the offer is likely to attract even more car-owners than a mere car-sharing offer, and also to a larger extent shift travel from car to other transport modes with less climate impact. An average Swedish car is used 3 % of time, which means that a lot of material is produced and bound in vehicles to no use. A smaller fleet of vehicles with higher degree of use also enables as a faster interchange of new vehicle technologies.

¹ Trivector Traffic Rapport 2014:84, Effekter av Sunfleet bilpool - på bilnehav, ytanvändning, trafikarbete och emissioner.

3. Mobility as a Service across the globe

3.1 MaaS in the current policy discourse

During the last couple of years, the concept of Mobility as a Service has become hailed as a potential solution to many of the problems that urban mobility systems face in terms of congestion and carbon emissions. At the 2015 ITS Congress in Bordeaux, MaaS was a hot topic, and the MaaS Alliance² was formed with the aim of promoting cooperation around MaaS in Europe. Founding members include Ericsson, ERTICO – ITS Europe, Transport for London and Xerox. The Finnish Ministry of Transport and Communication also took an interest in MaaS early on, and has actively supported the development of MaaS initiatives in Finland.

A survey of existing mobility integration and shared mobility projects in cities across the globe was made in 2015 in a feasibility study of MaaS for London.³ This survey is still to a large extent up to date, but the fact that the status of some of the described projects has changed illustrates the rapidly evolving nature of mobility as a service.

3.2 Levels of integration

MaaS offers come in different forms, and in the survey mentioned above six different stages of integration were identified, ranging from the most basic stage where operators provide discounts for other operators' services, all the way to fully integrated MaaS providers with tailored mobility packages on offer:

- 1) Cooperation only in terms of providing discounts for combined subscriptions
- 2) Ticketing integration: when one smart card can be used to access all the modes taking part in the service
- 3) Payment integration: when one single invoice is issued for all of the customers' mobility needs
- 4) ICT integration: when there is a single application or online interface that can be used to access information about the modes
- 5) Institutional integration: when multiple modes included in the service are owned and operated by one company
- 6) Integration with tailored mobility packages: when customers can pre-pay for specific amounts (in time or distance) of each service tailored towards their needs

² <http://maas-alliance.eu/>

³ UCL Energy Institute, Department for Transport (2015). "Feasibility Study for 'Mobility as a Service' concept in London".

Basic integration: Communauto, SBB and Cambio

Among the basic projects when it comes to the level of integration and cooperation between different actors are the ones run by Communauto (Canada), SBB (Switzerland) and Cambio (Belgium). What makes these schemes considered as MaaS is the fact that users of one mode of transportation are offered discounts for using other modes. The main operators or mobility integrators differ. Communauto and Cambio are car sharing operators offering their members discounts for bike sharing and public transport passes, whereas SBB is the government owned railway operator in Switzerland, offering discounts to public transport pass holders for bike sharing and car sharing (and cooperating with these operators to locate vehicles close to train stations). There is, however, no further integration of the different modes of transport and the use of each mode is paid for separately.

More integrated services: Hannovermobil, TaM, Smile and Moovel

The more integrated services take it one step further, from cooperation of different mobility providers to ticketing, payment and ICT integration. Hannovermobil⁴ has been up and running since 2004 (relaunched as a pilot in 2014) and is run by the public transport authority. Public transport pass holders are offered discounts for car sharing, taxi, car rental and long distance rail. A common card is used for public transport and car sharing and the costs for using these modes as well as taxi are also collected on the same bill. ICT integration is being developed, and a smartphone application is now available with real time information on public transportation and possibility to buy tickets directly in the app.

A similar project is run by the public transport authority in Montpellier, TaM.⁵ Customers pay a fixed monthly or annual fee for using public transport, bike sharing and car parking in connection to public transport, and get a discount on car sharing services. The public transport card is used for access to bike sharing and car sharing vehicles. Fixed costs are paid for in advance in the form mobility packages and hourly costs of bike and car sharing are paid for separately. There is also an online journey planner and ICT integration of the different modes.

Smile⁶, in Vienna, is still only a research project which involves cooperation between both transport providers and other actors, such as software companies and environmental protection groups. The aim of the project is to provide an integrated intermodal transport service, including information on all modes, booking and payment in one mobile application. A pilot project with more than 1000 participants ran in 2014. Some modes were pre-paid via subscription (like a public transport pass), and others directly after usage (taxi, rental car, parking).

Moovel⁷ is a countrywide service available in many German cities, unlike most of the above mentioned projects that are tied to a single city. It includes public transport, car rental, car sharing, bike sharing and taxi as well as national rail. All modes are provided by different actors, which are connected and combined in

⁴ <https://www.gvh.de/mobility-shop/product-overview/hannovermobil/?L=1>

⁵ <http://commercial.tam-voyages.com/>

⁶ http://smile-einfachmobil.at/index_en.html

⁷ <https://www.moovel.com/en/DE>

the Moovel mobile application, including intermodal journey planning, booking and payment for almost all services and ICT integration, but no ticketing integration.

Advanced MaaS-offers: SHIFT, Ubigo and Whim

The most advanced MaaS-offers on the market include tailored mobility packages, which means the customers pay for mobility much in the same way as they would pay for a mobile phone package with a fixed monthly cost covering all their use of different transport modes.

SHIFT,⁸ in Las Vegas, started in 2013 but was shut down after two years of testing. It provided a variety of different services, using vehicles owned by the mobility integrator (Project 100) itself. Customers payed on beforehand for monthly trip time (minutes) which they were then free to distribute between the different transport modes. Additional trip time could be purchased if the customer ran out.

Ubigo,⁹ in Gothenburg, was tested for a trial period and evaluated in 2014, and is now seeking a relaunch in Gothenburg and one or two other Nordic cities. The project was initially a cooperation between the public transport operator (Västtrafik), Sunfleet car sharing, Hertz car rental, TaxiKurir taxi and JCDecaux bike sharing. For the re-launch, a cooperation has been established with Ericson, providing the technical platform. ICT, payment and ticketing are all to be integrated in one mobile application for all transport modes and customers subscribe to prepaid monthly mobility packages tailored to suit the different customers (determined time or distance for each mode separately).

The Whim service¹⁰ is currently being tested and is scheduled to be launched in Helsinki in the autumn of 2016. Behind the service is the company MaaS Global, which brings together numerous different partners, from transport operators to research organizations. Like Ubigo, Whim offers pre-purchasable mobility packages (with a monthly quota of mobility points), and a mobile application for journey planning and ICT including all different transport modes.

