



Workshops for the participating cities and
commercial e-mobility providers

DELIVERABLE 1.1 & 1.2

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Summary sheet

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Project partners

Organisation	Abbreviation	Country
Gemeente Amsterdam	AMS	The Netherlands
Promotion of Operation Links with Integrated Services aisbl (POLIS)	POLIS	Europe
Taxistop asbl	Taxi	Belgium
Autodelen.net	Auton	Belgium
Bayern Innovativ GmbH	BI	Germany
Cargoroo	CA	The Netherlands
URBEE (E-bike network Amsterdam BV)	URBEE	The Netherlands
Gemeente Nijmegen	NIJ	The Netherlands
Transport for the Greater Manchester	TfGM	UK
Stad Leuven	LEU	Belgium
TU Delft	TUD	The Netherlands
University of Newcastle upon Tyne	UN	UK
Ville de Dreux	DR	France
Stadt Kempten (Allgäu)	Kemp	Germany
Universiteit Antwerpen	UAntwerp	Belgium

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Executive Summary

Shared mobility can be a driver of sustainable mobility. This market is emerging and public and private actors are looking for initiatives to further stimulate the uptake of shared mobility. One possibility, considered in this project, is the implementation of eHUBS in the urban environment. This requires collaboration between local governments, shared mobility service providers and other stakeholders (e.g. charging point operators). However, it is still unclear how these new public-private partnerships can successfully be established. Therefore, we explore the business model of the eHUB, in order to have a positive business case for eHUBS' stakeholders.

In order to develop the eHUB model, a workshop has been organised. The different business model's elements were discussed by a broad range of stakeholders, ranging from local governments to shared mobility providers to advertising agencies, with a view to having different perspectives and realigning the opposing interests (i.e. public actors' objectives vs private actors' objectives). In total, ten different focus group discussions took place, each designing the business model for the eHUB. These discussions were guided by a framework that is based on a scientific literature review on business models and business modelling design tools. The framework consists of four individual design domains, i.e. *service design*, *infrastructure design*, *finance design* and *feedback design*, and an overlapping layer, the *organisation design*. Ideas and remarks were generated by discussing these domains.

We compared the business models that were developed during the focus group discussions by performing a qualitative analysis. As a result, five business model prototypes are constructed: *first-/last-mile eHUB network*, *clustered shared (e-)mobility*, *point-of-interest eHUB network*, *hybrid eHUB network* and *closed eHUB network*. These represent scenarios in which a eHUB network could be successfully implemented still taking the stakeholders' interests into account.

Each prototype addresses a different problem in a specific socio-economic/geographical context, thus creating and delivering a specific value for its target groups. The value propositions of the five business model prototypes (i.e. first-/last-mile eHUB network, clustered shared (e-)mobility, point-of-interest eHUB network, hybrid eHUB network and closed eHUB network) are, respectively, the development of a fine mesh transportation network; a centralised, recognisable place for clustering shared mobility modes; an extended transportation network, complemented with alternative transportation modes, towards highly congested places; a fine mesh transportation network providing opportunities to centralise the maintenance and redistribution of shared mobility modes; and a transport hub on private grounds, integrated in an open network, in order to offer more alternative transportation options. The business model prototypes furthermore clarify their infrastructural and technological components, their funding sources and pricing schemes, their service and feedback channels and their barriers and risks.

The findings help to understand how local governments and shared mobility providers can effectively cooperate and pursue the common objectives of sustainable mobility. The results are used for the development of the blueprint, in which the eHUB consortium guides local governments and shared mobility providers towards a successful implementation of eHUBS in their urban environment.

1 Introduction

1.1 Background

Transport is responsible for 25% of the GHG emissions in the European Union (International Energy Agency, 2019). Reduction in car use and a shift to more sustainable transportation modes could help achieve Europe's objective to reduce the total GHG-emissions, congestion and accidents. The uptake of shared mobility in different urban regions could be one of the solutions to reduce the need for personal car use and car ownership. Shared mobility however is confronted with barriers that hinder its uptake; shared mobility providers look for opportunities to introduce services in urban regions that lead to profitability; local governments struggle to create a level playing field for shared mobility services in their region; local citizens complain about the chaotic public space, where shared mobility modes are utilizing public space on pavements or alongside the road. City authorities can enable the benefits of shared mobility, by introducing supportive measures for shared mobility providers, while managing the public space. The eHUBS project has reviewed scientific literature on the possible positive and negative impacts of shared mobility within work package 'Modelling', deliverable 1.1: 'State-of-the-art report for eHUBS'.

This project investigates the potential of eHUBs in addressing these challenges and barriers. An eHUB is a physical cluster of different transport modalities. Different zero-emission (electric as well as non-electric) and shared transport modes are made available. eHUBs can be linked together in a network, as well as connected to the existing public transport network. This combination creates transport hubs and enhances connectivity.

A broad range of actors are involved in the implementation and operation of eHUBs. To successfully install and operate this digital and physical infrastructure, the cooperation between the actors of this network is required. Because eHUBs are new elements in the urban transport environment, there is no established business model for these shared mobility hubs. Business modelling literature indicates that innovation in business models can create opportunities to achieve sustainable value creation (Evans et al., 2017). Moreover, literature implies that business models in the shared mobility market, whereby cooperation between both public actors and private actors is central, have the highest potential to realise the common objectives of shared mobility (i.e. stimulating multimodal transport, reducing car use and -ownership, stimulating sustainable transport, reducing congestion and stimulating active transport modes) (Cohen & Kietzmann, 2014). For this reason, we have organised a workshop for both public and private actors. The objectives of this workshop, and the related deliverables, are described below.

1.2 Objectives

Deliverable 1.1 and deliverable 1.2, defined as workshops for the participating cities and for commercial e-mobility providers (including non-partners) respectively, aim to develop different positive business case scenarios for eHUBs. It is an exploratory study, as eHUBs are new infrastructural components in the urban mobility landscape, to see how they can help achieving the stakeholders' objectives.

The workshop brings together several actors involved in the design, operation and implementation of an eHUB. The different stakeholders' objectives related to shared (electric) mobility can cause potential conflicts. In order to make the business case of the eHUB successful, every stakeholders' needs and concerns should be taken into account. Therefore, different stakeholders are invited to discuss the business case of the eHUB during a workshop.

This workshop tries to answer the following question: 'How can eHUBs create economic value for businesses involved in the operation and implementation of these hubs, thereby stimulating the use of shared mobility modes and hence, creating environmental value?' By answering this question, we can identify scenarios where eHUBS are viable and a potential option to stimulate the uptake of shared mobility and induce a modal-shift from personal car use to other mobility services.

Therefore, deliverables 1.1 and 1.2 discuss different key aspects of the eHUBs business model, e.g. roles and responsibilities of the different actors involved, objective and functions of eHUBs, revenue and cost schemes, evaluating and enforcing measures, service levels and regulations concerning shared (e-)mobility. The different building blocks of the conceptual framework are explained in section 2.

The outcome of these deliverables will be used in the blueprint developed in activity 2 of WP LT. This blueprint supports local authorities and shared mobility providers in collaboratively realising eHUBs in replication regions.

1.3 Structure

This report has been divided into four parts. The first part introduces the contextual setting and the objectives of the workshop. The second part elaborates on the conceptual framework we have constructed based on a literature review regarding business models. This framework has been used during the workshop, in order to assist the participants in developing potential business models for the eHUB. The third part focuses on the workshop's structure and its results. These results are categorised and analysed using our framework of section 2. The fourth and last part concludes the report and states the contributions of this report to the eHUBS project in general.

2 Business model framework

The eHUBS case requires the involvement of a network of actors, causing potential conflicts about the role and objective each of them has. For the purpose of designing eHUBS business models that can accomplish the common objectives of the network, a framework has been developed to facilitate this process. This framework is based on an extensive literature review of business modelling, especially focusing on a network-based approach. The participation and collaboration of all stakeholders in developing the business model prototypes is valuable; network-based business models have more potential of creating sustainable value (Schaltegger et al., 2019) because it is the network that seeks for value creation, thereby taking the interests of every stakeholder into account, rather than every single actor acting in his/her own interest. In the particular case of shared mobility hubs, shared mobility providers have the opportunity to enhance their profitability while complying and cooperating with public authorities (increasing the likelihood to extend their license-to-operate), while public authorities have the opportunity to enrol shared mobility services, thereby allowing more citizens to use these services and thus creating environmental value (e.g. reduced car ownership, reduced congestion, reduced GHG-emissions).

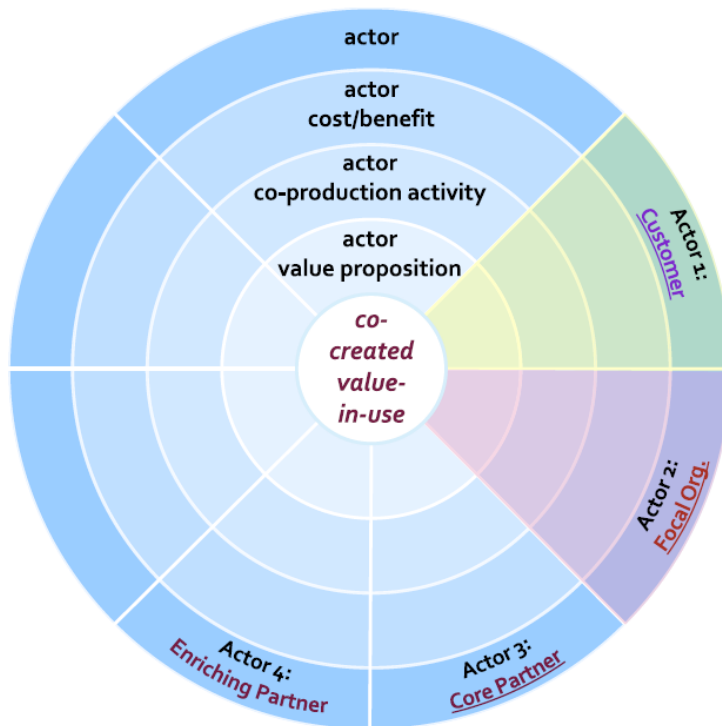
We used the following keywords to perform our literature review: ‘business model design’, ‘business model innovation’, ‘sustainable business models’, ‘business models in the sharing economy’, ‘shared mobility business models’, ‘product-service system business models’ and ‘network-based business models’.

