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Executive Summary

This deliverable describes the preparation and launch of activities performed in T7.5, Demonstrating Transition Track #3: “smart e-mobility up to M24” of the IRIS project. Within this transition track, a new Mobility as a Service (MaaS) concept called EC2B (“Easy to be” or “Easy to B”), is implemented in Gothenburg. EC2B offers customers an attractive alternative to owning their own car, allowing easy access to a variety of transport modes (as e-cars, e-bikes or public transport) in connection to where customers live or work and make their everyday choices for transport. The demonstrator will contribute directly to the goals of rolling out electric vehicles and reducing transport-based CO2 emissions, and indirectly also to the goal of increasing local air quality. EC2B is developed by the IRIS-partner Trivector, an SME based in Lund in the south of Sweden.

EC2B comprises three parts: flexible mobility services, advice and community. For the EC2B concept to be viable, local authorities need to be supportive of the idea of exchanging parking lots against MaaS in connection to a building, allowing the construction of buildings with a reduced number of parking lots, but requiring property developers to provide other services in exchange. The main value propositions are:

- EC2B helps residents in the (larger) cities to a carefree mobility without the need to own a car.
- EC2B helps real estate developers who want to offer the market a modern, urban and low-car housing concept, through a package solution for sustainable and flexible mobility that is attractive to both customers (residents) and authorities (the municipality).
- EC2B helps mobility service providers who want to reach a large and affluent market for their sustainable mobility services. It will form part of a comprehensive service for sustainable mobility, easily available at home.
- EC2B helps cities create a more attractive urban environment and sustainable development with fewer cars and a significantly more efficient land use.

In demonstrator 1, the EC2B service is developed for and offered to the residents in the 132 apartments in Riksbyggen’s Brf Viva (Brf Viva). Brf Viva is a tenant-owned housing association in Gothenburg built by Riksbyggen. The tenants will have access to four electric cars, one light e-vehicle (Zbee), four electric cargo bikes and five electric bikes, as well as public transport. In demonstrator 2, EC2B will be implemented in a lighter version among employees at Campus Johanneberg, together with Akademiska Hus, HSB and other actors on campus.

The full EC2B service in Brf Viva including app, vehicles and counselling service was launched in a first version in March 2019, and the vehicle sharing is now fully implemented with e-bikes, e-cars and light e-vehicles. Vehicles are used at a satisfying rate, and booking of vehicles and unlocking of the key cabinet through the app are working. The possibility to purchase electronic tickets for public transport was also rolled out during the spring of 2019 through a collaboration with the regional public transport authority. The app development proved more difficult than expected, and some of the functionality that was planned to be included in the first version is still under development. Nevertheless, there is a demonstrator in place with real users in Brf Viva. Trivector has also built a very strong partner network with good relationships to the mobility service providers and the app developer, which is an important asset for the work to launch EC2B at Campus Johanneberg which now is taking off.



Demonstrator	In a nutshell
#1 EC2B for tenants in Brf Viva	<u>Brief summary:</u> The MaaS concept EC2B offers customers an attractive alternative to owning their own car, allowing easy access to a variety of transport modes (as e-cars, e-bikes or public transport) in connection to where customers live or work. In demonstrator #1 EC2B is implemented for tenants in the 132 apartments in Brf Viva in Gothenburg, where no private car parking is available.
	<u>Expected impact:</u> Providing a mobility service instead of car parking means tenants are nudged towards more sustainable transport habits, using a car only when they need one.
#2 EC2B for employees on Campus Johanneberg	<u>Brief summary:</u> In demonstrator #2, the EC2B concept is adjusted to cater for the needs of employees in the campus area of Johanneberg. In addition to providing easy access to a wide range of transport options, a function will be developed within the EC2B app which allows employees to send receipts of their travel expenses (as car rental fees or public transport tickets) directly from the app to their employer's financial department in order to reduce administrative procedures.
	<u>Expected impact:</u> Through offering attractive options for local business travel, employees will be less dependent on driving their own car to work to be able to use it for business trips during the day, resulting in more sustainable transport habits and less traffic in the campus area. An added benefit is a reduced administrative burden for handling travel expenses.



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List of Abbreviations and Acronyms

Abbreviation	Definition
App	Application
API	Applications Programming Interface
Brf	Bostadsrättsförening/Housing Association
CIP	City Innovation Platform
DoA	Description of Action
EC2B	“Easy to be” or “Easy to B”
EU	European Union
FC	Follower City
ICT	Information and Communication Technology
IS	IRIS Solution
KPI	Key Performance Indicator
LH	Lighthouse
LHCSM	Lighthouse City Site Manager
MaaS	Mobility as a Service
TT	Transition Track(s)
WP	Work Package

1. Introduction

1.1. Scope, objectives and expected impact

Within this transition track, a new Mobility as a Service (MaaS) concept called EC2B (“Easy to be” or “Easy to B”), will be implemented in Gothenburg. EC2B offers customers an attractive alternative to owning their own car, allowing easy access to a variety of transport modes (as e-cars, e-bikes or public transport) in connection to where customers live or work and make their everyday choices for transport. EC2B is developed by the IRIS-partner Trivector, an SME based in Lund in the south of Sweden. Trivector Traffic is a traffic and mobility consultancy, with offices in Lund, Stockholm and Gothenburg, and increasingly active in innovation within the field of sustainable transport.

MaaS innovation projects often have a large focus on the ICT-solution needed to integrate several different mobility services into one app. However, research shows that the hurdles inherent in getting MaaS off the ground are not primarily technical, but have to do with the business model and getting all the actors in the MaaS ecosystem to sit at the same table in order to realise the potential benefits of collaboration.¹ The main focus of the EC2B demonstration in IRIS is therefore not on the app or the ICT scheme behind it. Rather, our focus is on designing a service that responds to the needs all actors involved: end-users as well as property developers and transport service providers, in order to find a working business model. The ICT-solution used in the project is a necessary prerequisite for being able to demonstrate a MaaS service, but it has a subordinate role.

The EC2B service integrates several different mobility solutions within one app. To start with, the following are included: e-cars, e-bikes (normal bikes as well as cargo bikes), light e-vehicles and public transport. Further on, taxi, rental cars and municipal bike sharing might be added. The APIs (Application Programming Interfaces) of all these services are integrated into the EC2B app, which becomes their user interface, while still clearly marketing their brand names.

An innovative feature of the service is that it will include mobility management elements, where users at strategic points in time will receive personal advice on how to achieve a more sustainable travel pattern, taking their specific needs into account. The service is augmented by an ICT (Information and Communications Technology) system (a Mobility as a Service/MaaS platform), displaying the different transport options available, handling booking, payment, etc. The service will also involve guidance and “nudging” features, steering users towards greener transport options as well as giving access to a sharing community among users. The core task of TT #3 is to develop the content of the service and the advisory module as well as to coordinate implementation of the service with the actors involved, including property developers, employers, transport service providers and IT developers.

The objective of T 7.5 is to demonstrate an alternative to the private car for travel for both households (demonstrator 1) and workplaces (demonstrator 2). In the first demonstrator, the EC2B service is

¹ Karlsson, M et al (2019). Development and implementation of Mobility-as-a-Service – A qualitative study of barriers and enabling factors *Transportation Research Part A Policy and Practice*. DOI: 10.1016/j.tra.2019.09.028



developed for, and offered to, the residents in the 132 apartments in Riksbyggen's Brf Viva. In the second demonstrator, EC2B will be implemented in a lighter version among employees at Campus Johanneberg, together with Akademiska Hus, HSB and other actors in the campus area.

It is expected that users of the EC2B service will use private cars less often (in the case of Brf Viva even to sell their private cars), and instead use public transport, shared bikes and shared e-cars, reducing their carbon footprint from transport. An additional objective is to develop and test the business model of a MaaS concept integrated with households or workplace.

1.2. Contributions of partners

The EC2B service is developed by Trivector together with a subcontractor who develops the ICT system, whereas the implementation of the service in Brf Viva (demonstrator 1) is made in close collaboration with Riksbyggen. The implementation at the Johanneberg Campus area (demonstrator 2) is made together with employers and property owners in the campus area: i.e. Chalmers technical university, Johanneberg Science Park, and property owners HSB, Akademiska Hus and Chalmersfastigheter (not a partner in IRIS but important actor in the campus area).

1.3. Relation to other activities

This deliverable describes the preparation and launch of activities performed in T7.5, "Demonstrating Transition Track #3: smart e-mobility" up to M24 of the IRIS project. It builds further on work reported in D7.1 and D7.2. The plan for monitoring of activities is presented in D9.5, and the results of the monitoring of the demonstration in T7.5 will be reported in D9.6 (intermediate monitoring report) and D9.7. Activities in T7.5 are also related to work in WP3 on business model and exploitation activities, as well as WP8 on replication.

1.4. Structure of this deliverable

This deliverable describes the launch of activities for the two interrelated demonstrators of the MaaS concept EC2B in Gothenburg: in Riksbyggen's Brf Viva with 132 apartments (demonstrator 1) and in the Johanneberg campus area (demonstrator 2). As the two demonstrators are similar in many parts, each of the chapters in this deliverable covers both demonstrators, to avoid unnecessary overlap. Chapter 2 introduces Gothenburg's ambitions for TT #3. Chapter 3 describes the baseline and identified drivers and barriers for implementing the two demonstrators. In chapter 4, the organization of work within T7.5 is described, whereas chapter 5 goes more into detail on the implementation of EC2B in the two demonstrators, with information on technical specifications which are of relevance for readers specifically interested in TT#3. Chapter 6 describes the monitoring scheme and relevant KPIs (Key Performance Indicators) for the two demonstrators respectively, and chapter 7 discusses ethics requirements. Chapter 8 finally concludes and looks ahead. References are found in chapter 9.