Overview of MaaS offers

To get an overview of the MaaS-offers presented above, all services have been plotted in a graph illustrating the spread in terms of number of transport modes included in the service and the level of integration, see Figure 3-1. It should be noted that none of the most advanced services is currently up and running: UbiGo ran a pilot in 2014, Shift was tested 2013-2015 and MaaS Global's service Whim is yet to be released.

⁸ <http://tech.co/las-vegas-startup-shift-shuts-down-2015-04> [2016-08-12].

⁹ <http://www.ubigo.se/las-mer/about-english/> [2016-08-12].

¹⁰ <http://maas.global/whim/>

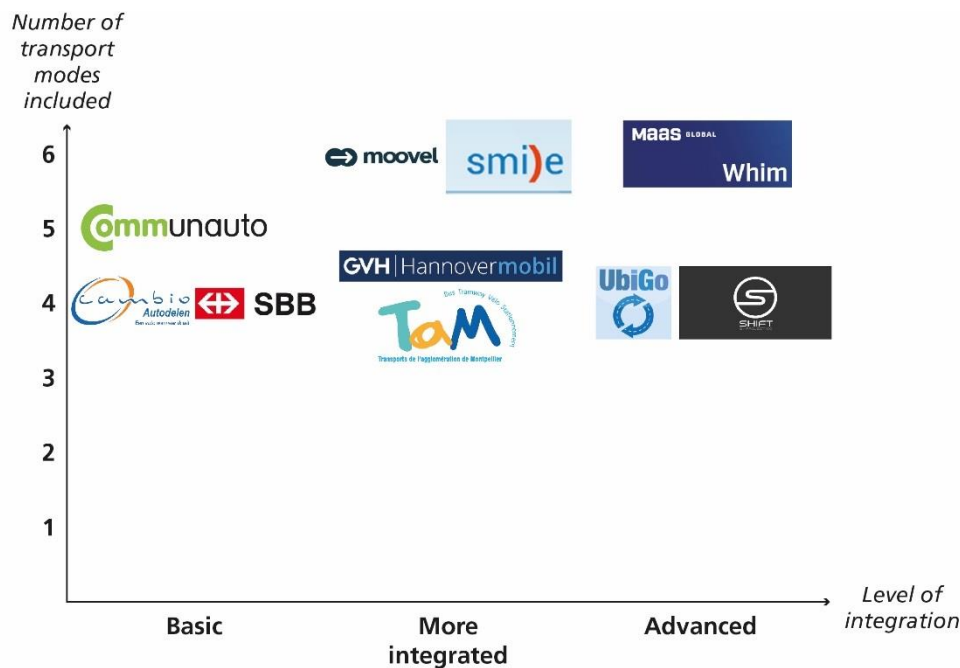


Figure 3-1 Overview of MaaS offers illustrating variation in terms of number of transport modes included and level of integration.

3.3 Mobility as a service connected to accommodation

A niche-market is mobility services connected to accommodation. Through offering mobility services as part of accommodation, property owners increase the value of their service offer. One example is Audi at home,¹¹ which now operates in Hong Kong and San Francisco, where Audi offers property owners access to an on-site fleet of Audi cars for rental, including valet service and 24/7 customer service. In San Francisco, Uber has established a collaboration with a property developer in the real estate development Parkmerced, comprising 3000 rental apartments, with the purpose of reducing private car use.¹² New residents will receive a \$100 monthly transportation subsidy from Parkmerced to use on Uber and public transit (\$30 must be used on Uber, the rest can be put on a Clipper Card for public transport). In return, Uber will cap the fares of any UberPool shared ride between Parkmerced and the nearby BART and MUNI stations to a maximum of \$5.

This emerging market also reflects a new interest from cities in opening up for alternative ways of solving the issue of parking in connection to accommodation. Traditionally, municipalities have specific parking requirements stating how many parking spaces need to be provided for each apartment in a new development. In some countries, these requirements are part of national legislation or coordinated regionally, but most often they are handled at municipal level. During the last few years, several Swedish municipalities have started working with more flexible parking requirements with the aim of reducing the number of cars in city centres. Property developers may then have the possibility to reduce the number of parking spaces if they in exchange make provisions for tenants to lead

¹¹ <https://www.audiathome.com/>

¹² <https://newsroom.uber.com/us-california/car-free-living/>

a life without a private car. Most commonly, property owners provide space for car-sharing cars and pay residents' membership fee for a limited number of years. Sometimes, other vehicles for sharing such as e-bikes, cargo bikes and similar are also offered in connection to the building. The city of Malmö works actively with such flexible parking requirements, and has also begun working with even more innovative ways of reducing the number of parking requirements, e.g. through allowing the construction of a house dedicated to cyclists, with no private parking spaces but in return very good standard for cyclists.

3.4 Market assessment

Mobility as a Service is rapidly developing around Europe. However, several of the services described in this chapter are in a pilot phase, or have not yet been launched on the market. No service with the highest level of integration is currently up and running. Many projects have focused on the development of mobile applications integrating journey planner, payment etc. The integration of different transport modes into one mobility offer seems to be a difficult issue to solve; what is now offered is most often discounts on other transport modes.

EC2B primarily focuses on the niche market identified in the previous section, where mobility services are integrated into accommodation. This market is still in an early stage, and so far, Uber seems to more or less alone in including public transport in a long-term mobility package. On the other hand, Uber does not offer vehicle sharing facilities in connection to accommodation but only includes Uber taxi and public transport.

4. The local context

4.1 Why introduce mobility as a service in Malmö and Copenhagen?

The municipalities of Malmö and Copenhagen have both expressed an interest in mobility as a service as a potential way of solving problems of ever-increasing traffic flows, while also reducing the climate impact from traffic. The cities also need to provide accommodation to a young and growing population. If some of the space that today is occupied by car traffic and parking could be used for building new housing, this would be very welcome.

4.2 What is already available?

Malmö

Public transport in Malmö is operated by Skånetrafiken, who has the overarching responsibility for local and regional buses and trains. Skånetrafiken is formally a part of the regional administration, and works under the regional Public transport authority (Kollektivtrafikmyndigheten). All traffic, both buses and trains, is outsourced to private transport operators. In Malmö, buses are run by Nobina.

As illustrated in Figure 4-1, central Malmö has a dense net of bus lines, most of which are operated at 10 minute intervals.