Drawing on scientific literature of business modelling (Faber et al., 2003; Massa et al., 2017; Teece, 2010; Zott et al., 2011), sustainable business models (Bocken et al., 2014; Lüdeke-Freund, 2019; Schaltegger et al., 2016) and business models in shared mobility (Cohen & Kietzmann, 2014; Firnkorn & Müller, 2012; Lagadic et al., 2019; Van Waes et al., 2018), we identified the elements that should be included in the workshop.

Furthermore, this literature review led to the identification of several business modelling design tools (e.g. Bocken et al., 2015; Calabrese et al., 2018; Joyce & Paquin, 2016; Lindgren et al., 2010; Osterwalder et al., 2010; Turetken et al., 2019; Upward & Jones, 2016). We selected the tools created by Turetken et al. (2019) and Lindgren et al. (2010) to build our business modelling design tool on. The following paragraphs explain these frameworks and the reasons why we selected them as basis for our framework.

The framework created by Turetken et al. (2019) is called the service-dominant business model radar (SDBM/R) (see **figure 1**). It assists practitioners during the process of developing a service-dominant business model (SDBM). This is defined as “a representation of the way in which a network of organisations, including the providers and customer, co-creates a value for the customer through a solution-oriented service and generates revenue and benefits for all network partners” (p.16).

Figure 1: The Service Dominant Business Model Radar (SDBM/R) by Turetken et al. (2019)



Considering the framework’s utility for the eHUBS case, the network-based approach of this framework is highly relevant. The framework’s inner circle defines the co-created value of the network, encouraging the network’s actors to think about the ways they can contribute to the central co-created value.

It further enables us to identify the different actors involved (i.e. the different slices of the chart) and their intended value creation processes, their costs and their benefits. These last elements (i.e. the fourth layer of the chart) influences the elements of the previous layers, thereby creating feedback loops. This enables us to identify the iterative process that helps to realign the different interests of the network’s actors.

One of the limitations of this framework is that it does not explicitly state the required resources to perform those activities, the relations between the network partners and the target groups the partners try to reach. Therefore, we also incorporate the framework constructed by Lindgren et al. (2010).

They are using the business model canvas (BMC) of Osterwalder and Pigneur (2004) as a basis, but they aim to construct a network-based business modelling framework. This is opposite to the single firm-centric view of the BMC of Osterwalder and Pigneur (2004).

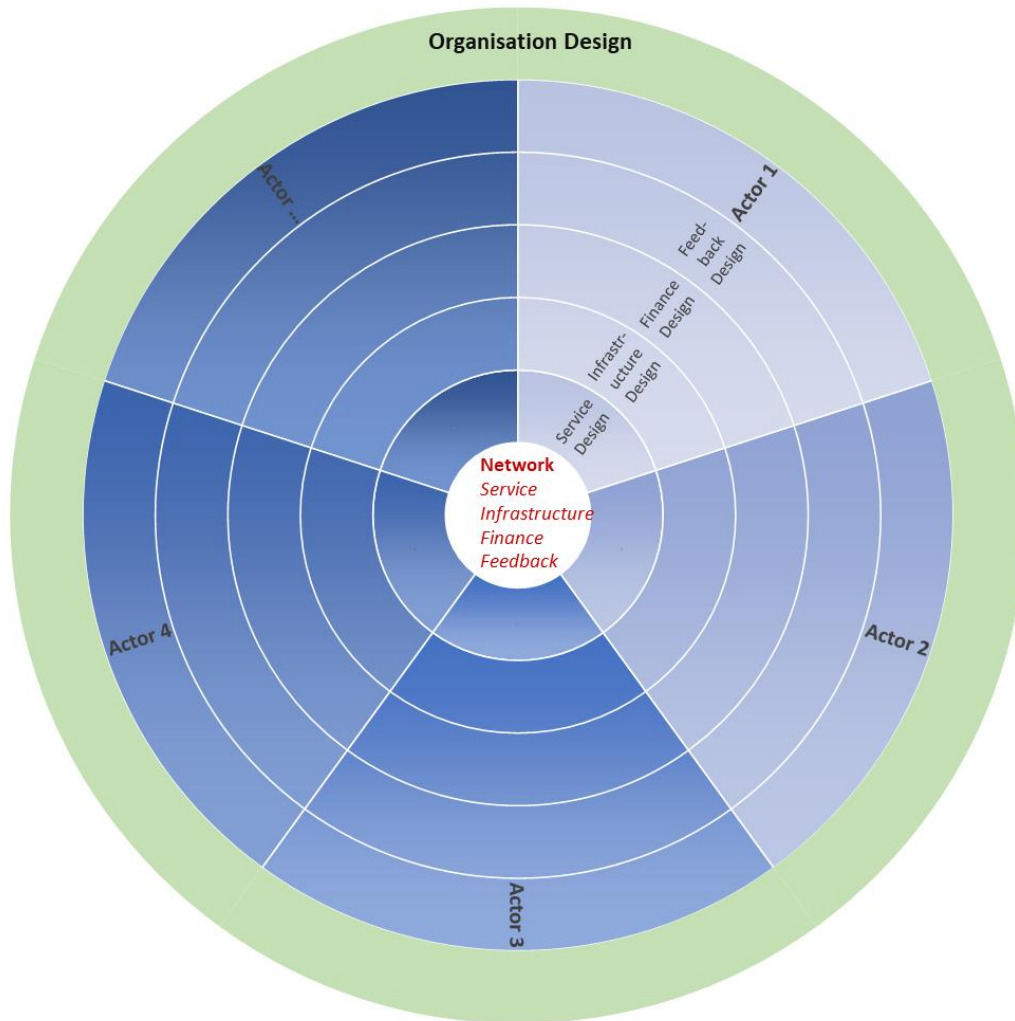
Their framework is more detailed in its approach than the SDBM/R of Turetken et al. (2019), making it more convenient to define its elements. It consists of four pillars and nine building blocks, thereby describing the value creating processes the network intends to perform:

- Product (physical, digital, virtual)
 - *Value proposition*: Describes the bundle of products, services and processes that the network regards as essential in its offering.
- Customer interface (physical, digital, virtual)
 - *Target customer*: Describes the group(s) of end-users the network is aiming to offer the value to.
 - *Distribution channel*: Describes the various ways the network is trying to reach out to the target customers.
 - *Relationship*: Specifies the interconnections the network actors establish between themselves and between their customer segments.
- Infrastructure management
 - *Value configuration*: Details the activities and resources required to produce the value propositions.
 - *Core competency*: Describes the competencies of the network necessary to perform the activities.
 - *Partner network*: Details the cooperative agreements between the network partners.
- Financial and non-financial aspects
 - *Cost structure*: Describes the financial and nonfinancial costs related to the execution of the value proposition.
 - *Revenue model*: Entails the financial and nonfinancial elements the network will benefit from when executing the activities.

These building blocks are useful for defining the elements of the eHUBS business model. The main drawback of this framework is the lesser focus on the role and activities of the single actor in the network. Considering the eHUBS case, we focus on the value that is created, delivered and captured by the network as well as the separate network partners.

Taking these shortcomings into account and in order to make use of a framework that is suited to facilitate the constructing of different business model scenarios for the eHUB case, we have constructed a new framework based on the two frameworks mentioned above. The framework consists of four domains, related to the first three layers of Turetken et al. (2019)'s framework and the four pillars of Lindgren et al. (2010)'s framework (see **figure 2**).

Figure 2: Conceptual Network-based Business Modelling Design Tool based on Lindgren et al. (2010) and Turetken et al. (2019)



The four design domains are defined as the service design, the infrastructure design, the finance design and the feedback design. When developing a business model scenario, the starting point is the network. After discussion about the network's design pillars, the elements of the four domains for the separate actors are described. This process is iterative, meaning that any inconsistencies between the domains of the actors and the network will lead to a new discussion in order to realign the interests of all partners.

The *service design* defines the value propositions, the target groups and the means, activities and processes in order to create the intended value for these target groups.

The *infrastructure design* describes the supporting technology, infrastructure and competencies that are required to reach out to the end-customers with the objective of delivering the value.

The *finance design* details the financial benefits, costs, investments and pricing schemes related to the performance of the activities defined in the service design.

The *feedback design* defines the systems that are required to monitor, evaluate and receive feedback from end-users and network partners and the risks associated with the value-creating activities defined in the service design.

During the process of describing the abovementioned elements, we consider the *organisation design* as the overlapping layer. It identifies the different network stakeholders and defines their relations, their dependencies and their roles.

In brief, our framework facilitates the development of a network-based business model, but with an explicit division between the whole network and the network partners. By defining the four design domains for every entity, the framework summarises how the network and its partners intend to create, deliver and capture value. The overlapping structure (i.e. the organisation design) indicates how the network operates and which role every actor can perform.

3 Workshop - New mobility services: maximising benefits, mitigating risks. Towards new public-private partnerships

This section elaborates on the business modelling workshop, called ‘*New mobility services: maximising benefits, mitigating risks. Towards new public-private partnerships*’, that was organised on the 24th of October 2019 in Leuven. Before detailing the results, the structure of the workshop is explained.

3.1 Workshop’s structure

This section presents the different components of the workshop called ‘*New mobility services: maximising benefits, mitigating risks. Towards new public-private partnerships*’. We have deviated from the original structure, i.e. the organisation of two workshops; one workshop reserved for public authorities and one workshop reserved for only private companies. By combining the workshop for commercial providers and the workshop for public authorities, we had more interaction between stakeholders with two different perspectives: the private sector’s profitability objective and the public sector’s sustainability objective. This interaction could unveil possible public-private partnerships and opportunities to create a positive business case for every partner.

The workshop’s programme is provided below. This section briefly describes which participants were invited, elaborates on the keynote speeches and explains the focus group discussions.

Table 1: *Workshop’s programme*

Topics

Introduction to eHUBs’ project

Polis’ Discussion paper on Micromobility

Karen Vancluysen, Polis

Key components: Data & Urban space management – Emerging approaches

Philippe Crist, International Transport Forum at the OECD

eHUBS use case of Amsterdam

Debbie Dekkers, City of Amsterdam

eHUBS use case of Leuven

Liselotte Van Gils, City of Leuven

The business modelling framework

Elnert Coenegrachts, University of Antwerp

Focus groups’ discussions about the different elements of the design domains affecting the business case: regulatory frameworks, public-private partnerships, data sharing, urban space management,...