2. Demonstration in a nutshell

2.1. Ambitions for TT#3

Gothenburg's ambition for the selected demonstration and replication is to develop and demonstrate new solutions for integration of different solutions of mobility.

The district has adopted a "Green Travel Plan", according to which a prerequisite for the densification of the campus area is that the total travel by car to the area will not increase compared to today's level. The Green Travel Plan contains references to city policy objectives for the city to grow and densify while reducing car traffic, to the city parking policy and to the region's goals for increased public transport. Shared mobility solutions will therefore be crucial for the expansion of residential housing and offices. The regional company for public transport, Västtrafik, has a target to reduce CO₂ emissions from public transport by 90% by 2035, as part of the environment and climate strategy for Västra Götaland Region, which was decided in November 2018. When this goal is broken down into real plans for Västtrafik, it means among other things, large investments in electric buses for urban transport, and biogas buses for regional transport.

Västtrafik (the regional public transport authority) as well as the city of Gothenburg are also working proactively to stimulate the development of mobility as a service (MaaS). The city of Gothenburg has adopted a new parking policy in 2018 which allows a lower parking norm in new developments given that property developers make arrangements for alternative mobility services such as car sharing and bike sharing, specifically encouraging new solutions such as MaaS².

Focus for the IRIS project is hence on working with MaaS as a means to reduce car dependency and reduce the number of parking spots in new developments.

	2017	2018	2019	2020	2021
Demonstrator 1: EC2B in Brf Viva	0	0	15 e-vehicles	15 e-vehicles	15 e-vehicles
Demonstrator 2: EC2B in Campus Johanneberg				Existing e-vehicles integrated in campus-wide service	Existing e-vehicles integrated in campus-wide service

² Riktlinjer för mobilitet och parkering i Göteborgs Stad



2.2. Demonstration area

In district Johanneberg, the EC2B e-mobility service will be implemented in two different demonstrators (Figure 1).

Demonstrator 1: In Riksbyggen's Brf Viva, tenants in the 132 apartments get direct access to EC2B through accommodation, with specific measures implemented in connection to the building complex. The city of Gothenburg works to create favourable conditions for property developers who work with innovative housing concepts that reduce the demand for private car ownership. There is no regular parking included but in exchange, the property developer implements other measures that reduce the need for private car ownership. Residents will have exclusive access to 4 electric cars (to start with Renault Zoe, later on one or two of these might be exchanged for somewhat bigger e-car models), 2 light e-vehicles, 4 electric cargo bikes and 5 electric bikes, as well as charging infrastructure for all types of e-vehicles (55 recharging polls for e-bikes, 6 for e-cars and 2 for light e-vehicles).

Demonstrator 2: In the version of the EC2B service demonstrated at the Johanneberg campus area, it was originally assumed that it would be offered to all end users in the campus area, both students and employees (15 000 people). However, after thorough discussions with the local partner consortium for T7.5, it was obvious that partners saw clear advantages with demonstrating a version of the EC2B service specifically targeting the needs of the employees in the campus area, instead of launching a more general service open to both students and employees. Hence, employees in the Johanneberg campus area (e.g. tenants to Akademiska Hus and Chalmersfastigheter, the two main property owners in the campus area) will now get access to a light version of EC2B, which includes booking and payment of e-vehicles (e-cars and e-bikes) at several locations around the district, but which does not include specific measures in connection to each building. A variety of transport suppliers already active in the district will provide the transportation services (e-car sharing, bike sharing, e-scooters and public transport). Furthermore, a function will be developed within the EC2B app which allows employees to send receipts of their transport expenses (as car rental fee or public transport tickets) directly from the app to their employer's economy

department in order to reduce administrative procedures.



Figure 1 Photo of demonstration area with Johanneberg campus area in the centre and BRF Viva to the left

2.3. Integrated Solutions in TT#3

The demonstrators described in this deliverable are part of the integrated solution “Innovative Mobility Services for the Citizens” of TT #3.

2.4. Integration of Demonstrators

The two demonstrators described in this deliverable are integrated as they both demonstrate the EC2B concept, but in different contexts. In demonstrator 1, the EC2B concept is implemented in BRF Viva, and the EC2B app is developed to cater for the needs of the residents of BRF Viva. In demonstrator 2 at Campus Johanneberg (which is planned to start later) takes its point of departure in the version of the EC2B concept and the app developed for BRF Viva, but develops it further to better cater for the needs of employees in Campus Johanneberg. The two demonstrators are located in close proximity to each other, and the e-cars stationed at BRF Viva and in the campus area can be accessed and used by users in both demonstrators as they are open to all users having registered with the car sharing company. However, e-bikes and light e-vehicles can only be accessed by users in the same demonstrator as these are located indoors to avoid theft.

Furthermore, there are several other demonstrators connected to TT#1 and TT#2 implemented in BRF Viva, which are not actively integrated with the demonstrators in TT#3.

2.5. Deviations according to the Grant Agreement

The pool of e-vehicles in Demonstrator 1 is under development, and the numbers of different types of vehicles will be adjusted throughout the first years of the demonstrator based on feedback from users and usage of the different vehicles. This means it is not certain that the composition of the vehicle pool will match in detail to that stated in the Grant Agreement.

For demonstrator 2, Trivector initially expected to roll out a light version of the EC2B service broadly on the campus area, targeting both employees, students and residents in the area. However, in discussions with the property owners and the largest employers in the area during the spring 2019 on how to best design a service that has a real impact on the mobility situation in the campus area, the project consortium came to the conclusion that such a broad service, targeting everyone but not being tailored for anyone, would not be an attractive value proposition to have an impact. Instead, partners are now developing a version of the EC2B service specifically tailored to the needs of the employees in the area, which will provide a better value for money. This version will form a very good complement to demonstrator 1 and is a better test of EC2B's business model than the original plan. However, it means the test group will be smaller than anticipated in the Grant Agreement, approximately involving 300-400 users.



3. Baseline/Drivers and barriers

3.1. Baseline

The mobility situation in the Johanneberg area is strained, as Gothenburg as a whole is a city traditionally planned and built for cars. During recent years, the city and the regional public transport company have implemented many measures to change this, but 44 % of journeys are still made by car³. In the area around campus Johanneberg, main actors such as Chalmers University of Technology, Akademiska Hus, other property owners and the municipality of Gothenburg have been working for several years to achieve and implement a Green Travel Plan for the area. According to the plan, a prerequisite for expansion and densification of the area is that the total travel by car to and from the area will not increase, compared to today's level.

Before the launch of the IRIS project, there was no MaaS available in the Johanneberg campus area, neither for residents nor for employees or students. Chalmers Technical University, Akademiska Hus and HSB have all procured car-sharing services that employees can use for business trips. Usage varies between the organizations. Whereas Chalmers have procured their own car sharing service from MoveAbout with three e-cars which have a high degree of usage, HSB and Akademiska Hus rely on the main Swedish car sharing operator Sunfleet, who has a relatively high number of ordinary cars and also some hybrid cars (but no pure e-cars) stationed in the main campus area. Usage of these cars for business trips among the employees is however rather low. Akademiska Hus has some shared bikes for employees to use (one e-bike and a couple of ordinary bikes), but these are not very often used as they are not possible to book on beforehand, employees do not know where to find these bikes, and there are no routines for keeping the bikes in good standard. At Chalmers, some departments have bikes for loan, but there is no common booking system for these.

Sunfleet had before the start of the IRIS project (and before the construction of Brf Viva) five ordinary cars stationed within 500 meters from Brf Viva, but no e-cars or hybrid cars.

Currently, the city has two electrical bus lines, powered by fully electric and hybrid buses. The first, that has been in operation for some years now, is the bus 55, operating the line between campus Johanneberg/Johanneberg Science park and campus Lindholmen/Lindholmen Science Park. The line is operated by eleven buses, of which three are fully electric and eight are hybrid buses. The bus line 16 is partly operated with two electric, articulated buses.

There is charging infrastructure available for electric vehicles, currently 27 chargers, in the Johanneberg campus area.

³ Trafikkontoret, Göteborgs stad. Trafik- och Resandeutveckling 2018



3.2. Drivers and Barriers

3.2.1. Technical:

Drivers – New digital technology opens new possibilities for shared mobility: it has never been so easy to find information, book and pay for public transport, car sharing and bike sharing. Charging infrastructure for e-vehicles is rolled out at large scale and many cities invest in bike sharing schemes. These are all drivers for the development of Mobility as a Service (MaaS).

Barriers – In a MaaS solution, APIs from many different sources need to be integrated, which might be difficult if these APIs do not follow the same standard. Furthermore, as MaaS is a new phenomenon, transport operators have limited experience with integration, and do not know what problems can occur when they integrate with other platforms. This was experienced in the integration of public transport tickets from Västtrafik in the EC2B app, where technical barriers delayed the implementation of digital tickets in the app.

3.2.2. Legal:

Drivers – In Sweden, more and more municipalities open up for flexible parking norms, where property developers can negotiate to reduce the number of parking lots they provide for each apartment if they instead implement other measures which reduce car ownership among the residents. This opens a new market for MaaS connected to accommodation. The issue of legislation is further discussed under section 5.2.3 (Governance).