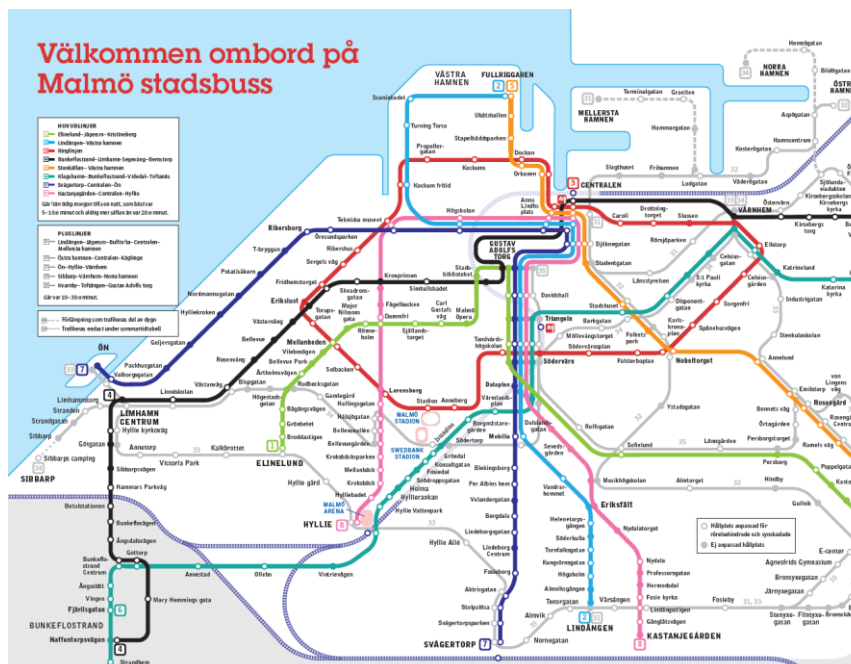


Figure 4-1 Bus lines in central Malmö

For commuters in and out of Malmö the regional train services are important. Regional trains stop at 3 different stations within the city of Malmö thanks to the City tunnel finished in 2010. Regional buses are an important complement in some relations. In central Malmö, 13 local bus lines provide last-mile access, and connect different urban areas. Skånetrafiken offers a range of travel cards and different payment methods. Tickets can be purchased in ticket machines at train stations, at travel centres, in selected shops, and online or through a mobile application. Through using a “jojo” smart card, passengers get a 10 % discount. On board local buses, tickets can only be purchased with a smart card or in the mobile app. Mobility packages are available, monthly or for 24 or 74 hours. A monthly pass for public transport ranges between 50 Euro for a pass valid within the city of Malmö to 130 Euro for a pass valid within the whole region of Scania. Many inhabitants of Malmö commute to Copenhagen, and a pass valid for commuting between Malmö and Copenhagen is about 200 Euro/month.

Within central Malmö, Malmö by bike provides bike rental at 50 stations around the city. Annual subscriptions are 250 Euro, and bikes can be used for one hour at a time. Temporary subscriptions are also available for 24 or 72 hours. An app provides real-time information on the location and availability of bikes.

Car-sharing is on the rise within Malmö. As of today, the car sharing company Sunfleet has cars stationed in more than 70 locations around the city. Sunfleet deploys a tailored price structure where customers choose between paying a higher monthly fee and a lower hourly cost, or a lower monthly fee and a higher hourly cost at different levels. Sunfleet has several years of experience of working with property developers towards including carsharing facilities in their new developments as a way of reducing the need for parking spaces.

Several companies provide rental cars; such as Hertz, Avis and Budget. A number of taxi firms, as well as Uber, operate in Malmö.

Level of integration

Skånetrafiken provides a journey-planner for mobile devices with real-time traffic information on all trains and buses, including the possibility to buy tickets. It is possible to connect Skånetrafiken’s smart card “jojo” to the bike-rental system, but only to get access to the bikes, not to pay for the service.

Currently, there is no integration between public transport and car sharing, rental cars or taxi.

Copenhagen

Public transport in Copenhagen is run by three different operators. Regional trains are run by DSB, buses by Movia, and metro by Metroselskabet. These operators collaborate around customer service, traffic information, tickets, communication and branding under the name DOT (Din Offentlige Transport, i.e. “your public transport”). The cost of a monthly pass for public transport is in the range of 46-170 Euro, depending on the number of zones. In the city centre, the availability of public transport is generally good, as illustrated in Figure 4-2.