3.1.1 Participants

The list of participants was composed in three steps. First, by discussing with consortium partners and conducting desk research, we identified the type of actors that should be involved in the organisation and operation of an eHUB. Second, by doing market research, we made up a list of shared mobility providers active worldwide. This list is not complete and is continuously being reviewed and updated. From this list we identified the shared mobility providers that are active in North-West Europe. We made a diverse selection of providers, in order to have different perspectives (i.e. carsharing, bike sharing, cargo bike sharing, scooter sharing and moped sharing providers). Thirdly, the consortium selected, next to shared mobility providers, interesting stakeholders, identified in step one, who could contribute in designing new business model scenarios. As such we had a diverse selection of participants for our workshop that could offer different insights.

3.1.2 Keynote speeches

The keynote speeches define the setting for the workshop's focus group discussions. The first keynote speech introduces the eHUBS project and its objectives. Furthermore, it discusses the evolution of micro-mobility in the urban environment and the related risks and opportunities that it brings along. The second keynote elaborates on the regulatory framework, data management, urban space management and public-private partnerships, from a perspective on shared mobility. The third and fourth keynote speeches identify the approach of Amsterdam and Leuven in implementing the eHUBs in their cities. Amsterdam explains its bottom-up method, Leuven its top-down approach. The last keynote speech clarifies the business modelling design tool that will be used during the focus group's discussions. Consequently, the keynote speeches present elements that the participants can take into account when discussing the eHUBS business model.

3.1.3 Focus groups

After the introductory keynote speeches, the actual workshop started. We assigned the participants to five different focus groups. Each focus group included one or two partner cities, who defined the elements of the urban context where the eHUBs were going to be implemented, and a range of different stakeholders (e.g. one bike sharing provider, one moped sharing provider, one charging point operator, one carsharing provider and one advertising agency). After discussing one or more business model scenarios, keeping the context defined by the hosting city in mind, the participants rotated to another focus group with a different urban environment (i.e. hosting city). As such, the participants developed several business model scenarios for two different urban environments. Each discussion was led by a moderator, who had a list of guiding questions available (see **table 2**), and someone who wrote down the answers. In order to assist the participants in clearly defining the business model's elements regarding the eHUBS case, we have constructed a list of questions related to every design domain of our framework.

Table 2: Design Domain's Questions

➤ Overlapping layer

Organisation design

Who are the different stakeholders? (Public authorities, shared mobility providers, advertising companies, charging point operators, Public transport operators, Private, non-mobility related, companies (e.g. real estate developers, business park owners), etc.)

What are the different roles of the network partners?

Which relations exist between the different actors?

What are the responsibilities of the different actors?

➤ Design Domains

Service design

What is the value proposition of the eHUB? Which market failure(s) is it addressing? What are the objectives of implementing the eHUBs?

What is the geographical context/environment eHUBs operate in?

What is the socio-economic context/environment eHUBs operate in?

Who are the different target groups/end-users?

What are the main needs and motivations of the different target groups?

What are every actor's value propositions?

How can an eHUB contribute to these value propositions?

Which functions/services are offered at the eHUB? Which key activities do the actors carry out?

Infrastructure design

Which technology can support the eHUB-model?

Which technical barriers can the eHUB-model encounter?

What does the service platform look like? (digital kiosk/application/online)

Which functions can be used through the service platform?

What is the design/composition of the eHUBs?

Which kind of data sharing standards are required/feasible?

Finance design

What investments are needed?
What are the potential funding sources (government funding, sponsoring, advertisement, real estate development, private investment)?
What are the different operational costs streams?
What are the different revenue streams?
What is the pricing scheme of the eHUB-model?
How are the revenues/costs shared between the actors?
What is the contracting structure (publicly owned, privately operated/ publicly owned & operated/ privately owned & operated)

Feedback design

Which performance metrics are defined to monitor the progress towards the objectives of the eHUBs?
Which service levels are defined to the different stakeholders?
How can these service levels create incentives for the stakeholders to do an outstanding job? What if the service levels are not met?
Which regulatory adaptations can enable/disable the objective(s) of the eHUB-model?
What are potential barriers to the use of eHUBs?
What are the risks associated with the eHUB-model and how can they be mitigated?
How can the end-users provide feedback?

The results of the focus groups' discussions are provided in the next section. Evidently, several business model scenarios were identified, but it is particularly interesting to see where similarities between these different scenarios exists.

3.2 Results

The workshop led to ten different discussions, each taking the urban environment of the table's host city as a starting point. This varied context, in combination with the different participants' experiences regarding shared mobility, led to diverse ideas and descriptions of the framework's design domains. The framework and guiding questions ensured that the ideas could be categorised and the data analysed in a consistent manner.

We looked for repeated elements in the developed frameworks to identify common and divergent ideas about the eHUBS model. This led to the formation of five different prototypes: "First-/last-mile eHUB-network", "Clustered (e-)shared mobility", "Point-of-Interest eHUB-network", "Hybrid eHUB-network" and "Closed eHUB-network". These prototypes are representations of the main findings about the considered eHUBS model.

Below, the principal aspects of every business model prototype are presented, in order to provide the essence of the five models and allow a brief comparison between them.

The appendix contains the completed frameworks for the five different business model prototypes, giving more detailed information about every aspect of the business model. Moreover, the appendix also elaborates on organisation design of the business models, wherein the different roles of the network actors are explained.