Barriers – Swedish legislation is not clear on what role public transport can take in relation to MaaS, as public transport is publicly subsidized. This has made public transport authorities a bit reluctant to engage with private MaaS providers, but the process of public transport authorities understanding their role in the new mobility landscape is ongoing and at the moment Trivector is hopeful that our collaboration with public transport which is now on a pilot-basis only will be followed by a long terms contractual arrangement or cooperation.

3.2.3. Social:

Drivers – There is an emerging trend where more and more people are concerned about their environmental footprint. Changing one's mobility pattern is not easy, but experience shows that moving into a new apartment is a window of opportunity for behavioral change. Experiences from BRF Viva seems to confirm this hypothesis.

Barriers – There are still many structures in society that presuppose that you own a car, and these are not overcome overnight. Hopefully this project can contribute to a mind shift among people coming into contact with the EC2B service.

3.2.4. Financial:

Drivers – MaaS connected to accommodation can reduce costs for property developers as it might reduce the number of parking lots they need to provide. It can also lower mobility costs for users if they are able



to get rid of their car. For mobility service providers, it might attract new customers. The driver is thus a potential value proposition for all involved parties.

Barriers – It is difficult to find a business model that works for all actors involved in a MaaS solution. Developing and maintaining the digital platform costs money, and most mobility service providers usually have very low margins, so it is hard to find the additional money to fund this new layer, especially before the added value to partners can be demonstrated. Scrutinising the business model of EC2B is therefore an important part of the project.

3.2.5. Environmental:

Drivers – The environment will potentially benefit both from the reduction in number of vehicles in circulation (less resources being consumed), the shift from fossil fuel to e-vehicles, the shift of transport mode for some trips from car to public transport, cycling or walking, and a reduction in the number of kilometres travelled, which is known from other projects is a common outcome when people go from owning a car to relying on shared modes.

Barriers – Mobility packages that include free access to public transport might shift some journeys from walking and cycling to public transport. Similarly, users who did not previously have access to a car might increase the number of car trips when they get access to a car sharing service in connection to accommodation.



4. Organization of work

Trivector is task leader of T7.5, and also has the largest budget for implementing this task. At Trivector, a team of 6-7 people are deeply involved in the project. A task leader coordinates work in relation to the IRIS project. Another person is our main contact in relation to Riksbyggen concerning Brf Viva (demonstrator 1), but also in relation to the mobility service providers we are collaborating with for both demonstrators. Two other colleagues are responsible for the contact with the subcontractor developing the app, SmartResenär. Furthermore, two colleagues with previous experience with Mobility Management have the main responsibility for developing and implementing the counselling part of the EC2B concept. Lastly, there is one person having responsibility for demonstrator 2, focusing on the campus area. To coordinate action internally, we have weekly meetings for information sharing with a set agenda.

For the development of the app, Trivector has recurrent meetings with the subcontractor SmartResenär, to keep informed about the work and discuss priorities along the way. During the periods of most intensive development, these meetings have taken place every week. At many of these meetings, mobility providers Västtrafik (public transport operator) and GoRide (bike sharing company) who are not part of the IRIS project have also been taking part as integration of their services into the app is an important part of development.

Trivector has a close collaboration with Riksbyggen for the implementation of EC2B in Brf Viva (demonstrator 1). For the first year of implementation we have had a coordination meeting between Trivector and Riksbyggen approximately every three weeks to make sure the implementation of the demonstration runs smoothly and plan activities ahead. When needed, representatives from the mobility service providers also participate in these meetings.

When it comes to the demonstration on Campus Johanneberg (demonstrator 2), Trivector has initiated a collaboration with Akademiska Hus and HSB who both have a small share of the budget of T7.5. In this collaboration Chalmers Technical University have also been invited, who are not formally part of the task but have an important role as the biggest employer in the campus area, as well as Chalmersfastigheter, who is the main landlord at Chalmers. These actors already have an established collaboration on campus mobility through the Green Travel Plan, and also on campus development generally through the FiveStar Campus initiative. This group met once in 2018, and has recurrent meetings from spring 2019 onwards as work on this task became more intense.

5. Demonstration of MaaS concept EC2B in Brf Viva and Campus Johanneberg

5.1. Specification of the measure

5.1.1. Hardware

Demonstrator 1: Version for Brf Viva

Residents in Brf Viva will have access to four e-cars (see Figure 4). To start, Renault Zoe have been chosen, while later on one or two of the cars might be exchanged for somewhat bigger models of e-cars. Residents will also have access to two light e-vehicles (Zbee), four electric cargo bikes and five e-bikes (see Figure 5), as well as charging infrastructure for all types of electric vehicles (55 recharging polls for e-bikes, 6 for e-cars and 2 for light e-vehicles). In addition, a collaboration with the Swedish e-scooter operator VOI is being discussed. The first bikes and cars were installed in December 2018 when the first residents moved in, and the number of cars and bikes increased as more and more residents move in to reach the numbers indicated above. The light e-vehicles arrived in May 2019. To access the e-bikes and light e-vehicles, an electronic key cabinet has been installed which is opened using the EC2B app (see Figure 6). Cars are at this stage opened through the Sunfleet app, which is so far only partly integrated in the EC2B application.

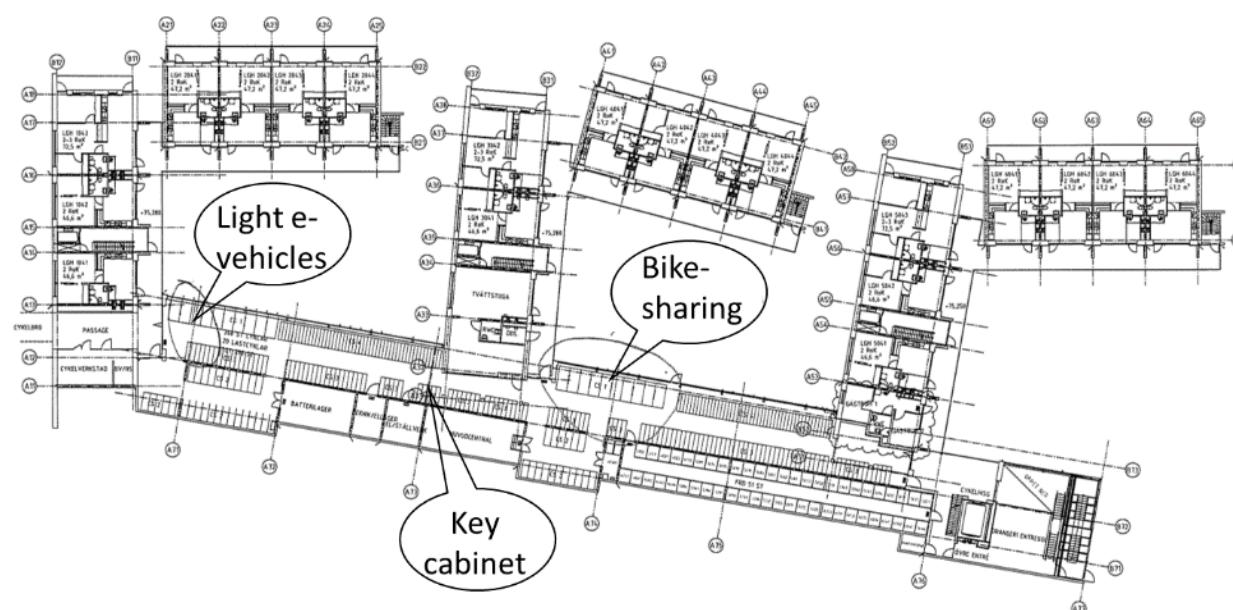


Figure 2 Plan over Brf Viva indicating location of light e-vehicles, shared e-bikes and key cabinet. Bikes and light vehicles are placed in an indoor garage at level -1 in relation to Dr Allards aata, accessed through a bridge from street level. Plan from Riksbvaagen.

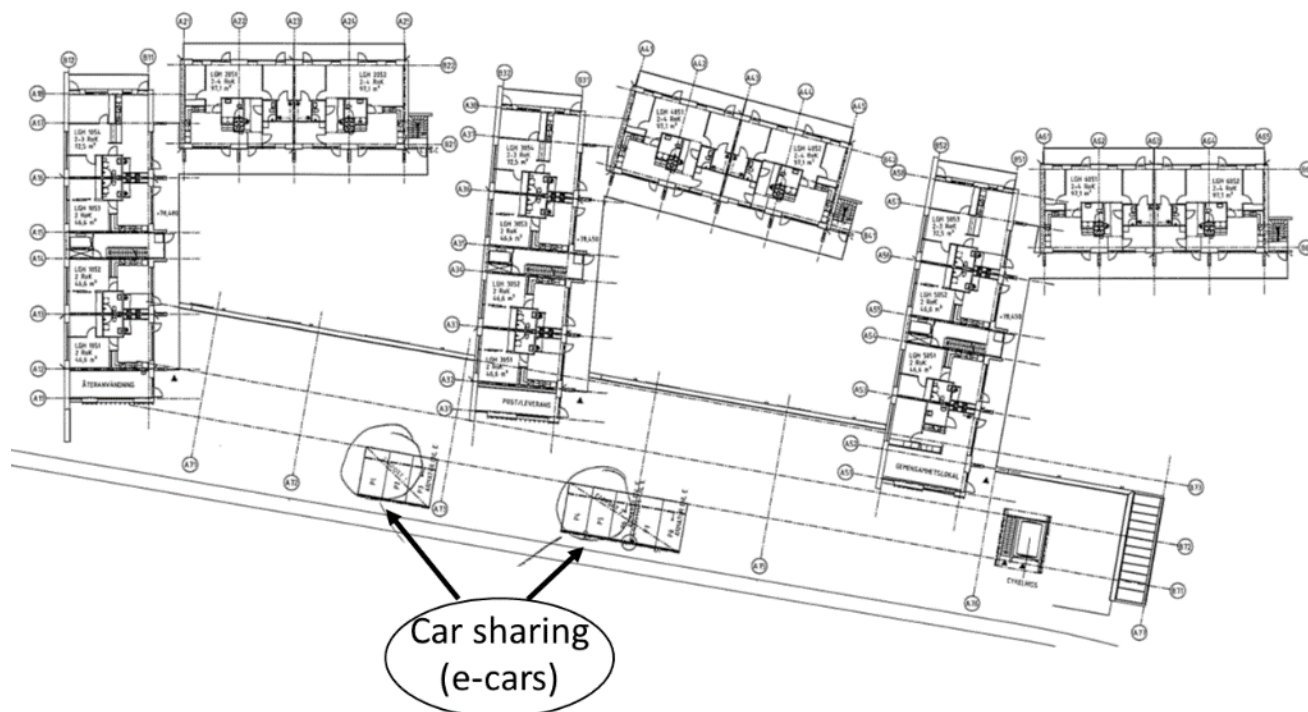


Figure 3 Plan over Brf Viva indicating location of e-cars in car sharing solution. Cars are located in car ports in same level as Dr Allards Gata. Plan from Riksbyggen.