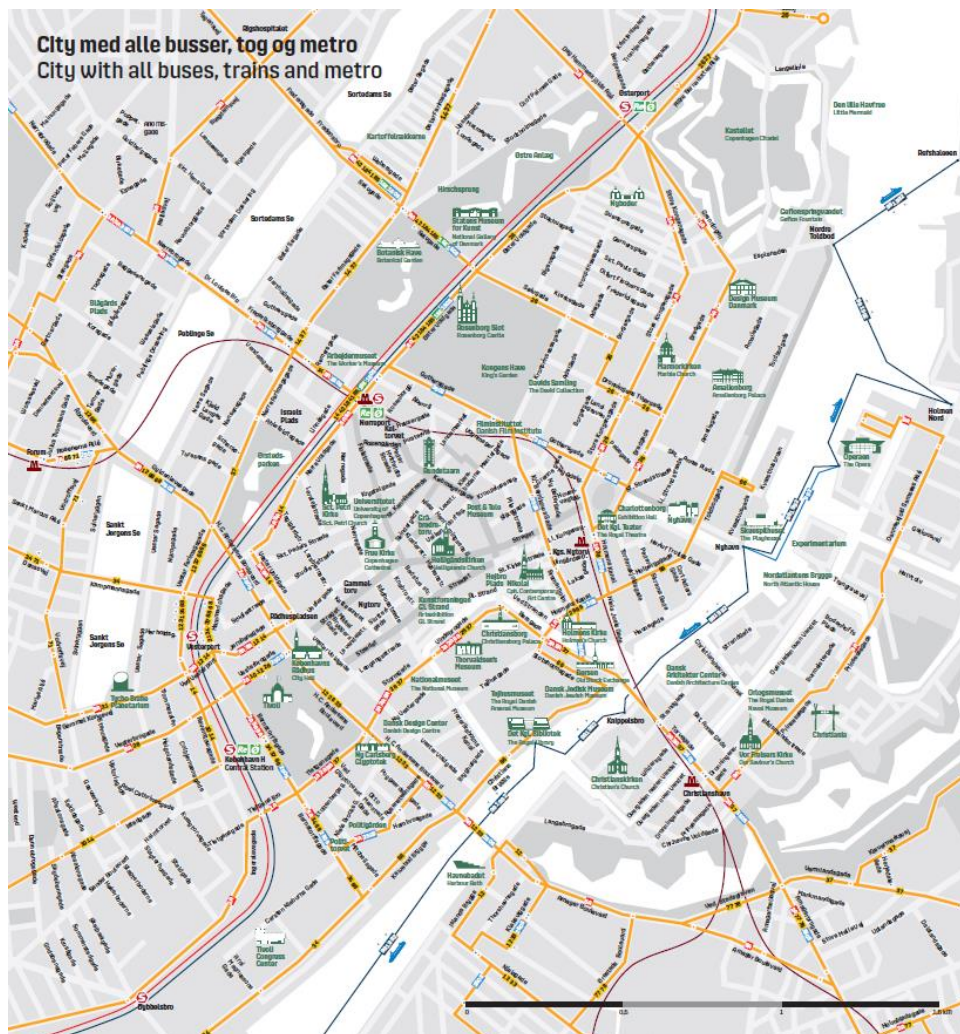


Figure 4-2 Public transport in central Copenhagen

Copenhagen's public rental bike system Bicyklen is the world's first electronic and intelligent bike-share system with features such as touch screen and GPS navigation. Bicyklen is described as "the fourth leg of Copenhagen's public transport infrastructure" and complements the already extensive infrastructure in the Danish capital, thus making it possible for users to seamlessly travel by train, metro and bus when completing the first and last kilometres of their trips. Bicyklen bike rental can be accessed either at a pay-as-you-go rate of 3 Euro/hour with no fixed cost, or at a monthly fee of 9 Euro, with an hourly rate of 0,74 Euro/hour. Several private companies offer bike rental as well; an interesting example is Donkey republic which offers a franchising concept for bike rental where bikes are booked and unlocked using a mobile app.

Car sharing services are provided by several operators. DriveNow provides a free-floating car pool with 400 electric vehicles within Copenhagen. LetsGo offers a car sharing service where cars are picked up and returned on fixed locations; some of these cars are electric vehicles. Car-sharing cars can be parked free of charge within Copenhagen, except for in the very city centre. Danish car-sharing operators offer cars at a pay-as-you-go rate, with no fixed fee. Prices differ depending on car size, time of the day etc.

Level of integration

The Danish public transport operators have joined forces to create the smart pass “Rejsekort”, an electronic ticketing system for travelling by bus, train and metro. This smart pass unites the different transport operators, travel zones, ticketing systems and discount schemes into a common system. In Copenhagen, there is a fully integrated system for the metro, bus and train services. Similarly, public transport operators collaborate to provide “Rejseplanen”, a journey planner that integrates real-time traffic information from all transport operators.

4.3 Travel patterns

Malmö

In order to identify the main target group for EC2B in Malmö, results from a previous project where an accessibility index for Malmö was calculated were used. Using the results of this index, three city districts were identified as having the best conditions for living a life without car. These were the city centre, the southern inner city and the western inner city, see Figure 4-3 below. Travel habits were then investigated for inhabitants of these three central city districts, using data from a travel survey from 2013, and compared with results for the population of the remaining districts. Unfortunately, travel survey data was not available at the same level of detail as the accessibility index, which is why the city district level was used.

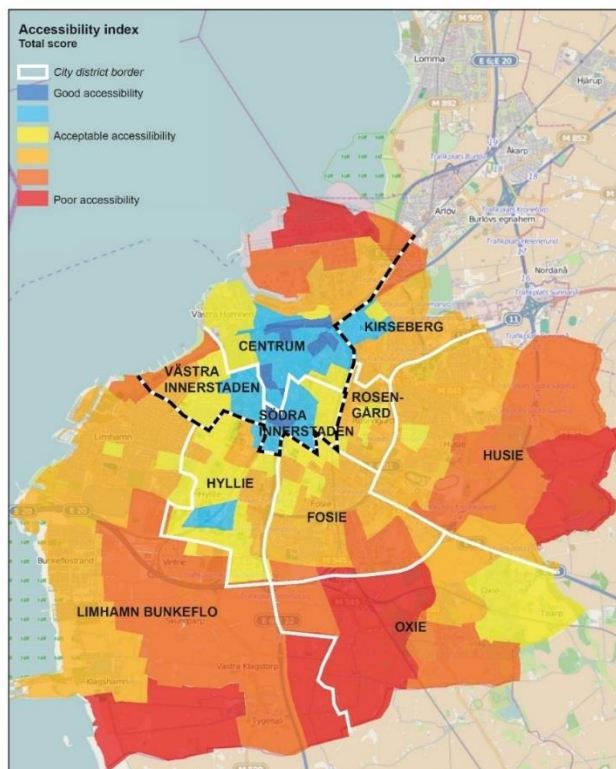


Figure 4-3 Map showing the accessibility within Malmö. The boundary between the three central districts selected for the feasibility study and the rest of Malmö is marked with a dotted line. Source: Trivector Rapport 2013:96, Normativt index för mer hållbar tillgänglighet i Malmö

It is clear from travel survey results that inhabitants of the three central districts have a more multimodal travel behaviour compared to residents of the more suburban areas, see Figure 4-4. They travel far less by car, and more by foot and by bike. Travel by bus is more or less the same in the two areas, but residents of the central districts travel twice as much by train compared to suburban dwellers.

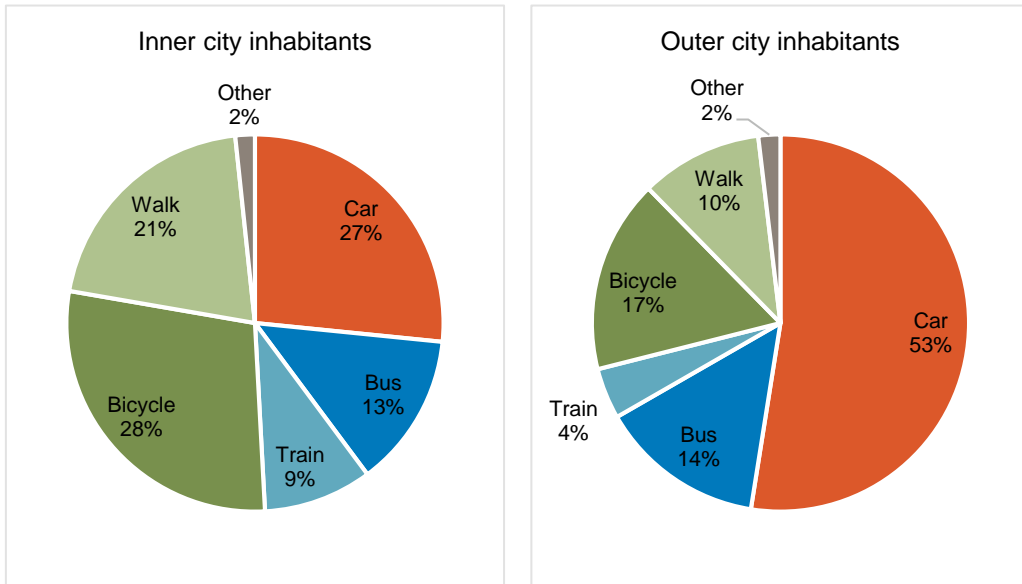


Figure 4-4 Number of journeys by different transport modes, comparison between inner city and outer city inhabitants. Data from Resvanor Syd 2013