Table 3: Summary of eHUBS business model prototypes

Design Domain	Business model prototypes	<u>BM 1: First-/last-mile eHUB network</u>	<u>BM 2: Clustered shared (e-)mobility</u>	<u>BM 3: Point-of-interest (POI) eHUB network</u>	<u>BM 4: Hybrid eHUB network</u>	<u>BM 5: Closed eHUB network</u>
Service Design	<p>Connected network of eHUBS, integrated in PT network. Availability of shared mobility modes should be ensured to have reliable transportation system</p> <p>Aim to stimulate multimodal travel behaviour</p> <p>First-/last-mile solution requiring a dense network connecting relevant locations for the target groups</p> <p>Main target group are daily commuters.</p> <p>Highest potential at dense city neighbourhoods</p> <p>Important to have an easily accessible environment</p>	<p>Locations centralising the supply of shared mobility modes in certain areas, creating a recognisable place where a shared mobility offer can be found</p> <p>Aim to generate demand for shared mobility</p> <p>Encourage shared mobility providers to provide their services in otherwise underserved areas</p> <p>Main target group are neighbourhood's residents</p> <p>Highest potential at small neighbourhoods or outlying areas where PT offer is minimal</p> <p>Opportunity to create safe environment stimulating additional economic and social activity (e.g. bars, local shops)</p>	<p>Network of eHUBS to safely and conveniently access different point-of-interests</p> <p>Integrated within PT network</p> <p>Aim to stimulate multimodal travel behaviour</p> <p>Extend transportation options to point-of-interests, increasing their attractiveness and lowering the need for parking lots</p> <p>Main target groups are tourists and visitors of shops and leisure facilities</p> <p>Highest potential at areas with concentrated number of social and economic activities and high congestion</p> <p>Opportunity to seek the commitment of real estate developers in extending the network of eHUBS</p>	<p>Network of eHUBS providing extensive shared mobility modes (free-floating and station-based)</p> <p>Aim to increase area covered by shared mobility services, thereby stimulating uptake of shared mobility modes</p> <p>Active fleet management is required but can be carried out by one central actor (for both free-floating and station-based modes)</p> <p>Main target groups are commuters and tourists</p> <p>Highest potential at dense city centres and neighbourhoods</p> <p>Opportunity to centralise maintenance/charging for all shared mobility modes</p>	<p>Closed network of eHUBS to ensure availability of shared mobility modes to demanding actors</p> <p>Aim to stimulate uptake of alternative transportation modes</p> <p>Extend the transportation possibilities for private customers, thereby adding value for the target groups</p> <p>Main target groups are real estate developers and business park owners</p> <p>Potential locations are based on the demand of private actors</p> <p>Opportunity to provide additional services (e.g. charging points for private cars, parcel lockers)</p>	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Business model prototypes		<i>BM 1: First-/last-mile eHUB network</i>	<i>BM 2: Clustered shared (e-)mobility</i>	<i>BM 3: Point-of-interest (POI) eHUB network</i>	<i>BM 4: Hybrid eHUB network</i>	<i>BM 5: Closed eHUB network</i>
Design Domain						
Infrastructure Design	Technology required to:	Technology required to:	Technology required to:	Technology required to:	Technology required to:	Technology required to:
	<ul style="list-style-type: none"> -monitor availability of shared mobility modes -gather data on trip chaining -provide travel advice based on a mix of personal preferences, policy preferences and time efficiency (i.e. MaaS application) -access and use all shared mobility modes (i.e. smart card/application/token) -provide information about PT connections 	<ul style="list-style-type: none"> -monitor availability of shared mobility modes -access and use shared mobility modes and charging infrastructure (i.e. smart card/application/token) 	<ul style="list-style-type: none"> -monitor availability of shared mobility modes -gather data on trip chaining -provide travel advice based on a mix of personal preferences, policy preferences and time efficiency (i.e. MaaS application) -access and use all shared mobility modes (i.e. smart card/application/token) -provide information about PT connections 	<ul style="list-style-type: none"> -monitor availability of shared mobility modes -gather data on trip chaining -provide travel advice based on a mix of personal preferences, policy preferences and time efficiency (i.e. MaaS application) -access and use all shared mobility modes (i.e. smart card/application/token) -mark allowed drop-off areas -efficiently redistribute and charge station-based and free-floating vehicles 	<ul style="list-style-type: none"> -monitor availability of shared mobility modes -access and use all shared mobility modes (i.e. smart card/application/token) -make access to eHUB exclusive 	
	Infrastructure required to:	Infrastructure required to:	Infrastructure required to:	Infrastructure required to:	Infrastructure required to:	Infrastructure required to:
<ul style="list-style-type: none"> -store private vehicles (e.g. personal bikes, scooters, mopeds) -adapt the offered supply of shared mobility modes (i.e. flexible infrastructure) -provide information and signalisation 	<ul style="list-style-type: none"> -enable additional services (e.g. parcel lockers, terraces, charging points for private vehicles) -adapt the offered supply of shared mobility modes (i.e. flexible infrastructure) -provide information and signalisation -ensure a safe environment -provide recognisable branding elements 	<ul style="list-style-type: none"> -store private vehicles (e.g. personal bikes, scooters, mopeds) -provide information and signalisation (mainly toward POIs) -provide recognisable branding elements 	<ul style="list-style-type: none"> -store private vehicles (e.g. personal bikes, scooters, mopeds) -provide information and signalisation (mainly toward POIs) -provide recognisable branding elements 	<ul style="list-style-type: none"> -adapt the offered supply of shared mobility modes (i.e. flexible infrastructure) -provide information and signalisation -centralise the maintenance of shared mobility modes (free-floating and station-based) 	<ul style="list-style-type: none"> -adapt the offered supply of shared mobility modes (i.e. flexible infrastructure) -access the eHUB (i.e. gateway) 	
Analogue and digital channels to enable services (e.g. leaflet, physical store, telephone service, screen, application)	Analogue and digital channels to enable services (e.g. leaflet, physical store, telephone service, application)	Analogue and digital channels to enable services (e.g. leaflet, physical store, telephone service, application)	Analogue and digital channels to enable services (e.g. leaflet, physical store, telephone service, application)	Analogue and digital channels to enable services (e.g. leaflet, physical store, telephone service, screen, application)	Digital channel to enable services (e.g. application)	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Design Domain	Business model prototypes	<u>BM 1: First-/last-mile eHUB network</u>	<u>BM 2: Clustered shared (e-)mobility</u>	<u>BM 3: Point-of-interest (POI) eHUB network</u>	<u>BM 4: Hybrid eHUB network</u>	<u>BM 5: Closed eHUB network</u>
Finance Design	<p>Different pricing schemes but to ensure availability demand-responsive pricing can be implemented</p> <p>Opportunity to integrate public transport's fee into subscription fee for shared mobility services (i.e. MaaS subscription)</p> <p>Funding sources can be subsidies from public authorities and PT operators, operating permits and advertisements</p>	<p>Different pricing schemes (e.g. subscription fee, pay-per-use)</p> <p>Opportunity to integrate fee for additional services into subscription fee for shared mobility services</p> <p>Additional revenues from additional services (e.g. charging private vehicles)</p> <p>Funding sources can be subsidies from public authorities, operating permits, advertisements and rent from local service providers (e.g. parcel locker, bike repair services)</p>	<p>Different pricing schemes but to ensure availability demand-responsive pricing can be implemented</p> <p>Opportunity to integrate public transport's fee and entrance fee for POI into subscription fee for shared mobility services (i.e. MaaS subscription)</p> <p>Funding sources can be subsidies from public authorities and PT operators, operating permits and advertisements</p>	<p>Different pricing schemes (e.g. subscription fee, pay-per-use)</p> <p>Opportunity to integrate public transport's fee and entrance fee for POI into subscription fee for shared mobility services (i.e. MaaS subscription)</p> <p>Financial incentives can be offered to redistribute the shared mobility fleet</p> <p>Funding sources can be subsidies from public authorities and PT operators, operating permits and advertisements</p>	<p>Different pricing schemes (e.g. subscription fee, pay-per-use)</p> <p>Opportunity to integrate price of the shared mobility offer and access to the eHUB into one subscription fee</p> <p>Funding sources can be subsidies from public authorities, operating permits and investments from real estate developers and private firms</p>	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Design Domain	Business model prototypes										
Feedback Design	<table border="1"> <thead> <tr> <th data-bbox="459 395 759 1214"><i>BM 1: First-/last-mile eHUB network</i></th> <th data-bbox="759 395 1048 1214"><i>BM 2: Clustered shared (e-)mobility</i></th> <th data-bbox="1048 395 1352 1214"><i>BM 3: Point-of-interest (POI) eHUB network</i></th> <th data-bbox="1352 395 1637 1214"><i>BM 4: Hybrid eHUB network</i></th> <th data-bbox="1637 395 1910 1214"><i>BM 5: Closed eHUB network</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="459 395 759 1214"> <p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p> <p>Main risks and barriers are related to: -the substitution of PT trips by shared mobility modes, thereby not reducing the car use -Viability of several eHUBS, leading to a low demand, low availability and low reliability of the shared transportation network -too strong focus on e-vehicles affecting the viability of the shared mobility services</p> </td> <td data-bbox="759 395 1048 1214"> <p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p> <p>Main risks and barriers are related to: -low usage of shared mobility services, leading to insufficient revenues for providers -low bargaining power of small cities and neighbourhoods, leading to low service levels and affecting the reliability of the shared system -too strong focus on e-vehicles and therefore affecting the viability of the shared mobility services</p> </td> <td data-bbox="1048 395 1352 1214"> <p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system for visitors of the POI (e.g. digital screen, yearly survey at the POI)</p> <p>Main risks and barriers are related to: -the substitution of PT trips by shared mobility modes, thereby not reducing the car use -Viability of several eHUBS, leading to a low demand and loss of valuable space at the POI -too strong focus on e-vehicles affecting the viability of the shared mobility services -insufficient space to accommodate further growth of the eHUB, reducing the reliability of the shared transportation network</p> </td> <td data-bbox="1352 395 1637 1214"> <p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p> <p>Main risks and barriers are related to: -the substitution of PT trips by shared mobility modes, thereby not reducing the car use -Inconvenience for public space users by numerous free-floating devices on the street -competition between free-floating and station-based providers, thereby affecting the viability of the eHUB -too strong focus on e-vehicles affecting the viability of the shared mobility services</p> </td> <td data-bbox="1637 395 1910 1214"> <p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly 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As explained in section 2, the organisation design is the overlapping layer of our framework. This means that we have identified, during the workshop, the different network partners and their possible roles. However, for every business model prototype the actors can take on one or several roles presented below. The five business model prototypes identify their key actors, the organisation design explains which functions these key actors have. It is thereby important to look at the service design (i.e. the value propositions and the key activities to be performed) of the business model to determine the roles of the network partners.

Table 4: Organisation design

Actors	<u>Network</u>	<u>Public authority</u>	<u>Public transport operator</u>	<u>Shared mobility provider(s)</u>	<u>Mobility enabling service providers (charging point operators, MaaS provider)</u>	<u>Non-mobility related commercial service providers</u>	<u>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</u>
Role of actor	Responsible for design of eHUB (offer of mobility services and additional facilities and related physical elements to provide mobility and additional services)	Facilitate the formation of a network; assemble network of stakeholders Collect and aggregate transport data from mobility providers.	Provide qualitative public transport	Provide shared mobility modes	Provide charging points	Provide facilities at the eHUB (e.g. lockers, local shops, bars)	Implement and install eHUBs at high demand areas/POIs (universities, shopping malls, business parks, etc.)
	Foster behavioural change (create neutral eHUB brand)	Foster behavioural change (create neutral eHUB brand) Define the level playing field; open foundation for creating different kinds of eHUBs involving different stakeholders	Foster behavioural change (marketing)	Foster behavioural change (marketing)			Implement and install eHUBs at residencies, in order to reduce parking space-obligations
	Provide available and convenience shared (e-)mobility offer	Maintain and operate the eHUBS' facilities	Maintain the eHUBS' facilities	Redistribute, recharge and maintain the shared mobility modes	Provide MaaS-solution		Invest in the infrastructure of eHUBS

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		Invest and enable shared mobility services (through subsidies)					
		Regulate; discourage use of private cars; create level playing field for shared mobility providers.	Implement and install eHUBs within public transport network	Invest in the infrastructure of eHUBS			
		Act as a mediator between partners		Maintain the eHUBS' facilities			

Table 3 presents the main ideas related to the four design domains (i.e. service design, infrastructure design, finance design and feedback design) in a concise way. In order to quickly grasp the essentials of the different models, a brief description of every model is provided below.

The first model (see page 36), named *First-/Last-mile eHUB-network*, focuses on the provision of a connected network of eHUBs, integrated in the public transport network. The eHUBs' network is mainly functioning as a first-/last-mile solution, thereby stimulating multimodal travel behaviour. It is therefore important to form a fine mesh network connecting the relevant locations for the target groups. This implies that the target groups, primarily commuters, can easily go from point A to point B by using the eHUBs' and public transport's network.

Local government, public transport operators and private companies (e.g. business park owners) should cooperate in order to identify potential areas and stimulate their target groups to make use of the mobility services. Shared mobility providers will have to ensure availability of their fleet so that consumers can rely on the shared system.

Furthermore, there are several essential elements that increase this model's potential; generating users data regarding trip chaining; MaaS application; physical/digital key to gain access to all eHUBS' facilities/services; channels to supply information about PT time schedules, connections with PT and available shared mobility services; infrastructure for storing private vehicles (e.g. personal bicycles, scooters, mopeds).

Considering the finance design, the shared mobility services can have different pricing schemes but to ensure the availability of shared mobility services a demand-pricing scheme can be implemented. Moreover, there is the opportunity of integrating the public transport's fee into the subscription scheme for all shared mobility services (i.e. MaaS subscription).

Lastly, this model poses some environmental and financial risks; users can mainly substitute their PT trips by shared mobility modes, thereby not reducing their car use; several locations of the eHUBs' network are not viable, leading to a low demand, low availability and low reliability of the shared system; too strong focus on e-vehicles affecting the business case of the shared mobility providers and consequently their service level.

The following business model prototype (see page 43), named ***Clustered shared (e-)mobility***, focuses on clustering shared mobility services and generating demand for these services. The eHUBs are mainly located in outlying neighbourhoods or small city centres, centralising the supply of shared mobility modes in that area. This will stimulate shared mobility providers to be active in otherwise underserved areas. Moreover, it creates opportunities to establish a safe environment where several facilities/services (e.g. parcel lockers, bars, local shops, charging points) can be provided, thus generating additional social and economic activity.

In close contact with the neighbourhoods' residents, the offer of shared mobility modes at the eHUB should be discussed in order to reduce the car-dependency of these residents. Local governments carry the responsibility to communicate with neighbourhoods, local economy actors and shared mobility providers to establish a relevant eHUB network, thereby incentivising the use of shared and personal e-mobility.

Furthermore, there are several essential elements that increase this model's potential; physical/digital key to gain access to all eHUBS' facilities/services; channels to monitor availability of shared mobility modes; charging infrastructure for personal vehicles (e.g. e-cars and e-bikes); flexible infrastructure design to adapt the facilities and services based on the demand; infrastructure to accommodate safety elements (e.g. sufficient lighting), economic and social activities (e.g. space for terraces).