Figure 4 E-cars being charged in car port at Brf Viva



Figure 5 Some of the shared electric bikes in Brf Viva, including both ordinary e-bikes and cargo bikes. Helmets can also be borrowed.



Figure 6 Key cabinet for bike and light e-vehicles in Brf Viva. Each key has its own case which is unlocked individually through the EC2B app.

Demonstrator 2: Version for Campus Johanneberg

In the version developed for Campus Johanneberg, the setup will mainly build on the vehicles already available in the campus area. Several of the partners involved in the project already have agreements with car sharing companies for employees to use for business travel, and some also have a small number of shared bikes, although these are not much used. Details are now being negotiated on how existing resources can be integrated in one common mobility service, and hence more efficiently used. More e-bikes are on the wish list, as is a common service function to make sure bikes are working properly when employees need them. Also in the pipeline is an integration of the city of Gothenburg's bike sharing system Styr&ställ, which is already available at campus. Fully implemented, a MaaS concept at Campus Johanneberg would comprise four mobility hubs to cover the whole campus area, see Figure 7.



Figure 7 Potential mobility hubs at Campus Johanneberg

5.1.2. Software – demonstrators 1 and 2

Users of the EC2B service access available transport resources through the EC2B app.

MaaS ICT platform

The EC2B app has been implemented based on a MaaS ICT platform from the subcontractor *SmartResenär*. The SmartResenär platform consists of three main parts: a frontend component library for rapid mobile app development, a collection of generic MaaS backend services and tools that runs on SmartResenär servers and an integration layer where API integrations towards mobility suppliers are implemented and managed by SmartResenär. The structure of the ICT platform is further illustrated in Figure 8. The purpose of the SmartResenär platform is to facilitate rapid development and efficient management and operation of MaaS applications by providing MaaS operators with generic, reusable

MaaS functionality and ready-made mobility supplier API integrations so that the MaaS operator can focus their efforts and resources on how to package, design and deliver their unique customer-facing (UX/UI) service offering. SmartResenär assists MaaS operators with this last part by supplying bespoke development and customisation services.

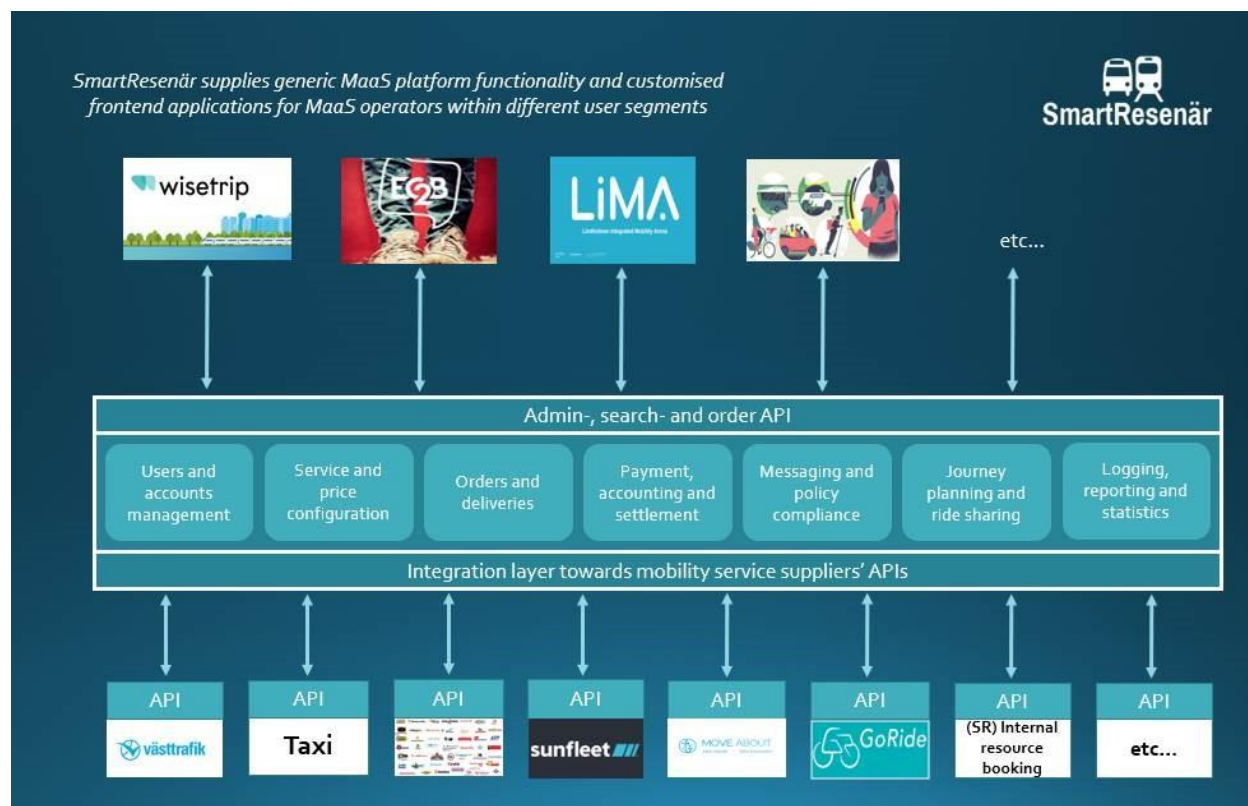


Figure 8 SmartResenär generic MaaS ICT platform used in the project

User interface of the EC2B app

The user interface of the EC2B application is explained in Figure 9. So far, the app is only available in Swedish, but the main functionality in each screen is explained in the figure. Through the EC2B app users can see available vehicles, handle bookings of bikes, light e-vehicles and e-cars, and unlock the key cabinet. The logic of booking and unlocking e-bikes and light e-vehicles is explained in Figure 10.

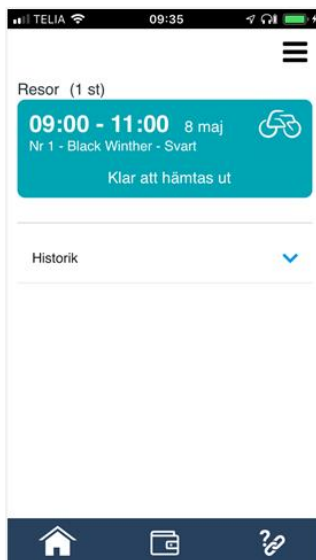
Through a unique collaboration with public transport operator Västtrafik, users in Brf Viva also have the opportunity to buy digital public transport tickets from Västtrafik directly in the app. This is the first time a public transport operator in Sweden opens up to sell their digital tickets through a third-party digital retail channel, and so far this has only been agreed for a trial period until the end of 2019 although Trivector is involved in a constructive dialogue on a continuation.

The logic of buying public transport tickets through the app is shown in Figure 11. Booking of cars has not yet been deeply integrated into the EC2B app, and at the moment, users are linked from the EC2B app to the Sunfleet app when they want to book a car. For demonstrator 2, an integration is planned with the car-sharing operator MoveAbout, which has a number of e-cars stationed in the Johanneberg campus area.

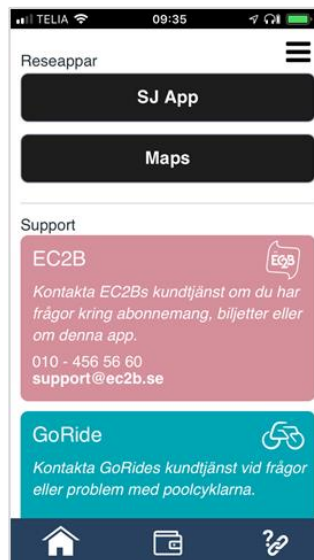
Functionality in the EC2B application



The home screen where trips are booked. Accessed through the house symbol at the bottom.



The "wallet" where the user can access booked trips. Accessed through the middle button



The page "links and customer service" is where users access the customer services for included mobility services.



The time selector is accessed through clicking on the clock at the home screen.



A side menu with more options is accessed through clicking on the three lines at the top right corner.