Comparing travel habits between age groups, there is a clear pattern that people in the age group 40-64 years travel most by car, followed by the group 26-39 years, see Figure 4-5. This pattern is the same in both central and suburban Malmö. Interestingly, though, the difference in car use between inner city dwellers and suburban dwellers is more pronounced than the difference between various age groups within the inner city, which indicates that contrary to expectations the target group of EC2B is not to a large extent defined by age.

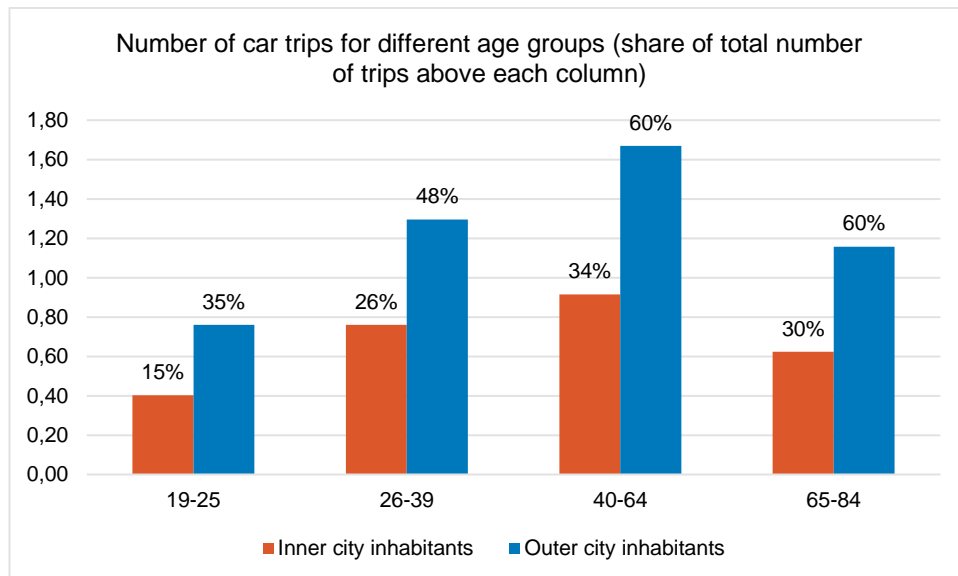


Figure 4-5 Number of car trips for different age groups, comparing inner city and outer city inhabitants.

Looking into the variations in travel habits between households with and without children, inner city households with children are more likely to travel by car than households without children, see Figure 4-6. This indicates that households with children have mobility needs that are difficult to fulfil using alternative transport modes, which should be taken into account when the EC2B service offer is designed.

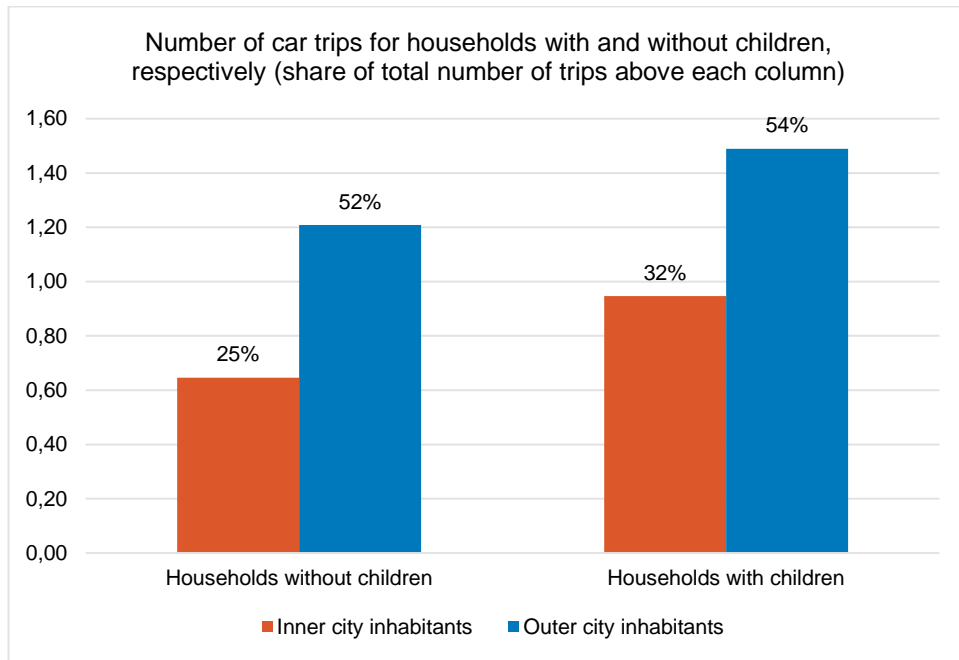


Figure 4-6 Number of car trips for households with and without children, comparing inner and outer city inhabitants.

In the suburban parts, households with children also make more car trips per day, but there is less difference in the car's share of total number of trips between households with and without children. This indicates that the total number of trips with all transport modes increases in households with children, but that the modal split remains more or less constant.

When comparing the number of journeys by travel mode and activity for inner city dwellers, we see that the car is used most frequently for commuting to work; business-related travel; pick-up/drop off of kids; shopping; and visiting friends and family, see Figure 4-7. Compared to the total number of trips made for each activity, the car has the largest share of journeys for business-related travel; pick-up/drop off of kids; and shopping.