Considering the finance design, the shared mobility services can have different pricing schemes (pay-per-use, subscription fee). Additionally, there are expenses for using the eHUBS' facilities (e.g. battery charging locker, charging station). There is the opportunity of integrating the payment for these expenses into the physical/digital key that gives access to all eHUBS' facilities and services.

Lastly, this model poses some environmental and financial risks; low actual use of shared mobility services, leading to insufficient revenue for the providers; too strong focus on e-vehicles affecting the business case of the shared mobility providers and consequently their service level; small cities and neighbourhoods do not have enough bargaining power to require minimum service levels from the providers, thereby reducing the reliability of the shared system if the providers are not providing qualitative services.

The third business model prototype (see page 48), named ***Point-of-interest (POI) eHUB network***, focuses on the formation of a network of eHUBs that connects different point-of-interests (POIs), so that these highly crowded areas can be more easily reached by alternative modes of transportation. This extends the transportation options visitors have, thereby increasing the attractiveness of the POIs and lowering the car's utility. It furthermore reduces the congestion and the need for parking lots at the POIs.

It is important that the eHUBs' network is complementary with the public transport network, so that tourists, visitors of local shops and leisure activities and commuters (who can also benefit from this network) have a seamless multimodal travel experience.

Local governments can seek commitment of real estate developers to install eHUBs at their private zone. Shared mobility providers will have to ensure availability of their fleet so that consumers can rely on the shared system.

Additionally, there are several essential elements that increase this model's potential; generating users data regarding trip chaining and visitors' profile; MaaS application; physical/digital key to gain access to all eHUBs' facilities/services; channels to supply information about PT time schedules, connections with PT and available shared mobility services; infrastructure for storing private vehicles (e.g. personal bicycles, scooters, mopeds); infrastructure for charging private vehicles (e.g. e-bikes, e-cars).

Considering the finance design, the shared mobility services can have different pricing schemes but to ensure the availability of shared mobility services, a demand-pricing scheme can be implemented. Furthermore, there is the opportunity of creating one fee that integrates the public transport's fee, the shared mobility service's fee and the entrance fee to the POI.

Lastly, this model poses some environmental and financial risks; users can mainly substitute their PT trips by shared mobility modes, thereby not reducing their car use and decreasing the revenues for public transport; too strong focus on e-vehicles affecting the business case of the shared mobility providers and consequently their service level; eHUBs' location is restricted by its size and cannot accommodate further growth, thereby reducing the reliability of the shared system; low actual use of shared mobility services, leading to insufficient revenue for the providers and loss of valuable space at the POI's area.

The fourth business model prototype (see page 54), named **hybrid eHUB network**, focuses on the formation of a hybrid network of eHUBs that provides an extensive range of transportation modes, from free-floating to station-based shared mobility services. This increases the area covered by shared mobility services, with a view to stimulating the uptake of shared mobility modes. This network should be complementary with the public transport network, as it provides several possibilities to resolve the first-/last-mile problem. As such, the network can create opportunities for mainly commuters and city's residents to have a seamless multimodal travel experience.

Moreover, the model provides opportunities to centralise the maintenance and charging services for both station-based as free-floating shared mobility modes, reducing the operational costs of the shared mobility services. Active fleet management is required to ensure that the shared mobility services cover certain areas so that the shared system is convenient to use. For this reason, public authorities have to implement a control system that can monitor the locations of the free-floating modes, in order to ensure compliance from the providers with the minimum service levels.

Additionally, there are several essential elements that increase this model's potential; fleet management system in order to redistribute and recharge free-floating and station-based modes; generating users data regarding trip chaining; MaaS application; physical/digital key to gain access to all eHUBS' facilities/services; channels supplying information about PT time schedules, connections with PT and available shared mobility services; geofencing technology to prevent free-floating devices being misplaced.

Considering the finance design, the shared mobility services can have different pricing schemes (e.g. pay-per-use, subscription fee) and can offer financial incentives to return the free-floating device to a underserved area, or eHUB for recharging. Moreover, there is the opportunity of integrating the public transport's fee into the subscription scheme for all shared mobility services (i.e. MaaS subscription).

Lastly, this business model poses some environmental and financial risks; users can mainly substitute their PT trips by the shared mobility modes, thereby not reducing their car use and decreasing the revenues for public transport; free-floating devices are too numerous on certain locations (e.g. on the pavements), leading to frustrations of other public space users; too strong focus on e-vehicles affecting the business case of the shared mobility providers and consequently their service level; low actual use of shared mobility services, leading to insufficient revenue for the providers and an unreliable shared system; free-floating providers capture market share of station-based providers in areas with eHUB presence (or vice versa), thereby affecting the profitability of the competitor as well as the reliability of the shared system.

The final business model prototype (see page 61), named ***Closed eHUB network***, focuses on the formation of a closed network of eHUBs that is based on a demand from residents or private companies (e.g. business park owners, real estate developers). Availability of shared mobility services is assured at these hubs, since they are for exclusive use of subscribers. This model also enables private companies to provide additional value for residents and employees by expanding their transportation possibilities. For these reasons, car users can be convinced to reduce their car-dependency and choose for alternative modes of transport. The eHUBs should also offer additional services and facilities as parcel lockers and charging points for personal vehicles.

One crucial element of this model is the implementation of technology that allows or denies access to the eHUB and its facilities. Consequently, this can prevent vandalism of these hubs and its shared mobility modes. Additionally, there are two elements that increase this model's potential; a physical/digital key to gain access to all eHUBS' facilities/services; digital channels to plan, book and pay for the eHUBS' services; technology to register as a eHUB user.

Considering the finance design, the shared mobility services can have different pricing schemes (e.g. pay-per-use, subscription fee). However, there is the opportunity to integrate the price of all services and access to the eHUB into one subscription fee.

Lastly, this business model poses some environmental and financial risks; users can mainly substitute their PT trips by the shared mobility modes, thereby not reducing their car use and decreasing the revenues for public transport; low actual use of shared mobility services, leading to insufficient revenue for the providers, an unreliable shared system and the need to transform the public/private space; insufficient connection with open eHUBs in other areas, thereby losing customers who cannot reach their destination.

This section presented five potential business model scenarios regarding the eHUBS case. They mainly differ in the intended value they want to create and deliver; BM 1 and BM 4 mainly target daily commuters, therefore requiring a reliable transportation system; BM 2 targets less dense neighbourhood having less transportation alternatives other than the car, therefore requiring a centralised recognisable location for residents where an offer of shared mobility can be found; BM 3 addresses the problem of high congestion at POIs, offering more possibilities to reach the POIs and thereby increasing their attractiveness; BM 5 aims to reduce car use and dependency with the help of private non-transport related actors, requiring the transformation of private space to provide alternative mobility options.

The differences in service design imply changes in the other design domains. However, it is also important to note similarities between the business model prototypes; it is recommended to implement technology that monitors the availability of shared mobility modes and that enables access to and use of all shared mobility modes; customers should be able to access the eHUBS' facilities and services through both analogue and digital channels; it is recommended to install infrastructure that can be adapted to the users' changing needs and requirements. The main risks are related to the substitution of PT trips by shared mobility modes; the economic viability of the eHUBS at risk because of a too strong focus on e-mobility modes; the economic viability of the eHUBS at risk due to a low demand for shared mobility. These analogies reveal the aspects that should be taken into account when implementing an eHUB network, regardless of the issues they address and the context they are implemented in.

4 Conclusions

This deliverable identified possible business model scenarios for eHUBs. It created a framework to assist the design of network-based business models, consistent with scientific literature on business modelling design and network-based business models. Literature has further expressed the potential of merit (i.e. public-private) business models to achieve sustainable objectives in the (urban) mobility context. Therefore, we organised one workshop for public authorities and private actors, collaboratively developing business model scenarios using our framework.

The results of this workshop are five merit business model prototypes for the eHUB. They help understand the potential benefits of network-based business models in the mobility environment. It points out to the different interests and perspectives of the network partners, while keeping the network's objectives and value propositions in mind. It is important to notice that every network partner can contribute to the network's objectives in several ways, not neglecting their own objectives. The workshop thus helped to create positive synergies between public and private actors and assisted in developing different business model scenarios that are beneficial to the network partners involved.

The findings contribute to the eHUBS project's objectives, namely a successful implementation of eHUBs in several replication cities. This requires a mutual understanding between public and private players of the eHUBS' objectives and their mutual commitments. The business model prototypes indicate how public-private partnerships can be established and which elements to consider. The findings fit into the blueprint for partner and replication cities and the blueprint for commercial shared mobility providers (respectively deliverable 2.1 and 2.2 of work package 'Long Term Effects'), which provides information on how to cooperate with commercial partners, local governments and other stakeholders.

Limitations of this exploratory study need to be acknowledged, most notably the developing process of the business model prototypes. The ideas generated during the workshop depend on the participants. A broad range of stakeholders were invited in order to have different perspectives. Furthermore, we have established different geographical contexts (i.e. host city's environment) for which the eHUB model was developed. Similar ideas developed by different participants for different geographical contexts provide insights regarding potential eHUBs' business models. However, we cannot identify every potential business model for the eHUB and we are not sure the business model prototypes identified in section 3.2 are all potentially successful eHUBS' business models.

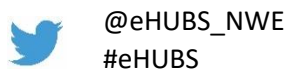
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The eHUBS Consortium

The consortium of eHUBS consists of 15 partners with multidisciplinary and complementary competencies. This includes European cities, leading universities, networks and electric and shared mobility providers.