The FAQ is accessed through the side menu

Figure 9 Main functionalities of the EC2B application



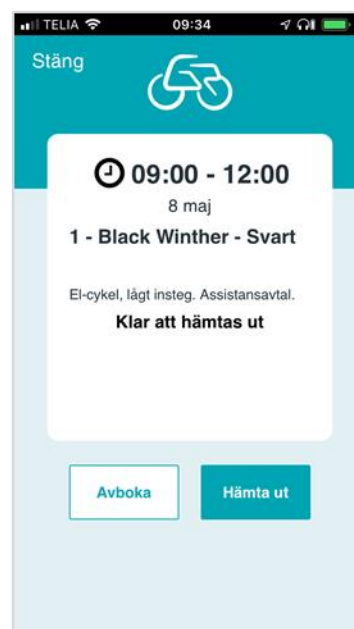
Booking of e-bikes and light e-vehicles



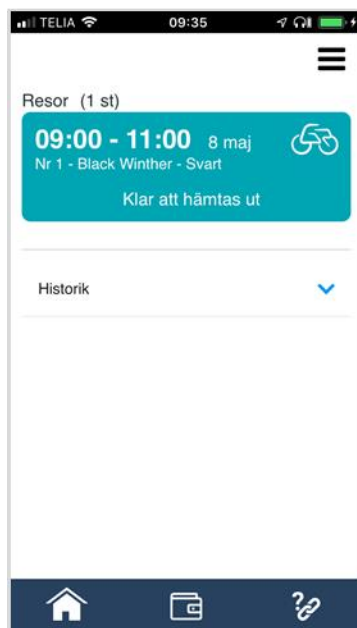
The user selects a time and length for desired reservation. Based on this information available vehicles are listed.



The user selects a vehicle to see more information and clicks the button at the bottom to make the reservation



When the reservation has been made, this is confirmed on a new screen



The reservation is now available in the wallet.



When the user is ready to pick up the reserved bike, s/he unlocks the key cabinet in two steps using the app.

Figure 10 EC2B application: booking of e-bikes and light e-vehicles



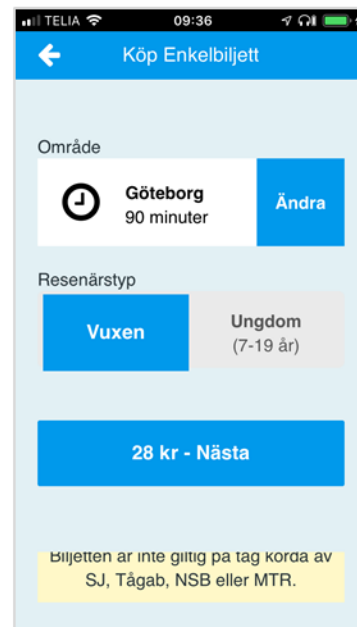
Purchase of public transport tickets



The user can access public transport tickets from the home screen



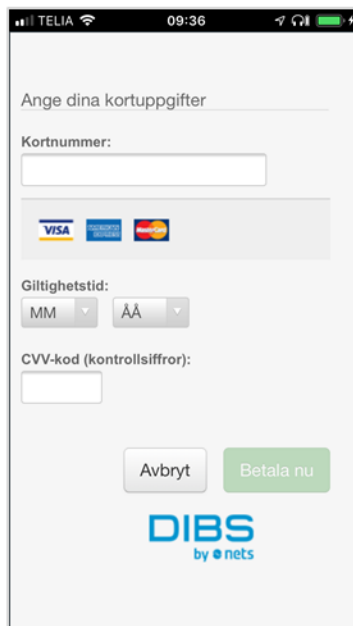
Different types of tickets (single, 30 days of 24 h) are available in the app



When selecting the ticket type, you also get the choice between adult or youth ticket



The user confirms the purchase. It is possible to save credit card details for future purchases.



The user registers credit card details



A ticket is saved in the wallet which can be validated by the public transport operator.

Figure 11 EC2B application: purchase of public transport tickets



5.1.3. Procurement of equipment and services

Development of the EC2B application to be used in demonstrators 1 and 2 was procured by Trivector within the IRIS project. The task being subcontracted is the work related to setting up and adjusting an ICT system to the requirements of the IRIS project for use within Johanneberg (Gothenburg), as the MaaS platforms available on the market are general in character and need to be adapted to the specific circumstances of the project. Procurement also covers support and costs related to license during the pilot period. For the procurement, a specification of the service was made based on parameters that were identified as relevant. A screening of the market was performed and offers were taken in from several providers and evaluated according to a pre-defined evaluation scheme, taking into account the principles for best value for money and absence of any conflict of interest (according to Articles 10, and 13 of AMGA).

Riksbyggen has procured the e-bikes and the key cabinet for demonstrator 1, whereas e-cars are leased through car sharing operator Sunfleet and light e-vehicles are leased through Clean Motion. Procurement and leasing of vehicles is financed outside of the IRIS project.

Procurement of vehicles and other equipment (as key cabinets) for demonstrator 2 will be financed outside the IRIS project by Akademiska Hus and Chalmersfastigheter.

5.2. Societal, user and business aspects

5.2.1. Citizen engagement

One of the tag lines that Trivector has had in mind while developing the EC2B concept has been “easier every-day life with EC2B”. In order to create a service that can really help users achieve a hassle-free and sustainable mobility, a close dialogue with potential and real users has been central. During the first year of the IRIS project, before the first residents moved into Brf Viva, interested future residents were invited to a series of three meetings where the plans for EC2B in Viva were described, and input was collected on different aspects of the concept. Although residents knew there would be no private car parking in their new home, the specification of the mobility service they would get in exchange was still quite open. Trivector wanted to know more about both their needs, and their expectations of the service. These meetings were very useful, and we learnt a lot which will be useful the implementation of demonstrator 1. One example was the timing of information. We expected that the decision on whether or not to sell the car would be made before moving into the new apartment. However, the dialogue with future users made us understand that many future users first wanted to learn more about the service and try it out for themselves, in order to evaluate the alternatives before potentially deciding to sell their car. We also learnt that the interest in smaller e-vehicles such as Renault Twizy was rather low, and we hence changed the composition of vehicles in the vehicle pool in Brf Viva and lowered the number of small e-vehicles from two to one.

Once users started moving into Brf Viva in December 2018, citizen engagement went into a new phase. User dialogue and the possibility for users to get personal travel advice has been seen as a key part of the EC2B concept all along, but the forms are being continuously developed building on the experiences Trivector gains along the way. Representatives from Trivector/EC2B, car sharing operator Sunfleet and bike sharing operator GoRide have been present at information meetings that Riksbyggen have hosted



for new residents about two months before they moved into Brf Viva, to present the EC2B concept and answer questions at that stage. At such occasions, residents have also been invited to book an appointment for a personal travel counselling session with a representative from EC2B. However, this opportunity has not been used a lot. Instead, more informal “mobility evenings” in the bicycle garage, organized a few weeks after residents moved in, has proven to be a good concept. To these events residents were invited to have a small snack and some coffee, while representatives from Trivector/EC2B, Sunfleet and GoRide introduced the EC2B service. Then participants could mingle around to see by themselves how vehicles were unlocked, try the e-bikes, ask any questions they might have and also get help to download and install the EC2B app in case they had not already done so. Three such events have been performed, timed with when residents moved in. The fact that residents move in at three subsequent occasions has proved useful as it has enabled Trivector to iterate and learn from previous experiences as we develop the EC2B concept further. More events are planned to continue spur interest for the EC2B concept and attract new users. So far, these events have been carried out for demonstrator 1, but given that they were well received it is planned to include the concept also in demonstrator 2 and adjust it to employees instead of residents. Tenants have also been approached by telephone, with the purpose of answering questions about the service and providing some personal counselling for those who did not participate in mobility evenings or personal counselling sessions.

5.2.2. Business model

5.2.2.1. Demonstrator 1: version for accommodation

EC2B’s business model has several dimensions and is more like a network than a straight value chain. There are at least two groups of customers (residents and property owners/developers) and several different payment streams. Value is created in the different relationships between the actors in the network, where multiple actors are both producer and consumer, or both customer and supplier.

EC2B comprises three parts: flexible mobility services (attractive packages through digital services), advice (counselling in sustainable mobility) and community (platform for sharing). The main value propositions are:

- EC2B helps residents in the (larger) cities to a carefree mobility without the need of owning a car. This is done through the packaging of flexible mobility services, counselling and a community for sharing.
- EC2B helps real estate developers who want to offer the market a modern, urban and low-car housing concept, through a package solution for sustainable and flexible mobility that is attractive to both customers (residents) and authorities (the municipality).
- EC2B helps mobility service providers who want to reach a large and affluent market for their sustainable mobility services. It will form part of a comprehensive service for sustainable mobility, easily available at home.
- EC2B helps cities create a more attractive urban environment and sustainable development with fewer cars and a significantly more efficient land use.

The business model of the EC2B service is not yet settled in detail as the service relies on a complex ecosystem of partners, but the main idea is that property developers save money through avoiding the construction of expensive car parking, and that part of the money that is saved is spent on paying for the EC2B service for the residents during a certain period of time. As the concept is further developed, one could also imagine that service providers (e.g. car sharing, public transport or taxi) pay a kick-back to EC2B



for the transactions that are generated through the app and the value the service creates through bringing in new customers and increasing customer satisfaction.

The focus of EC2B is to primarily reach property owners who have a desire to develop sustainable alternatives for their accommodation and excel as leading sustainable players. The market is expected to grow year by year. A forecast shows that 700,000 new homes are needed by the year 2025 in Sweden's major cities, which implies that the market for property owners who build new properties is large and attractive. We also see an increasing interest for the EC2B service from developers of whole new districts, involving several different property developers, which poses new challenges to the EC2B concept.