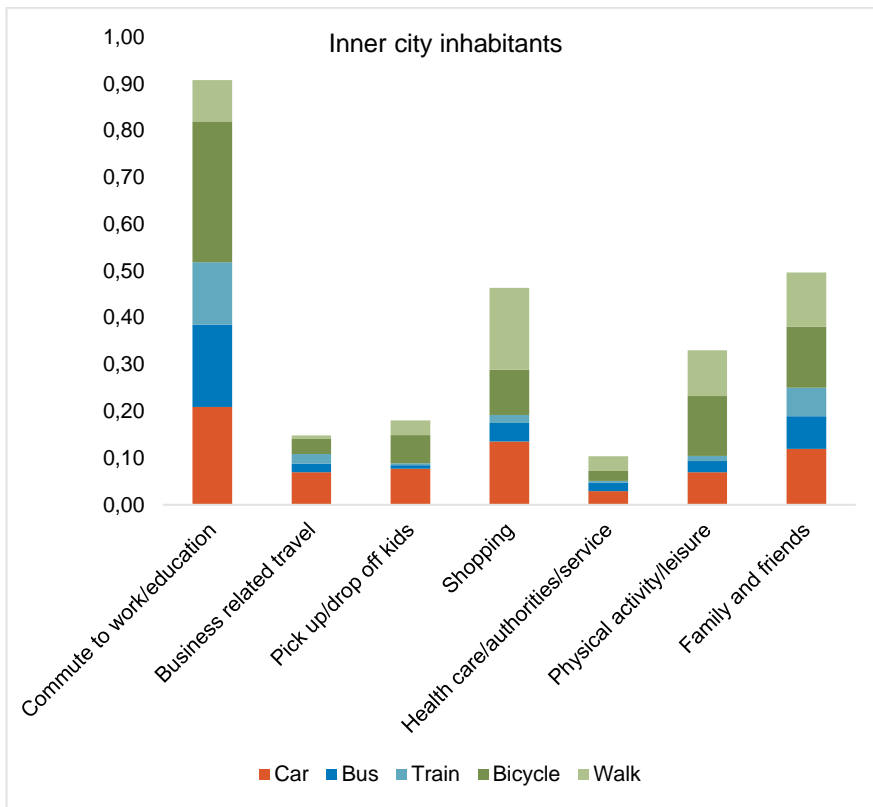


Figure 4-7 Number of trips by travel mode and activity, inner city inhabitants

Taking a look at the number of trips in different length intervals, walking and cycling clearly dominate trips that are less than 1 km, see Figure 4-8 below. For trips in the interval 1-5 km the car plays a significant role, even though walking and cycling still dominate. For trips longer than 5 km the car is the most frequently used transport mode, but bus and train are also commonly used.

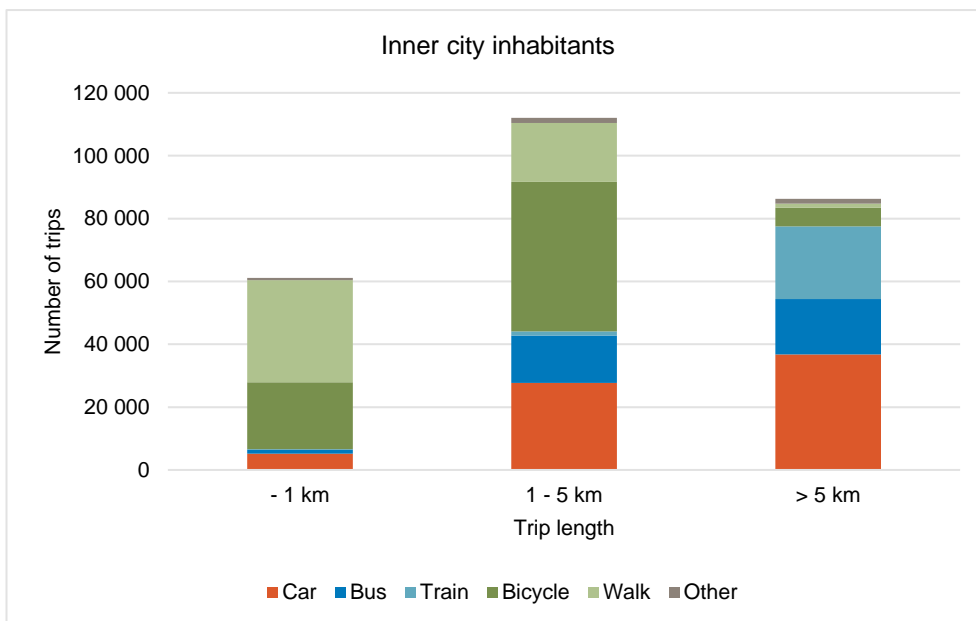


Figure 4-8 Number of trips by travel mode and trip length, inner city inhabitants

Copenhagen

Movia, who have looked into the potential for MaaS in Copenhagen, identifies 3 successive waves/sequences of probable MaaS-assimilation in Copenhagen.

In a first wave, the “Mobilists” (already multimodal travellers) will welcome MaaS as a way of making it easier to keep using different modes of transport. The mobilists are mainly inhabitants of the central municipalities (Copenhagen and Fredriksberg) together making up the city of Copenhagen, and to a lesser degree inhabitants of the surrounding municipalities. Today, 66 % of inhabitants in the central municipalities and 54 % in the surrounding municipalities use several different modes of transport for their everyday journeys over a period of two weeks.

In a second wave, it may be possible to attract the “Light car users”, people who do not use a car every day. This group consists of:

- ▶ People commuting to the central parts of the city, living close to public transport nodes. The possibilities for a MaaS-offer to be successful are promising as nearly 50 % of the 18.000 commuters to the central municipalities living up to 1 km from a railway station use the car to get to work. A service that can offer a simple solution to the “first and last mile” problem might make some of these people try new ways of commuting. MaaS may also be interesting for the 38.000 people that commute to the central municipalities from the greater surrounding Sjaelland region, depending on other factors such as parking facilities near railway stations and central bus stops.
- ▶ Inhabitants in the central parts using their cars mainly for weekend trips. 25 % of car owners in the central municipalities are not using their cars on a daily basis, which adds up to 26.000 idle cars in the weekdays. In the surrounding municipalities the corresponding figures are 12 % of car owners and 16.000 idle cars.
- ▶ Inhabitants of the central parts that are thinking about purchasing their first car. Although little is known about this group it is reasonable to assume their current travel habits to be multimodal, which should make MaaS interesting.

An attractive MaaS-offer might be able to replace car ownership for these customer segments, if it can make car use cheaper and/or easier than a privately owned car.

Lastly, there is the very diverse group of everyday car users, representing the households and individuals that will be hardest to sway, as it requires the greatest shift in travel habits. In the short term it is perhaps not realistic to get people in this group to give up car ownership altogether, but a well-designed MaaS offer could make it more attractive for this group to use alternative transport modes every once in a while.