For further information please visit <http://www.nweurope.eu/ehubs>



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BM 1: First-/last-mile eHUB network

Table 5: “First-/Last-mile eHUB-network” business model scenario

Service Design	Network (eHUB)	Public authority	Shared provider(s)	mobility	Mobility enabling service providers (charging point operators, MaaS provider)	Public transport operators	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Value proposition	<p>First-/Last-mile solution</p> <p>Open, extensive network</p> <p>Proximity to origin and destination</p> <p>Possible transit connection</p>	<p>Reduce personal car-dependency</p> <p>Stimulate multimodality</p> <p>Stimulate active modes of transport</p> <p>Reduce congestion</p> <p>Reduce environmental impact</p> <p>Reduce parking pressure</p>	<p>Proximity of different mobility modes</p> <p>Assure availability of shared mobility modes</p> <p>Create higher demand areas for shared mobility</p>		<p>Expanded charging network</p> <p>Seamless use of different transportation modes</p>	<p>Qualitative network integration with public transport</p>	<p>Easily reachable office buildings, not only by car</p>
Target groups	<p>Mainly commuters</p> <p>People coming to the city for touristic, leisure or shopping activities</p> <p>City's/neighbourhood's residents</p>	<p>Citizens recently moved to a new neighbourhood</p> <p>People using limited mobility modes (PT-only, car-only)</p>	<p>People using limited mobility modes (PT-only, car-only)</p>		<p>Shared e-mobility providers</p> <p>Commuters</p>	<p>Commuters</p>	<p>Employees</p>
Socio-economic/geographical context	<p>Dense city neighbourhoods</p> <p>Close to transit connections</p>						

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Service Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Key activities and services	Provide shared mobility offer based on neighbourhood/user needs Provide convenient use of shared mobility services Provide easily accessible environment Provide feedback system to assess the offered shared mobility services	Maintain eHUBS' facilities Create neutral eHUB-brand Incentivise citizens to use shared mobility	Provide shared mobility modes Redistribute and recharge shared vehicles Maintain eHUBS' facilities	Provide and maintain charging stations Integrate all modes in one application, where planning, booking and payment of a trip can be done	Provide qualitative PT, connected with eHUB network Incentivise commuters to use shared mobility to reach PT-connection	Stimulate employees to use alternative modes of transport	
Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Supporting/enabling technology	Data gathering system on trip chaining Technology to monitor availability of shared mobility modes MaaS application that provides travel advice based on a mix of personal preferences, policy preferences and time efficiency Easy to use, convenient application/smart card, token to use all shared mobility modes		Data gathering system on user information				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Key data objectives	<p>Availability of shared mobility modes</p> <p>Users' data on where the shared mobility modes are used</p> <p>Data on PT-connections</p> <p>To have the right mobility mode available at the right location at the right time</p>						
Key infrastructure components	<p>Infrastructure to enable mobility services</p> <p>Flexible infrastructure to easily adapt the offered supply of shared mobility modes to the demand</p> <p>Infrastructure to provide information and signalisation</p> <p>Recognisable eHUB branding elements</p>	Dedicated public space for shared mobility services and certain personal transportation modes (e.g. bicycles)	Stations for shared mobility modes		Charging stations	Infrastructure to enable easy connection with PT	Dedicated private space for shared mobility services

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Service channels/Interface to the customer	<p>Analogue channel: -Information leaflet on available shared mobility modes, PT-time schedule and additional services -Store to buy tickets -Telephone service to make reservation</p> <p>Digital channel: -Screen to provide information and to provide the possibility to plan, book and pay the trip -Application to provide information and to provide the possibility to plan, book and pay the trip</p>					Digital channel providing information on connection opportunities between shared mobility modes and public transport	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Finance Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Pricing Scheme	<p>Different pricing schemes across the different shared mobility providers</p> <p>Pay-per-use (time and distance dependent)</p> <p>Demand-responsive pricing</p> <p>Subscription fee to make use of certain shared mobility mode</p> <p>Subscription fee to make use of all shared mobility modes and public transport</p>		<p>Financial incentive when returning shared mobility mode to the right location (redistribution mechanism)</p> <p>Integrate price of shared mobility service within PT-ticket</p>			Integrate price of shared mobility service within PT-ticket	
Funding sources	<p>Subsidies from public authorities and PT-operators</p> <p>Operating permits for mobility providers</p> <p>Advertisement (only locations where there is high visibility)</p>	Fee from the shared mobility providers if the eHUBs are maintained by public company/authority	Advertisement on shared mobility vehicles			Advertisement on PT-vehicles	Provide mobility budget for employees
Contracting structure	<p>Public-private partnerships</p> <p>Tenders/concessions</p>						

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Risks	<p>Users substitute mainly their PT trips by shared mobility modes, not reducing their car use</p> <p>Low availability of shared mobility modes → people will search for alternative transportation modes</p> <p>Low demand for shared mobility, which does not attract many providers leading to low availability → chicken/egg problem</p> <p>eHUBS' location is restricted by its size. It cannot accommodate further growth → Availability, reliability of the shared system is too low</p> <p>Strong focus on electric mobility modes → financial risk</p>	<p>Reduction in PT use</p> <p>Subsidies provided to shared mobility providers operating in an already profitable area</p> <p>Small cities cannot require certain minimum service levels to be met from the shared mobility providers → not enough bargaining power</p>	<p>eHUBS' locations does not offer sufficient demand</p> <p>Public authorities require very high service levels, which require additional investments/increase operating costs</p>	<p>Data to be integrated into MaaS-platform is not available</p>	<p>PT is substituted by shared mobility modes</p>		
Feedback channels	<p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p>		<p>Application to provide feedback on shared mobility services at specific location</p>	<p>Application to provide feedback on shared mobility services at specific location</p>			

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS provider)</i>	<i>Public transport operators</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Barriers	<p>Weather conditions prevents customers to use shared mobility modes</p> <p>Subscription to one city's eHUB model can create barrier for intercity mobility</p> <p>Many mobile applications required to make use of the shared mobility modes</p> <p>Distance to reach eHUB is too far (especially by foot)</p> <p>Initial investment of shared e-cars is too high. Offer of shared e-cars is therefore too low. Offer possibility to provide shared ICE-cars</p>	GDPR restricts sharing user data			GDPR restricts sharing user data		

BM 2: Clustered shared (e-)mobility

Table 6: “Clustered shared (e-)mobility” business model scenario

Service Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Non-mobility related commercial service providers
Value proposition	<p>Generating demand for shared mobility</p> <p>Clustering demand for shared mobility</p> <p>Recognisable for customers where to find shared mobility offer</p> <p>Opportunity to generate social and economic activity</p> <p>Safe environment, creating opportunities for additional local social and economic activity (e.g. local shops, bars)</p> <p>Charging infrastructure available for public consumers</p>	<p>Reduce personal car-dependency</p> <p>Stimulate multimodality</p> <p>Stimulate active modes of transport</p> <p>Reduce environmental impact</p> <p>Stimulate local economic and social activities</p>	<p>Assure availability of shared mobility modes</p> <p>Higher demand areas for shared mobility</p>	<p>Expanded charging network (also available for consumers)</p> <p>Higher demand areas for charging services</p>	<p>Additional economic and social activity</p>
Target groups	City's/neighbourhood's residents	People using limited mobility modes (PT-only, car-only)	People using limited mobility modes (PT-only, car-only)	<p>Shared e-mobility providers</p> <p>Public consumers</p>	City's/neighbourhood's residents
Socio-economic/geographical context	<p>Small neighbourhoods/rural areas</p> <p>Outlying areas where PT offer is minimal and car use is high</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Service Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators)</i>	<i>Non-mobility related commercial service providers</i>
Key activities and services	<p>Provide shared mobility offer based on neighbourhood/user needs</p> <p>Provide convenient use of shared mobility services</p> <p>Provide easy accessible environment</p> <p>Provide feedback system to assess the offered shared mobility services</p> <p>Provide facilities to offer additional social and economic activity</p>	<p>Maintain eHUBS' facilities</p> <p>Create neutral eHUB-brand</p> <p>Incentivise citizens to use shared mobility</p> <p>Contact local shops and service facilities to become network partner</p>	<p>Provide shared mobility modes</p> <p>Redistribute and recharge shared vehicles</p> <p>Maintain eHUBS' facilities</p>	<p>Provide and maintain charging stations</p>	<p>Centralise activities at the eHUB</p>
Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility providers</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Non-mobility related commercial service providers</i>
Supporting technology	<p>Technology to monitor availability of shared mobility modes</p> <p>Easy to use, convenient application/smart card, token to use all shared mobility modes and charging infrastructure</p>		<p>Data gathering system on user information</p>	<p>Data gathering system on public user information</p>	
Key data objectives	<p>Availability of shared mobility modes</p> <p>Users' data on which shared mobility modes are used and for what purpose</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility providers</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Non-mobility related commercial service providers</i>
Key infrastructure components	<p>Infrastructure to enable mobility services and additional services (parcel lockers, battery charging lockers, terraces, etc.)</p> <p>Flexible infrastructure to easily adapt the offered supply of shared mobility modes to the demand</p> <p>Information about offer of shared mobility modes, facilities and services</p> <p>Infrastructure to provide a safe environment</p> <p>Recognisable eHUB branding elements</p>	Dedicated public space to shared mobility modes	Stations for shared mobility modes	Charging stations for shared mobility vehicles and personal vehicles	
Service channels/Interface to the customer	<p>Analogue channel:</p> <ul style="list-style-type: none"> -Information leaflet on available shared mobility modes, PT-time schedule and additional services -Store to buy tickets -Telephone service to make reservation <p>Digital channel:</p> <ul style="list-style-type: none"> -Application to provide information and to provide the possibility to plan, book and pay the trip 			<p>Digital channel:</p> <ul style="list-style-type: none"> -Screen to provide payment possibility for charging service (public users) -Application to reserve and pay charging service (public user) 	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Finance Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators)</i>	<i>Non-mobility related commercial service providers</i>
Pricing Scheme	<p>Different pricing schemes across the different shared mobility providers</p> <p>Pay-per-use (time and distance dependent) of shared mobility modes</p> <p>Subscription fee to make use of certain shared mobility mode</p>		Financial incentive when returning shared mobility mode to the right location (redistribution mechanism)	Pay-per-use or subscription fee to make use of charging services (for public users)	
Funding sources	<p>Subsidies from public authorities</p> <p>Operating permits for mobility providers</p> <p>Advertisement (only locations where there is high visibility)</p> <p>Rent from local firms offering additional facilities/services (e.g. parcel lockers, bike repair services)</p>	Fee from the shared mobility providers if the eHUBs are maintained by public company/authority	Advertisement on shared mobility vehicles		
Contracting structure	<p>Public-private partnerships</p> <p>Tenders/concessions</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators)</i>	<i>Non-mobility related commercial service providers</i>
Risks	<p>Low availability of shared mobility modes → people will search for alternative transportation modes</p> <p>Low demand for shared mobility, which does not attract many providers leading to low availability → chicken/egg problem</p> <p>eHUBS' location is restricted by its size. It cannot accommodate further growth → Availability, reliability of the shared system is too low</p> <p>Strong focus on electric mobility modes → financial risk</p>	<p>Small cities cannot require certain minimum service levels to be met from the shared mobility providers → not enough bargaining power</p>	<p>eHUBS' locations does not offer sufficient demand</p> <p>Public authorities require very high service levels, which require additional investments/increase operating costs</p>		<p>Low demand for shared mobility → affects profitability</p>
Feedback channels	<p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p>		<p>Application to provide feedback on shared mobility services at specific location</p>		
Barriers	<p>Weather conditions prevents customers to use shared mobility modes</p> <p>Many mobile applications required to make use of the shared mobility modes</p> <p>Distance to reach eHUB is too far (especially by foot)</p> <p>Initial investment in shared e-cars is too high. Offer of shared e-cars is therefore too low. Offer possibility to provide shared ICE-cars</p>	<p>GDPR restricts sharing user data</p>		<p>GDPR restricts sharing user data</p>	