As the implementation of the EC2B service in new projects depends on Trivector's ability to build long-lasting relationships with both property developers and mobility service providers, as well as to navigate within the legislative and political landscape, it is foreseen that the Swedish market will be the main focus for EC2B for the near future.

5.2.2.2. Demonstrator 2: version for commercial properties

Although not the initial business model for EC2B, the service has attracted a lot of attention also from commercial property developers, specifically for office buildings. One obvious possibility for this market segment would be to duplicate the business model developed for residential properties and replace parking with a mobility service offer primarily in new developments. At the same time the project has shown that many property developers in the sector of commercial properties are interested in offering their tenants – and employees – a sustainable mobility service also in existing buildings. The reason for this is to reduce the costs for parking and/or to enable further exploitation in an area with a difficult parking situation. This case is now tested in Demonstrator 2, where EC2B is adjusted to employees in Campus Johanneberg. In this business model, an extra layer is introduced between landlord and end user, which is the employer.

5.2.3. Governance

The EC2B service operates at the intersection between many different actors: in addition to the end-users, Trivector interacts with property developers, mobility service providers (both public and private), and in the case of the campus area also employers, as well as with the municipality. Trivector does not intend to provide mobility services under the EC2B brand in its own right, but only to bring together the services of others in an integrated offer which benefits both mobility providers (who can gain a broader audience), and users. For the EC2B service to thrive, good relations with collaborating mobility providers (both public and private) is hence key. In Figure 12 below, an organizational scheme of the relations between these actors in demonstrator 1 are explained.

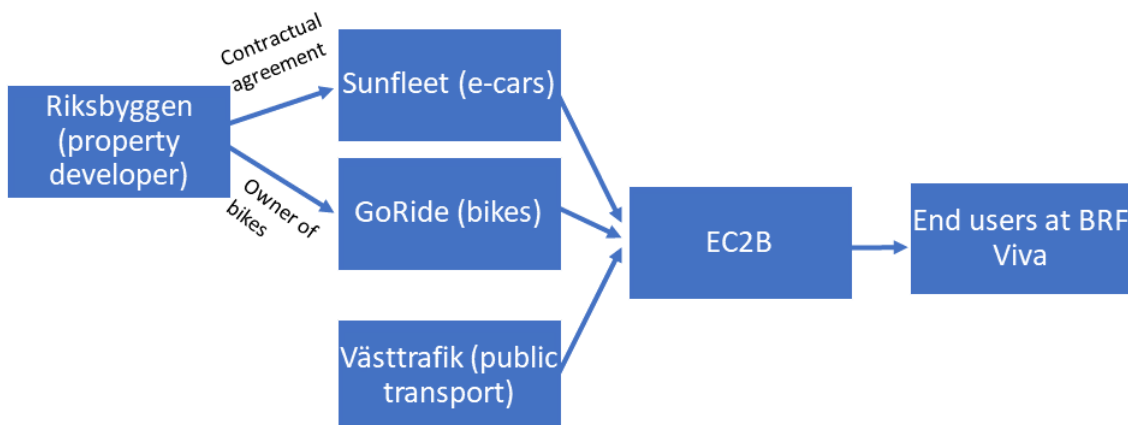


Figure 12 Organizational scheme of relations between EC2B, property developer, mobility providers and end users in the case of BRF Viva (demonstrator 1).

Furthermore, for the EC2B concept to be viable, local authorities need to be supportive of the idea of exchanging parking lots against MaaS in connection to a building, allowing the construction of buildings with a reduced number of parking lots, but requiring property developers to provide other services in exchange. The new parking policy adopted by the city of Gothenburg is one step in this direction.⁴ The policy states (own translation from Swedish):

The purpose of implementing additional mobility services is to provide new mobility options and to reduce the need to own and use a car. The purpose is further to contribute to good economy in the construction of new accommodation and create attractive urban spaces. Examples of mobility measures that can reduce the parking requirement is the provision of car sharing, sharing of cargo bikes, additional public transport, provision of annual bike service and rebates on public transport and taxi. The city is also open for new innovative mobility solutions and deployments of “Mobility as a Service”.

Local authorities can also create a favourable environment for MaaS through promoting public transport, biking and walking, as well as discouraging car traffic through parking fees and other incentive structures.

For the implementation of EC2B for employers/employees at Campus Johanneberg (demonstrator 2), this requires a new organizational structure among the actors in the area to be implemented, to solve issues such as ownership of vehicles, access rights to mobility hubs, and payment schemes. Akademiska Hus and Chalmersfastigheter own most of the buildings in the area and provide their tenants with some services related to the buildings, but to also provide mobility services to their tenants would mean an extension

⁴ Anvisningar till Riktlinjer för mobilitet och parkering i Göteborgs Stad. Hantering av mobilitets- och parkeringsfrågor i detaljplan och bygglov. Adopted by the steering committee for mobility and parking, Gothenburg, April 17 2019. Dnr: 16-0469. www.goteborg.se



of their undertaking which is not necessarily within their current mandate. For Chalmersfastigheter, they are owned by Chalmers Technical University, and hence an extension of their undertaking would require support from the university. At the moment, constructive discussions between Chalmersfastigheter, Akademiska Hus, Chalmers Technical University, Johanneberg Science Park and HSB are taking place to put an appropriate organizational structure in place to enable a common mobility service in the campus area.

5.3. Impact Assessment

5.3.1. Expected impact

EC2B is unique among MaaS concepts in linking its mobility services to the place where most trips start: where people live (or work), creating an integrated solution with multiple benefits. Previous studies show that people who don't own a car have a more sustainable travel pattern than others, which means that EC2B has a great potential for reducing car traffic. Furthermore, if property developers can skip building expensive underground garages and instead offer attractive mobility services, this means previously locked financial assets are released. If EC2B is broadly implemented, this may have an impact on how mobility is considered when planning new developments in cities, resulting in less car traffic and reduced accommodation costs. Through using shared vehicles, users can also access newer and less polluting vehicles. Furthermore, less vehicles in circulation also means less resources are being used for manufacturing of vehicles, which is a substantial share of a vehicle's environmental footprint.

The demonstrator will hence contribute directly to the goals of rolling out electric vehicles and reducing transport based CO₂ emissions, and indirectly also to the goal of increasing local air quality.

5.3.2. KPIs

5.3.2.1. Demonstrator 1

The following KPIs were selected for demonstrator 1 of T7.5:

- Improved access to vehicle sharing solutions
- Ease of use for end users of the solution
- Reduction in car ownership among tenants
- Yearly km driven in e-car sharing systems
- Reduction in driven km by users of the service
- Energy savings
- Carbon dioxide reduction

As the users of EC2B in Brf Viva are new not only to the service, but also to the area, it is not self-evident what the baseline to compare results with should be. For example, when it comes to access to vehicle sharing solutions, the relevant baseline is not what was available in the district before Viva was built (as the area did not have as many residents), but rather what access other residents have in newly built houses in similar locations. The same is true when calculating the baseline for how many kilometers residents would have driven, had the EC2B service not been there, and also for estimating the emissions that would have occurred if users had not used the e-cars but their own, predominantly fossil-driven cars.



Here it is more relevant to use statistics from similar areas than using information on how the residents of Viva travelled before moving in, as it would be impossible to deduct what part of the change in behavior was due to the introduction of the EC2B concept, and what was simply an effect of moving to a more central location with better access to public transport and better biking facilities.

To set the baseline for car ownership, residents in Brf Viva responded to a survey before moving in, where they stated how many cars their household had access to, and this survey will be followed up later on to see whether the car ownership level has gone down after moving into Viva and getting used to the EC2B service. However, statistics on car ownership in similar locations will also be an interesting reference point to see if/how it differs in Brf Viva.

When it comes to the number of km driven in the e-car sharing system, the reduction in km driven, energy savings and CO₂ reduction, these KPIs are all coupled to each other. The initial estimations of CO₂ savings obtained through the sustainable urban mobility solutions deployed in the project were made on the basis of CO₂ intensity of the European electricity grid of 443g CO₂/kWh, as this was the instructions received. However, when calculating the final CO₂ savings, we suggest that emission factors for the Swedish grid should be used. In the calculations made to estimate potential savings, the following assumptions were made:

- A previous study (Trivector report 2014:84, Effects of Sunfleet car sharing) shows that in average, a person in Gothenburg who joins a car sharing service reduces the number of kilometers driven from 6,470 km/year to 4,520 km/year, an average reduction of 1,960 km/year.
 - The average carbon intensity of a Swedish car was 163 g/km in 2015, while the average for an e-car (based on CO₂ intensity of European grid) is 53 g/km. (This should be exchanged for Swedish grid factors when calculating the final KPIs)
 - Given that 200 persons in the 132 apartments at Brf Viva join the car sharing service included in EC2B, their carbon footprint from transport can be expected to be reduced by 123 tons of CO₂
 - Given that in this specific solution, further measures will be included compared to a conventional car pool, car use can be expected to be reduced more than in previous cases.
- Previous studies show that individualized information can reduce car travel with up to 5 %, reducing the carbon footprint of the 200 people in the demonstrator with another 8,5 tons of CO₂/year.

5.3.2.2. Demonstrator 2

The following KPIs were selected for demonstrator 2 of T7.5:

- Improved access to vehicle sharing solutions
- Ease of use for end users of the solution
- Yearly km driven in e-car sharing systems
- Reduction in driven km by users of the service
- Energy savings
- Carbon dioxide reduction

In the version of the EC2B service implemented in the Johanneberg campus area (demonstrator 2), it was originally assumed that it would be offered to all end users in the campus area, both students and employees (15,000 people). In previous calculations to estimate potential savings, a modest effect of 1 % reduction on car travel was estimated, resulting in an expected CO₂ reduction of 128 t/year based on the



EU grid factor. However, as plans changed in discussion with local partners, a more focused demonstration is now being planned for, specifically targeting employees within the campus area. Details still remain to be settled before it is possible to make an estimate of potential effects.