5. Feasibility study

5.1 Operational feasibility

Creating the transport agent

The role of transport agent is new in the ecosystem of mobility, and this role hence needs to be created from scratch. So far, Trivector has been driving the process of developing EC2B as an internal innovation project, but if the service is to be implemented, it would make sense to start a separate company that would take on this role. In order to take the step of starting up a new company, the relationship between Trivector and this new company would need to be sorted out, including ownership structure etc. This process has been started, but several issues still remain to sort out.

Getting key partners on board

The city

In order for EC2B to get into the market, the acceptance of city authorities is key. One of the unique features of EC2B is that it is intended to act as a substitute for parking spots, allowing property developers an alternative way of living up to municipal parking requirements. If this is to work, the city has to accept EC2B as an adequate alternative.

In Malmö, municipal authorities already apply a flexible parking requirement which allows property developers to negotiate the number of parking lots they need to provide in connection to a new development. A well-established alternative is “parking acquisition”, where property developers apply to city authorities for having the municipal parking company provide a sufficient number of parking spots in one of their parking facilities in the area for 25 years, against a pre-determined fee. The municipality also encourages property developers to provide car-sharing facilities in connection to the property through lowering the parking requirement with 30 %. The city of Malmö has a strong vision of reducing car traffic within the city centre, and see the development of new mobility services providing an alternative to owning one’s car as one way of doing so. Hence, the city has pronounced a clear interest in working with EC2B as a potential alternative to providing parking spots. The city of Malmö is partner in the project, and several representatives participated in the stakeholder workshop in Malmö in June.

In Copenhagen, there is a general interest in MaaS as a potential solution that could contribute towards reducing private car use, and the municipality is partner in the project. However, the connection to accommodation and parking is less pronounced. At the moment, there is no political will of working with modified parking requirements, which means this part of the EC2B concept is not feasible within the Copenhagen context. The municipality of Copenhagen has started a

process together with Movia with the aim of creating MaaS pilot in Copenhagen, but this pilot will not have a connection to accommodation and will hence not be a EC2B pilot but a general MaaS pilot.

Transport operators

In order to create a value proposition that lives up to requirements, it is absolutely fundamental that key partners are willing to collaborate in providing the service. Here, public transport is the one key partner that is necessary to get on board, as EC2B relies heavily on public transport as provider of the bulk of daily travel included in the service.

In Malmö, Skånetrafiken runs all public transport. Trivector has good relations to Skånetrafiken, and we have begun a dialogue with them around the possibility for them to enter into a pilot phase for EC2B. A representative of Skånetrafiken participated in the stakeholder workshop held in Malmö in June, and an individual meeting between Trivector and Skånetrafiken surrounding EC2B is being planned. In Copenhagen, public transport is run by three different operators; Movia, DSB and Metroselskabet. Movia is partner in this project. All three public transport operators work together through the collaboration DOT, and all operators participated in the stakeholder workshop held in Copenhagen in August. However, public transport operators in Copenhagen are mainly interested in further developing their already existing collaboration around the smart card Rejsekortet and journey planner Rejseplanen into a more MaaS-like product, and at the moment there is no interest in participating in a pilot for EC2B. However, should their development of a common MaaS offer be successful, it would be very interesting to try integrating it into an accommodation-based EC2B-offer in the future.

Other transport operators are important, but are to a larger extent interchangeable. Bike sharing in both Copenhagen and Malmö is also a key ingredient in the value proposition, and provided by one single operator. However, in both cities the bike-sharing system is procured by the city, which makes collaboration easier. It is also necessary to find a car sharing firm that is interested in providing this essential part of the EC2B offer. In Malmö, we have established a good dialogue with Sunfleet, who are already used to working with property developers in creating solutions that reduces the need for parking spots. Sunfleet also participated in the Malmö stakeholder workshop. Other transport providers that Trivector has started a dialogue with include Taxi Skåne, and the goods delivery firm MOVEBYBIKE.

Property developers

In Malmö, Trivector is working closely together with the municipal housing company MKB towards identifying potential new developments where it would make sense to implement an EC2B pilot. A promising dialogue has also been started with a small private architect/constructor active in both Malmö and Lund. At the stakeholder workshop in Malmö, representatives of constructing company Skanska and property manager Vasakronan also participated. Also energy provider E.ON, who are partnering with the City of Malmö in an interesting new “smart city” development in Hyllie at the outskirts of Malmö participated at the

workshop. An individual meeting regarding the possibility to work with EC2B as part of this development is being planned during the autumn.

As the results of initial discussions in the partner circle indicated that EC2B's concept of creating a MaaS offer connected to accommodation does not seem to fit into the current institutional context in Copenhagen, no stakeholder dialogue with property developers in Copenhagen was held. Technical feasibility

Creating a technical platform

During the last year, several technology providers have announced their entrance into the MaaS market. Telecom companies such as Finnish Sonera and Swedish Ericsson are developing technical platforms that are intended to provide the ground for integrating information about a broad range of transport options. Also dedicated MaaS-providers such as Finnish MaaS Global, and German Moovel seem to focus a lot on providing an advanced smartphone application.

Although this is a fascinating development, from the point of view of EC2B the most essential MaaS innovation does not lie in the creation of a technical platform, but rather in the negotiation of a mobility service package that is attractive enough to compete with the private car. From a technical point of view, for EC2B in a pilot phase it might be enough to create a very simple user interface that brings together already available journey planners etc. under one common login, and redirects all bills to one single point. Later, when more general MaaS offers have been implemented, it could be an option to connect some of these to EC2B, so that EC2B no longer provides the technical platform by itself, but focuses on the negotiation of agreements between service providers, property developers and city authorities.

5.2 Economic feasibility

Financial flows

For the business model of EC2B to be viable, costs must be smaller than the value created for the customers (end-users and property developers). Especially for end-users, costs and values are not only calculated in money, but also include values such as not having to take care of a car, or implications for social status of not owning a car.

An interesting point of reference in this context is the subscription fee for other MaaS offers. MaaS Global's service Whim, which is supposed to be launched during the autumn of 2016, comes in three sizes: Light is 89 €/month, and includes free public transport and 1000 "whim points" equivalent to 2 taxi trips. Medium is 249 €/month, and includes 5 500 whim points. Premium is 317 €/month, and includes 8000 whim points, equivalent of 8 taxi trips and 5 days of rental car/month. Ubigo's service that was tested in Gothenburg in 2014 charged a minimum of 120 €/month, but most users opted for subscriptions at around 180 €/month which included various proportions of public transport, car and bike sharing, taxi etc.