BM 3: Point-of-interest (POI) eHUB network

Table 7: “Point-of-interest (POI) eHUB-network” business model scenario

Service Design	Network (eHUB)	Public authority	Shared provider(s)	mobility	Mobility enabling service providers (charging point operators, MaaS providers)	Public-transport operator	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Value proposition	<p>Convenient and safe access to point-of-interests</p> <p>Providing alternative mobility modes to high demand areas</p> <p>Increased number of visitors</p>	<p>Reduce personal car-dependency</p> <p>Stimulate multimodality</p> <p>Stimulate active modes of transport</p> <p>Reduce congestion</p> <p>Reduce environmental impact</p> <p>Reduce parking pressure</p>	<p>Proximity of different mobility modes</p> <p>Assure availability of shared mobility modes</p> <p>Higher demand areas for shared mobility</p>		<p>Expanded charging network (also available for consumers)</p> <p>Seamless use of different transportation modes</p>	<p>Qualitative network integration with public transport</p>	<p>Easily reachable office buildings, shopping malls and touristic attractions not only by car</p>
Target groups	<p>Tourists</p> <p>People participating in shopping or leisure activities</p> <p>Commuters</p>	<p>People using limited mobility modes (PT-only, car-only)</p>	<p>People using limited mobility modes (PT-only, car-only)</p>		<p>Shared e-mobility providers</p>	<p>Personal car users</p>	<p>Tourists and people participating in shopping or leisure activities</p>
Socio-economic/geographical context	<p>Areas with high number of social and economic activities</p> <p>Highly congested areas with highly frequent PT-connection</p>						

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Service Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public-transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Key activities and services	<p>Provide shared mobility offer based on users' needs</p> <p>Provide convenient use of shared mobility services</p> <p>Provide easily accessible, safe environment</p> <p>Provide feedback system to assess the offered shared mobility services</p>	<p>Maintain eHUBS' facilities</p> <p>Create neutral eHUB brand</p> <p>Incentivise citizens to use shared mobility</p> <p>Contact local shops, touristic attractions and leisure facilities to become network partner</p>	<p>Provide shared mobility modes</p> <p>Redistribute and recharge shared vehicles</p> <p>Maintain eHUBS' facilities</p>	<p>Provide and maintain charging stations</p> <p>Integrate all modes in one application, where planning, booking and payment of a trip can be done</p>	<p>Provide qualitative PT, connected with eHUB</p>	<p>Maintain eHUBS' facilities</p> <p>Integrate eHUB in real estate development</p>	
Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Supporting technology	<p>Data gathering system on trip chaining</p> <p>Technology to monitor availability of shared mobility modes</p> <p>MaaS application that provides travel advice based on a mix of personal preferences, policy preferences and time efficiency</p> <p>Easy to use, convenient application/smart card, token to use all shared mobility modes and public transport</p>		<p>Data gathering system on user information</p>	<p>Data gathering system on trip chaining information</p>			<p>Data gathering system on visitors' profile</p>

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Key data objectives	<p>Availability of shared mobility modes</p> <p>To have the right mobility mode available at the right location at the right time</p> <p>Which transportation mode has been substituted to reach POI</p>						Visitors' profiles and mode of transport
Key infrastructure components	<p>Infrastructure to enable mobility services</p> <p>Infrastructure to provide information and signalisation (towards POI)</p> <p>Recognisable eHUB branding elements</p>	Dedicated public space for shared mobility modes and certain personal transportation modes (e.g. bicycles)	Stations for shared mobility modes		Charging stations for shared mobility modes and public e-vehicles	Infrastructure to enable easy connection with PT	Dedicated private space for shared mobility services
Service channels/Interface to the customer	<p>Analogue channel:</p> <ul style="list-style-type: none"> -Information leaflet on available shared mobility modes, PT-time schedule and POI-facilities/services/shops -Store to buy tickets -Telephone service to make reservation <p>Digital channel:</p> <ul style="list-style-type: none"> -Screen to provide information (POI-related) and to provide the possibility to plan, book and pay the trip -Application to provide information and to provide the possibility to plan, book and pay the trip 						

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Finance Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Pricing Scheme	<p>Different pricing schemes across the different shared mobility providers</p> <p>Pay-per-use (time and distance dependent)</p> <p>Demand-responsive pricing</p> <p>Subscription fee to make use of certain shared mobility mode</p> <p>Subscription fee to make use of all mobility services</p>		<p>Financial incentive when returning shared mobility mode to the right location (redistribution mechanism)</p> <p>Integrate price of shared mobility service within PT-ticket and access ticket to POI</p>		<p>Pay-per-use or subscription fee to make use of charging services (for public users)</p>	<p>Integrate price of shared mobility service within PT-ticket</p>	<p>Integrate price of shared mobility service and PT within access ticket to POI</p>
Funding sources	<p>Subsidies from public authorities and PT-operators</p> <p>Operating permits for mobility providers</p> <p>Advertisement (only locations where there is high visibility)</p>	<p>Fee from the shared mobility providers if the eHUBs are maintained by public company/authority</p>	<p>Advertisement on shared mobility vehicles</p>			<p>Advertisement on PT-vehicles</p>	<p>Advertisement on highly visible location</p>
Contracting structure	<p>Public-private partnerships</p> <p>Tenders/concessions</p>						

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Risks	<p>Users substitute mainly their PT trips by shared mobility modes, not reducing their car use</p> <p>Low availability of shared mobility modes → people will search for alternative transportation modes</p> <p>Low demand for shared mobility, which does not attract many providers leading to low availability → chicken/egg problem</p> <p>eHUBS' location is restricted by its size. It cannot accommodate further growth → Availability, reliability of the shared system is too low</p> <p>Strong focus on electric mobility modes → financial risk</p>	<p>Reduction in PT use</p> <p>Subsidies provided to shared mobility providers operating in an already profitable area</p>	<p>eHUBS' locations do not offer sufficient demand</p> <p>Public authorities require very high service levels, which require additional investments/increase operating costs</p>		<p>Data to be integrated into MaaS-platform is not available</p>	<p>PT is substituted by shared mobility modes</p>	<p>Demand for shared mobility is low → dedicated private space needs to be reformed to accommodate personal vehicles</p>
Feedback channels	<p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system for visitors of the POI (e.g. digital screen, yearly survey at the POI)</p>		<p>Application to provide feedback on shared mobility services at specific location</p>		<p>Application to provide feedback on shared mobility services at specific location</p>		

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared provider(s)</i>	<i>mobility</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>	<i>Private, non-mobility related, companies (e.g. real estate developers, business park owners)</i>
Barriers	<p>Weather conditions prevents customers to use shared mobility modes</p> <p>Many mobile applications required to make use of the shared mobility modes</p> <p>Distance to reach eHUB is too far (especially by foot)</p> <p>Initial investment of shared e-cars is too high. Offer of shared e-cars is therefore too low. Offer possibility to offer shared ICE-cars</p>	GDPR restricts sharing user data			GDPR restricts sharing user data		

BM 4: Hybrid eHUB network

Table 8: “Hybrid eHUB-network” business model scenario

Service Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators, MaaS providers)	Public transport operator
Value proposition	<p>Increased uptake of shared mobility modes (free-floating and station-based)</p> <p>Extensive transportation modes’ offer</p> <p>Centralised maintenance and charging facilities for all shared mobility modes (free-floating and station-based)</p>	<p>Reduce personal car-dependency</p> <p>Stimulate multimodality</p> <p>Stimulate active modes of transport</p> <p>Reduce congestion</p> <p>Reduce environmental impact</p> <p>Reduce parking pressure</p> <p>Proper management of public space</p>	<p>Proximity of different mobility modes</p> <p>Assure availability of shared mobility modes</p> <p>Create higher demand areas for shared mobility</p>	<p>Expanded charging network (accommodating free-floating and station-based shared mobility modes)</p> <p>Seamless use of different transportation modes</p>	<p>Qualitative network integration with public transport</p>
Target groups	<p>People coming to the city for touristic, leisure or shopping activities</p> <p>City’s/neighbourhood’s residents</p> <p>Commuters</p>	<p>People using limited mobility modes (PT-only, car-only)</p>	<p>People using limited mobility modes (PT-only, car-only)</p>	<p>Shared e-mobility providers</p> <p>Commuters</p>	<p>Commuters</p>
Socio-economic/geographical context	<p>Dense city centres/neighbourhoods</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Service Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Key activities and services	<p>Provide shared mobility offer based on neighbourhood/user needs</p> <p>Provide convenient use of shared mobility services</p> <p>Provide easily accessible environment</p> <p>Provide feedback system to assess the offered shared mobility services</p> <p>Provide centralised maintenance and charging facilities for all shared mobility modes</p> <p>Active management of shared mobility modes</p>	<p>Maintain and operate eHUBS' facilities</p> <p>Create neutral eHUB-brand</p> <p>Incentivise citizens to use shared mobility</p>	<p>Provide shared mobility modes</p> <p>Redistribute and recharge shared vehicles</p> <p>Maintain and operate eHUBS' facilities</p>	<p>Provide and maintain charging stations</p> <p>Integrate all modes in one application, where planning, booking and payment of a trip can be done</p>	<p>Provide qualitative PT, connected with eHUB network</p> <p>Incentivise commuters to use shared mobility to reach PT-connection</p>