5.3.3. Monitoring plan

Information needed for KPI measurement is collected through the app and from our collaborators (e.g. statistics on number of trips with different vehicles/public transport or trip length for e-cars). For demonstrator 1, a survey with questions on previous travel habits and expectations on the service was sent out to future residents in Brf Viva approximately two months before moving in. As residents move in at three different points in time from December 2018 to June 2019, surveys were sent out at three different occasions. The pre-survey will be complemented with a follow-up survey once users have established a new travel pattern, being planned in the October 2019. At this point, the survey will be complemented with an app-based travel survey using TravelVU, an app developed within Trivector, to get a more detailed picture of how EC2B users travel.

For demonstrator 2 at campus Johanneberg, the details of the monitoring plan are yet to be settled, but a collaboration has been established with researchers at Chalmers who are keen on using this case for their research on emerging mobility services. Usage of the service will be tracked through the app (of course taking GDPR into account), and this information will be complemented with a survey among users.

5.4. Commissioning Plan

The commissioning plan for the EC2B service comprises three separate parts: 1) the content of the service in terms of mobility services and functionality, 2) the technical functionality of the application being developed for the demonstration, and 3) the form and content of the counselling part of the service.

For securing that the content of the EC2B service answered to the real needs of users, user dialogue was the most important tool used. Trivector's interaction with users in Brf Viva for demonstrator 1 is described in detail under section 5.2.1 on citizen engagement. For demonstrator 2, developed for the campus area, the dialogue with employers and landlords in the area proved to be very useful.

For the app development (which is the same for demonstrators 1 and 2), testing was done in several steps. First, the subcontractor doing the development of the app made internal tests to secure new functionality was working properly. In a second step they released test versions for Trivector so that internal testing could be carried out. In a third step, test versions (with modifications if needed) were passed on to mobility providers (public transport operator Västtrafik and bike sharing company GoRide, none of which are part of the IRIS project), for them to approve before release. Both Västtrafik and GoRide have also communicated directly with the developer at SmartResenär. Västtrafik has performed validation tests in both testing and production environment. Glitches and problems from the tests have been documented and evaluated as to how serious they were, from not serious (acceptable to let go) to very serious (hindering release of the app). Development has then been planned to solve the most serious problems first. Tests have been made when needed, and before the release of a new version of the application.

For the qualitative content of the counselling part of the EC2B concept, an iterative approach was used where the concept was first developed based on research and previous experience, tried out with users,



and modified based on the experience gained. These feedback loops secured that counselling provided a value to users of the service, both concerning the content of counselling and that counselling was introduced to users at the right points in time.

Phase	Activity	Parties involved	Responsibility
1 Design	Set up preliminary design of service (IT platform, service content and communication plan)	Trivector Riksbyggen	Initiation and coordination of work Provide feedback
2 Engineering	Elaboration of design	Trivector	Arrive at final design
3 Contracting	Contracting of subcontractor for IT platform Contracting of mobility services Negotiation with Public transport on integration	Trivector Riksbyggen Trivector	Set up and sign contracts
4 Realization	Development of IT platform and app Installation of physical facilities related to service	Subcontractor Riksbyggen	Develop IT platform Install charging infrastructure, bicycle repair room among others
5 Testing	Testing of app	Trivector	Make sure app provides necessary functionality
6 Completion	Launch of service	Trivector Riksbyggen	Communication with users and intro meetings among others

5.5. Implementation Plan

5.5.1. Planning of activities

The work to be performed within T7.5 has two distinct parts: developing and implementing EC2B for residents in Brf Viva (demonstrator 1) and developing EC2B for employees within Campus Johanneberg (demonstrator 2). Due to the fact that the first residents in Brf Viva moved in already in December 2018 (M14 of the IRIS project), work during the first year was heavily focused on getting the EC2B service on track for them. The first e-cars and e-bikes were installed in time, and after some unfortunate delay with the subcontractor, the first version of the EC2B app was launched in March 2019 (M17). Development work nevertheless continues to further refine the service for the users in Brf Viva, but Trivector is now also into the operation and monitoring phase of this part of T7.5.

For demonstrator 2, concentrating on delivering EC2B in the Johanneberg Campus area, a first dialogue with the partners involved was initiated in the spring of 2018, whereas more intense work took off in the spring of 2019 when resources were relieved internally at Trivector as the implementation of EC2B in Brf



Viva went into an operation phase. The service to be implemented at Campus Johanneberg will draw on the features in the EC2B app developed for Brf Viva, but also add new features. There will be less focus on personal counselling, but the experiences gained from Trivector's interaction with users in Brf Viva will be useful for designing the content of the service also in the subsequent version developed for employees. Demonstrator #2 is expected to be launched in the late spring of 2020.

5.5.2. Planning of costs and (equipment) investments

Since much of the development work done in demonstrator 1 (developing and implementing EC2B in Brf Viva), is useful for demonstrator 2 (developing and implementing EC2B in Campus Johanneberg), Trivector has planned to use approximately 60 % of our resources allocated for development for demonstrator 1, and 40 % for demonstrator 2. The same proportions hold for the IT development done by our subcontractor. This also means that resources will be consumed at a higher pace at the beginning of the project as this is when the main part of development is done, and at a slower pace towards the end when work is focused mainly on support to users, as well as on monitoring and evaluation in WP9. So far, Trivector's resources are being consumed at the pace planned for.

5.5.3. Risk management

Risks were identified as part of D7.1, see Table 1 below.

Table 1 Risks and mitigation strategies

Risk	Mitigation strategy
Delays in construction work of Brf Viva	No longer relevant. A minor delay occurred during ground works, but these delays never had an impact on the timing of the IRIS project.
Problems involving mobility service providers	Major service providers are now collaborating, so no longer relevant.
Problems concerning development and operation of ICT platform	<p>Problems related to development and operation of ICT platform are managed through a close collaboration with the subcontractor. As it is a new market, we wanted to establish a partnership with the subcontractor instead of buying a ready-made platform, in order to be able to influence development and functionality. During the development phase meetings were held every week to prioritize work and handle problems.</p> <p>Risks during the operational phase are managed in the following way:</p> <ul style="list-style-type: none">• Contract with subcontractor guarantees a minimum level of availability of the service• Support function available on email and phone for users• If ICT platform for EC2B is temporarily down, users can still book and pay for the services included through dedicated apps from the transport service providers• Continued close collaboration with subcontractor to prioritize further development and other actions to ensure operations at both short and long sight.



Internal resources not available	Work on IRIS project is being spread among a larger number of employees to allow for more flexibility in resource allocation
End users not interested in EC2B	Close dialogue with future users before launch of service
Property developers do not see the value of EC2B	Close dialogue with property developer throughout design of the service to understand their needs
Difficulties to find a working business model	Focus on the life of EC2B post-IRIS, where the service should be viable for replication on commercial terms

5.5.4. Progress achieved up to M24

Regarding demonstrator 1, the full EC2B service in Brf Viva including app, vehicles and counselling service was launched in a first version in March 2019, and the vehicle sharing is now fully implemented with e-bikes, e-cars and light e-vehicles. Vehicles are used at a satisfying rate and booking of vehicles and unlocking of the key cabinet through the app are working. The possibility to purchase electronic tickets for public transport was also rolled out during the spring of 2019. To date, the EC2B service has 125 unique users, which is a good rate given that there are 132 apartments in total. The exact number of tenants is not known, but according to Riksborgen there are probably around 1,5 adults per apartment, hence around 200 potential users.

The app development proved more difficult than expected, and it was disappointing not being able to launch the first version of the app in time for the first residents in Brf Viva to move in, and some of the functionality we had planned to include in the first version is still under development. Nevertheless, we have a demonstrator in place with the main components, and real users in Brf Viva. Trivector has also built a very strong partner network with good relationships to the mobility service providers and the app developer, which is an important asset for the future work to launch EC2B at Campus Johanneberg in demonstrator 2.

5.6. Conclusion

Two years into the IRIS project, it is interesting to think back to the first meetings with future EC2B users in the late autumn of 2017, and conclude that a lot of what Trivector and other partners then discussed as possibilities and hypotheses has since been turned into a functioning service and implemented in real life. So, what have been learnt on the way to get here?

- An initial hypothesis was that personal mobility counselling sessions would be an important part of the EC2B concept to help tenants start using the service, but experience has shown that this is not the case. Instead, users have been more interested in trialing the services included at “mobility evenings” and help with solving practical issues as downloading and configuring the app.
- Campaigns, as for example a rebate on public transport, turned out to be a good mean to increase the use of the EC2B service and nudging tenants to download and start using the app.



- Good routines are needed to handle and help new users joining in along the way. Although Brf Viva was a new housing complex, some apartments were sold early on and new tenants moved in.
- The on-boarding process for registering to all the mobility services involved in EC2B is rather complicated with separate passwords for the shared bikes and the car sharing service. This is difficult to coordinate with so many different service providers, so the structure has to be simplified to make life easier for the users.
- It is impossible to know exactly who lives in Brf Viva, not even Riksbyggen have a complete picture as they are not involved when apartments are sold a second time. This makes it difficult to communicate with tenants. The only way to reach all tenants has been to hand out info sheets in tenants' post boxes.
- It is sometimes unclear who should decide about new developments of the service as there are so many different contractual agreements between Riksbyggen, Trivector and the mobility service providers. The contractual structure is more complicated than one could wish.
- The business model of EC2B is dependent on scaling up the service to new projects and customers to finance continued operation and development of the service.
- It takes time and effort to build up good and trustful relationships, both with customers and with partners/subcontractors, but this is necessary to create preconditions for the continued development of the service.
- Housing without parking for private cars is a strong driver to increase the use of MaaS and shared vehicles as it creates a real demand. Although some tenants have kept their car for using it for special occasions (going to the summer cottage is a common reason), most of them do not seem to be using their cars on a daily basis and state in interviews that they drive less than before.