For end users, these are relevant comparisons, but the business model for EC2B is different from these services as two main income flows are projected for EC2B. In addition to the subscription fees for mobility packages paid by end-users, a service fee paid by property owners for getting access to EC2B in their properties is foreseen. To find the optimum level for these fees, one should make comparisons with what the cost is today for the services EC2B wishes to replace.

Current costs for end-users

Owning and driving your own car is connected to several costs, of which many people do not have a good overview. In addition to fuel and maintenance costs, insurance and value depreciation should not be forgotten. In a Swedish context, calculations show that owning and driving a new, small VW using the driving pattern of people living in the central parts of Malmö adds up to around 350 Euro/month. The cost per kilometre is about 0,62 Euro/month. Compared to inhabitants of the outer parts of Malmö, the total cost is lower as people in the central parts tend to drive less. On the other hand, the cost per kilometre is higher the less you drive as fixed costs are divided by the total number of kilometres. For people living in the city centre, the cost of parking should also be added to the cost of owning a car. Within central Malmö, the cost of parking is 1-2,5 Euro/h depending on parking zone. Residents in the city centre pay a lower fee of 1,5-2,5 Euro/day in the area where they live, which adds up to 45-75 Euro/month. The total cost of owning and driving a car for someone living in the central parts of Malmö hence lies around 395-425 Euro/month.

In Copenhagen, the hourly price of parking is 1,35-3,8 Euro/h depending on parking zone, but residents can hold a residential parking license at around 90 Euro/year which means that parking is a rather small cost for most residents of Copenhagen.

Although owning and driving a small, second-hand car in the Swedish context incurs a cost of about 400 Euro/month, for EC2B to be able to compete with private car ownership the monthly cost per customer needs to be lower than that. It should also be acknowledged that the cost of owning a car is most often shared between several individuals in a household. To make the cost of EC2B comparable, one option would be to create “family packages” that includes mobility for several individuals at a competitive price.

It should also be remembered that many of the potential customers of EC2B already have a monthly subscription to public transport, for which they pay between 50 Euro for a pass valid within the city of Malmö to 130 Euro for a pass valid within the whole region of Scania. A pass valid for commuting between Malmö and Copenhagen is about 200 Euro/month. As public transport is foreseen to be included in the EC2B service package, customers would not have to pay for this service twice. Depending on each individual’s daily transport need, EC2B packages would have to be customized to include a relevant amount of public transport, which would also be reflected in the price.

Current costs for property developers

For property developers, building a parking spot is about 12 000 Euro in a multi-storey car park, and 25 000-45 000 Euro in an underground garage. An alternative for property developers today is to acquire the required parking spots in a multi-storey car park operated by the municipality in Malmö, which according to Malmö's parking policy from 2010 costs 5000-10 000 Euro per spot depending on the area (the higher cost in central locations). This is a comparatively low amount, the nearby city of Lund e.g. charges around 15 000 Euro per parking spot.

If property developers experience EC2B as a viable alternative to paying for parking spots with the municipality, this means they should be ready to pay in the range of 5000-10 000 Euro per parking spot that is replaced by EC2B.

5.3 Assessment of feasibility

Feasibility of EC2B in Malmö

In Malmö, the implementation of an EC2B pilot seems highly feasible. The city supports the concept, and seems willing to create supporting conditions for a pilot through accepting EC2B as an alternative to providing parking spots in connection to a new development. Several property developers have shown an interest in the concept, and negotiations are ongoing with two of them. A dialogue has been initiated with key transport operators, and both public transport operator Skånetrafiken and car-sharing firm Sunfleet have expressed an interest in the concept, although the dialogue is yet at an early stage.

Feasibility of EC2B in Copenhagen

In Copenhagen, the implementation of an EC2B pilot seems less likely in the near term. Although the municipality of Copenhagen as well as the three transport operators are interested in MaaS as such, the idea of connecting MaaS to accommodation is less feasible in the context of Copenhagen, as the necessary preconditions for working with flexible parking requirements are not in place. Hence the way forward will be through voluntary agreements. In the future, it may be interesting to try to identify property developers that would be interested to include EC2B in their accommodation concepts anyway, but this will have to be on a later stage as it means that one of the central cash flows of EC2B as we think of it today would not be available. Another option in Copenhagen in a later phase could be to introduce EC2B at a larger scale already from the start, e.g. at city district scale.

6. Conclusions and next steps

6.1 Conclusions

Mobility as a service is certainly a concept that attracts a lot of interest and is likely to play a significant role in the future transport system of our cities. Also the niche market of connecting mobility services to accommodation is on the rise, but at the moment EC2B seems to be the only service designed to include both public transport, car-sharing and other transport services in a service connected to accommodation.

What are the opportunities then for scaling the EC2B business model? Some pre-conditions need to be in place for EC2B as we think of it today to be viable. First, a certain level of accessibility with walk, bike and public transport is required if EC2B is to be an attractive alternative to the car. This means EC2B is best suited for urban areas with a certain population density. Second, there needs to be legal conditions in place that allow property developers to exchange parking spaces for EC2B, as this is a key bargaining chip for making the EC2B business model work. When municipal authorities provide the possibility for property developers to trade parking spaces for mobility services, this means previously locked assets are released that can be invested in EC2B. In contexts where strict parking requirements are not in place, the market forces could play an important role. If there is a market demand for accommodation with access to mobility services instead of parking spaces, property developers may get higher returns on investment if they build less parking spaces and instead include EC2B in their service offer to tenants as this allows them to exploit their properties to a higher degree. Third, necessary agreements with key partners need to be in place, not least with public transport which EC2B depends on.

As already indicated above, though, another option could be to adjust the EC2B business model to also make it possible to implement in other contexts, e.g. in existing housing, in commercial buildings etc. This might be interesting in a later phase and has not been dismissed as a potential future development for EC2B.

6.2 Next steps

Given that this feasibility study shows promising results for the potential implementation of an EC2B pilot in Malmö, Trivector intends to continue to work towards turning EC2B into a start-up, and implementing the first pilots. In parallel to the process we have had going with Malmö and Copenhagen, we have also started a dialogue with LKF, the municipal housing company in Lund, aiming at creating another pilot in Lund. Before being able to implement the first pilots, however, we need to further validate the business model, both in relation to end customers, property developers and mobility service providers. Who exactly are our main end customers? How much are they willing to pay for our service? How can our offering be customized to cater for their different needs? We also need

to continue our dialogue with the main transport providers to get them on board, and before we can sign any agreements we need to further develop and validate the value proposition in relation to these key partners. Furthermore, we need to solve the remaining technical details and find a preliminary content for the social function to get a “minimum viable product” in place for testing in these first pilots.