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Supporting technology	<p>Data gathering system on trip chaining</p> <p>Geofencing technology</p> <p>Technology to monitor availability of shared mobility modes</p> <p>MaaS application that provides travel advice based on a mix of personal preferences, policy preferences and time efficiency</p> <p>Easy to use, convenient application/smart card, token to use all shared mobility modes and public transport</p> <p>Fleet management system to redistribute and recharge free-floating and station-based shared mobility modes</p>	Control system on location of free-floating shared mobility modes, to ensure compliance with minimum service levels	Data gathering system on user information		
Key data objectives	<p>Availability of shared mobility modes</p> <p>Users' data on where the shared mobility modes are used</p> <p>Data on PT connections</p> <p>To have the right mobility mode available at the right location at the right time</p>	Locations and use of free-floating shared mobility systems to properly manage public space			

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Key infrastructure components	<p>Infrastructure to enable mobility services</p> <p>Flexible infrastructure to easily adapt the offered supply of shared mobility modes to the demand</p> <p>Infrastructure to provide information and signalisation</p> <p>Recognisable eHUB branding elements</p>	<p>Dedicated public space to shared mobility modes and certain personal transportation modes (e.g. bicycles)</p>	<p>Stations for shared mobility modes</p>	<p>Charging stations (dedicated to free-floating and station-based shared mobility vehicles)</p>	<p>Infrastructure to enable easy connection with PT</p>
Service channels/Interface to the customer	<p>Analogue channel:</p> <ul style="list-style-type: none"> -Information leaflet on available shared mobility modes, PT-time schedule and additional services -Store to buy tickets -Telephone service to make reservation <p>Digital channel:</p> <ul style="list-style-type: none"> -Screen to provide information and to provide the possibility to plan, book and pay the trip -Application to provide information and to provide the possibility to plan, book and pay the trip 				<p>Digital channel providing information on connection opportunities between shared mobility modes and public transport</p>

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Finance Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Pricing Scheme	<p>Different pricing schemes across the different shared mobility providers</p> <p>Pay-per-use (time and distance dependent)</p> <p>Demand-responsive pricing</p> <p>Subscription fee to make use of certain shared mobility mode</p> <p>Subscription fee to make use of all shared mobility modes and public transport</p>		<p>Financial incentive when returning shared mobility mode to the right location (redistribution mechanism)</p> <p>Integrate price of shared mobility mode within PT-ticket</p>		<p>Integrate price of shared mobility mode within PT-ticket</p>
Funding sources	<p>Subsidies from public authorities and PT-operators</p> <p>Operating permits for mobility providers</p> <p>Advertisement (only locations where there is high visibility)</p>	<p>Fee from the shared mobility providers if the eHUBs are maintained by public company/authority</p> <p>Fee from the shared mobility providers if public authority operates the maintenance and charging facilities at the eHUB</p>	<p>Advertisement on shared mobility vehicles</p>		<p>Advertisement on PT-vehicles</p>
Contracting structure	<p>Public-private partnerships</p> <p>Tenders/concessions</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Risks	<p>Users substitute mainly their PT trips by shared mobility modes, not reducing their car use</p> <p>Low availability of shared mobility modes → people will search for alternative transportation modes</p> <p>Low demand for shared mobility, which does not attract many providers leading to low availability → chicken/egg problem</p> <p>Free-floating providers capture market share of station-based providers in areas with eHUB-presence (or vice-versa)</p> <p>eHUBS' location is restricted by its size. It cannot accommodate further growth → Availability, reliability of the shared system is too low</p> <p>Strong focus on electric mobility modes → financial risk</p>	<p>Reduction in PT use</p> <p>Subsidies provided to shared mobility providers operating in an already profitable area</p> <p>Small cities cannot require certain minimum service levels to be met from the shared mobility providers → not enough bargaining power</p> <p>Free-floating providers are extensively using the facilities/space at the eHUB → insufficient availability for station-based providers</p>	<p>eHUBS' locations does not offer sufficient demand</p> <p>Public authorities require very high service levels, which require additional investments/increase operating costs</p>	<p>Data to be integrated into MaaS-platform is not available</p>	<p>PT is substituted by shared mobility modes</p>
Feedback channels	<p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p>		<p>Application to provide feedback on shared mobility services at specific location</p>	<p>Application to provide feedback on shared mobility services at specific location</p>	

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	<i>Network (eHUB)</i>	<i>Public authority</i>	<i>Shared mobility provider(s)</i>	<i>Mobility enabling service providers (charging point operators, MaaS providers)</i>	<i>Public transport operator</i>
Barriers	<p>Weather conditions prevents customers to use shared mobility modes</p> <p>Subscription to one city's eHUB model can create barrier for intercity mobility</p> <p>eHUBs cannot be accommodated for both free-floating as station-based providers</p> <p>Many mobile applications required to make use of the shared mobility modes</p> <p>Distance to reach eHUB is too far (especially by foot)</p> <p>Initial investment of shared e-cars is too high. Offer of shared e-cars is therefore too low. Offer possibility to offer shared ICE-cars</p>	<p>GDPR restricts sharing user data</p>		<p>GDPR restricts sharing user data</p>	

BM 5: Closed eHUB network

Table 9: “Closed eHUB-network” business model scenario

Service Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Value proposition	<p>Closed network</p> <p>Assured availability of shared mobility modes</p> <p>Customised offer</p> <p>Demand-based locations</p> <p>Proximity to shared mobility modes</p>	<p>Reduce personal car-dependency</p> <p>Stimulate active modes of transport</p> <p>Reduce congestion</p> <p>Reduce environmental impact</p> <p>Target specific neighbourhood</p>	<p>Proximity of different mobility modes</p> <p>Assure availability of shared mobility modes</p> <p>Decreased vandalism to shared mobility vehicles</p>	<p>Expanded charging network (accommodated for shared mobility modes as well as private transportation modes)</p>	<p>Offer different transportation modes in proximity of residencies and office buildings</p>
Target groups	<p>City’s/neighbourhoods’ residents (higher profiles)</p>	<p>People using limited mobility modes (PT-only, car-only)</p>	<p>People using limited mobility modes (PT-only, car-only)</p>	<p>Shared e-mobility providers</p> <p>Private e-vehicle users</p>	<p>Residents, employees</p>
Socio-economic/geographical context	<p>Small to large neighbourhoods</p> <p>Rural and urban environment</p>				
Key activities and services	<p>Provide shared mobility offer based on neighbourhood/user needs</p> <p>Provide convenient use of shared mobility services</p> <p>Provide easily accessible environment</p> <p>Provide feedback system to assess the offered shared mobility services</p> <p>Provide closed system, only accessible when having a subscription</p>	<p>Maintain eHUBS’ facilities</p> <p>Incentivise citizens to use shared mobility</p>	<p>Provide shared mobility modes</p> <p>Redistribute and recharge shared vehicles</p> <p>Maintain eHUBS’ facilities</p>	<p>Provide and maintain charging stations</p>	<p>Maintain eHUBS’ facilities</p> <p>Incentivise residents/employees to use alternatives modes of transport</p>

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Infrastructure Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Supporting technology	<p>Technology to make access to eHUB exclusive</p> <p>Technology to monitor availability of shared mobility modes</p> <p>Easy to use, convenient application/smart card, token to use all shared mobility modes</p>		Data gathering system on user information	Data gathering system on private users' profile	
Key data objectives	<p>Availability of shared mobility modes</p> <p>Users' data on where the shared mobility modes are used</p> <p>Create shared mobility users' profile</p>				
Key infrastructure components	<p>Infrastructure to enable mobility services</p> <p>Flexible infrastructure to easily adapt the offered supply of shared mobility modes to the demand</p> <p>Gateways to gain access to the eHUB</p>	Dedicated public space for shared mobility modes and certain personal transportation modes (e.g. bicycles)	Stations for shared mobility modes	Charging stations (accommodated for private users and shared mobility modes)	Dedicated private space for shared mobility modes and personal transportation modes
Service channels/Interface to the customer	Digital channel: Application to provide information and to provide the possibility to book and pay the trip			Digital channel to provide information, book and pay for charging services (private users)	Digital channel to provide information for the residents and employees about shared mobility offer

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Finance Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Pricing Scheme	<p>Subscription fee to gain access to the eHUB offer</p> <p>Different pricing schemes across the different shared mobility providers</p> <p>Pay-per-use (time and distance dependent)</p>				
Funding sources	<p>Subsidies from public authorities</p> <p>Investment from real estate developers or private firms</p> <p>Operating permits for mobility providers</p>		Advertisement on shared mobility vehicles		<p>Provide mobility budget for employees</p> <p>Integrate subscription fee into rent</p>
Contracting structure	<p>Public-private partnerships</p> <p>Tenders/concessions</p>				

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Risks	<p>Users substitute mainly their PT trips by shared mobility modes, not reducing their car use</p> <p>Low demand for shared mobility, which does not attract many providers leading to low availability → chicken/egg problem</p> <p>Strong focus on electric mobility modes → financial risk</p> <p>Network of closed eHUBs is too limited. Users cannot reach destination</p>	<p>Reduction in PT use</p> <p>Subsidies provided to shared mobility providers operating in an already profitable area</p>	<p>eHUBS' locations does not offer sufficient demand</p> <p>Public authorities require very high service levels, which require additional investments/increase operating costs</p>		<p>Shared mobility offer is not suited for residents/employees. eHUB needs to be reformed to private space.</p>
Feedback channels	<p>QR code to give feedback on eHUBS' facilities and services</p> <p>Feedback-system on community and neighbourhood level (yearly surveys)</p> <p>Digital feedback channel of private companies (for residents and employees)</p>		<p>Application to provide feedback on shared mobility services at specific location</p>		

D1.1 & D1.2 Workshops for participating cities and commercial e-mobility providers

Feedback Design	Network (eHUB)	Public authority	Shared mobility provider(s)	Mobility enabling service providers (charging point operators)	Private, non-mobility related, companies (e.g. real estate developers, business park owners)
Barriers	<p>Weather conditions prevents customers to use shared mobility modes</p> <p>Subscription to one closed city's eHUB model can create barrier for intercity mobility</p> <p>Many mobile applications required to make use of the shared mobility modes</p> <p>Initial investment of shared e-cars is too high. Offer of shared e-cars is therefore too low. Provide possibility to offer shared ICE-cars</p> <p>Commitment required of private companies to install and maintain eHUBs at their private ground</p>	<p>GDPR restricts sharing user data</p>	<p>Several eHUBs' locations within closed network are not fitted within shared mobility provider's network. Redistribution/maintenance cost is too high for those locations</p>		