6. Summary of Monitoring of KPIs

The KPIs to be monitored for the demonstrators in T7.5 are the following:

- Improved access to vehicle sharing solutions
- Ease of use for end users of the solution
- Reduction in car ownership among tenants
- Yearly km driven in e-car sharing systems
- Reduction in driven km by users of the service
- Energy savings
- Carbon dioxide reduction

Information needed for KPI measurement is collected through the EC2B app and from our collaborators (e.g. statistics on number of trips with different vehicles/public transport or trip length for e-cars). For demonstrator 1, a survey with questions on previous travel habits and expectations on the service was sent out to future residents in Brf Viva approximately 2 months before moving in. This pre-survey will be complemented with a follow-up survey once users have established a new travel pattern, being planned in October 2019. At this point, the survey will be complemented with an app-based travel survey using TravelVU, an app developed within Trivector, to get a more detailed picture of how EC2B users travel.

For demonstrator 2, the details of the monitoring plan are yet to be settled, but a collaboration has been established with researchers at Chalmers who are keen on using this case for their research on emerging mobility services. Usage of the service will be tracked through the app, and this information will be complemented with a survey among users.

7. Ethics requirements

The IRIS Ethics Deliverables are consortium confidential documents that provide information on the IRIS ethics approach and are the basis for the ethics requirements described in this chapter.

D12.1 H – Requirements No.1: The scope of the this deliverable is to explain how the IRIS consortium will address the identification and recruitment of participation of humans in the demonstration pilot projects and how the consortium will implement informed consent procedures for these human research participants.

D12.2 POPD - Requirement No.2: The scope of this deliverable is to show how the IRIS consortium will address the ethical, data protection, confidentiality and privacy aspects related to the processing of personal data collected by IRIS consortium partners for the purpose of executing the project tasks.

7.1. GDPR compliance

7.1.1. GDPR compliance per IRIS demonstration measure

For the demonstration of EC2B in Brf Viva, Trivector needs to be able to communicate with the residents in order to be able to provide them with information on the service or invitations to meetings. Trivector has received lists of e-mail addresses from Riksbyggen to use for this purpose. A Personal Data Processing Agreement has been set up between Riksbyggen and Trivector to regulate responsibility concerning the handling of personal data to make sure that GDPR is respected.

Once users download and register with the EC2B app, they need to agree to the terms of conditions of the service, which specify how data is collected and used and how GDPR is respected. Data is logged on the usage of the service, and it is specified in the terms of conditions that data will be used for development of the service and for research purposes, but that user data will only be presented on aggregated level.

Similarly, when we send out user surveys, these include an introduction stating the purpose of the survey and describing how data will be used, including information about GDPR.

Below a list of questions regarding GDPR are answered for each IRIS demonstration measure in this transition track.

1. Who is the responsible data controller for the IRIS demonstration measure?

According to the GDPR the ‘controller’ is “the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data”.⁵

Trivector is the controller of data for both demonstration measures in T7.5

⁵ Source: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/controllers-and-processors/what-are-controllers-and-processors/>

2. Is the controller briefed on their responsibilities related to the protection of personal data?

For each IRIS demonstration measure, the data controller will be briefed on their obligations. The main responsibility of the data controller is to make sure the EU and national data legislation as provided in Chapter 2 of this deliverable are followed.

Yes. Trivector has internal routines in for the handling of personal data which all employees are informed about.

3. Is there any processing of personal data involved in the monitoring or operation of demonstrator?

For each demonstrator pilot the data controller will assess what type of data is collected and if personal data is involved. Personal data includes information relating to natural persons who can be identified or who are identifiable, directly from the information in question; or who can be indirectly identified from that information in combination with other information⁶.

Yes, personal data is handled both in the operation and monitoring of both demonstrators.

4. In case of processing of personal data is there any high risk for the data subjects?

If any processing of personal data leads to a high risk for the data subjects, a Data Protection Impact Assessment in accordance with Article 35 of the GDPR will be conducted by the data controller. In such cases, the relevant guidance from the WP29, which has been renewed by an endorsement of the European Data Protection Board, will be followed. See <https://edpb.europa.eu/node/70> for more information on when there is a high risk for the data subjects.

No risks have been identified for the data subjects.

5. Informed consent procedure

In case personal data will be processed for this demonstrator an informed consent procedure needs to be executed by the data controller as defined above. The informed consent will need to include a:

- A participant Information Sheet notifying the users about the use and possible re-use of the data collected during the pilot demonstration activities
- Informed Consent Sheet to be signed by the pilot participant before commencement, allowing for processing and publication of data.

The data controller needs to take care of the collection and processing of the informed consent procedure. In case additional information is required the IRIS deliverable D12.1 Chapter 7 and D12.2 Chapter 3 provide further information.

An informed consent is obtained from users when they sign the terms of use upon starting to use the EC2B app, and similarly for the travel survey app that is used for monitoring use.

⁶ Source: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/key-definitions/what-is-personal-data/>



6. In case of a Data Protection Impact Assessment the Institutional Data Protection Officers needs to confirm?

In case of a Data Protection Impact Assessment it is mandatory to take into account the opinion of the relevant Institutional Data Protection Officer into account. This will be done by the respective data controllers at the pilot demonstration sites. “Each Pilot host institution must confirm that it has appointed a Data Protection Officer (DPO) and the contact details of the DPO will be made available to all data subjects involved in the research. For host institutions not required to appoint a DPO under the General Data Protection Regulation 2016/679, a detailed data protection policy for the project must be provided in IRIS prior commencing any activity involving human participants in the pilots.”

This is not relevant for the demonstrators in question.

7.2. Ethical aspects

Some background data that might be considered sensitive is collected in the monitoring phase, e.g. on income levels and travel patterns, including GPS tracking of travel. However, all data is collected using methods that guarantee anonymity, and no data is collected without an active prior consent. All data is stored and handled in accordance with GDPR.



8. Links to other Work Packages

The lessons learned from T7.5 will be evaluated in WP9, communicated in WP 10 and hopefully replicated in WP8. To enable the successful replication on WP8, work on business models and exploitation activities in WP3 will be useful. However, for the EC2B model to be successfully replicated it is important that work in WP3 and WP8 does not focus too narrowly on replication in IRIS follower cities and international replication, as a first natural step would be a replication within the Swedish context.

9. Conclusions and Next Steps

Two years into the IRIS project, it is interesting to think back to the first meetings with future EC2B users in the late autumn of 2017, and conclude that a lot of what Trivector and other partners then discussed as possibilities and hypotheses has since been turned into a functioning service and implemented in real life. Although there is still some way to go before reaching the defined goals, all partners involved are proud to see the EC2B service live, enabling the residents in Brf Viva to make sustainable transport choices tailored to their everyday needs. So, what have been learnt on the way to get here?

- An initial hypothesis was that personal mobility counselling sessions would be an important part of the EC2B concept to help tenants start using the service, but experience has shown that this is not the case. Instead, users have been more interested in trialling the services included at “mobility evenings” and help with solving practical issues as downloading and configuring the app.
- Campaigns, with for e.g. a rebate on public transport, turned out to be a good means to increase the use of the EC2B service and nudging tenants to download and start using the app.
- Good routines are needed to handle and help new users joining in along the way. Although Brf Viva was a new housing complex, some apartments were sold early on and new tenants moved in.
- The on-boarding process for registering to all the mobility services involved in EC2B is rather complicated with separate passwords for the shared bikes and the car sharing service. This is difficult to coordinate with so many different service providers, but the structure has to be simplified to make life easier for the users.
- It is impossible to know exactly who lives in Brf Viva, not even Riksbyggen have a complete picture as they are not involved when apartments are sold a second time. This makes it difficult to communicate with tenants. The only way to reach all tenants has been to hand out info sheets in tenants’ post boxes.
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- Housing without parking for private cars is a strong driver to increase the use of MaaS and shared vehicles as it creates a real demand. Although some tenants have kept their car for using it for special occasions (going to the summer cottage is a common reason), most of them do not seem to be using their cars on a daily basis and state in interviews that they drive less than before.

As of November 2019, the first round of monitoring of travel behaviour among the residents in Brf Viva (demonstrator 1) has been finished, and Trivector is about to start analysing this data. This will provide interesting information to further understand how MaaS combined with accommodation effects travel behaviour, and enable further fine-tuning of the service. The implementation of EC2B in demonstrator 1



is now achieved, and activities that remain to be implemented in demonstrator 1 include carrying out further campaigns to spur use of the service, as well as continued monitoring of the usage.

During the coming year focus will be on developing EC2B for Campus Johanneberg in demonstrator 2. Constructive discussions are going on with the main property owners and employers in the campus area on how to develop the service to cater for the needs of employees in the area. Partners have a clear shared vision of the future mobility on campus, and will be able to draw upon the experiences from demonstrator 1 in the work to realize this vision. This work will go into a more intense phase during late 2019 and the spring of 2020, with demonstrator 2 hopefully to be implemented from May 2020.



10. References

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