Future mobihubs as social connector for the neighbourhood

About positive friction, quantum mechanics, and your mother.

Jelmer Koedood

Master Thesis

This master thesis was written in the context of the master Design for Interaction at the faculty of Industrial Design Engineering at the Delft University of Technology in the Netherlands.

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ADVIER
MOBILISEERT

TU Delft

Preface

This graduation report contains my final project and therefore final challenge as a Design for Interaction student at the TU Delft. It contains a redesign for Mobihubs for the context of the Netherlands, done for and in collaboration with Advier. This redesign was made with the help of the Vision in Product Design method, and numerous other design and research methods. There have been case studies, interviews, on-site visits, literature studies, user testing, rapid prototyping, video editing, storytelling and reframing methods and ideas.

With this report, I conclude my time at the TU Delft and as a student. This leaves me with mixed feelings. I am going to miss, next to the numerous student discounts at museums and cinemas, the time I had at the faculty and beyond. I am also excited for what is to come, whatever that may be.

Before this project I had never done a project that has to do with mobility, but I can say that it has been a pleasure. But, perhaps that does not say all that much, because this project was about much more than just mobility. I can say that I have used 'every trick in my book' during this project, meaning I was able to demonstrate all of the skills that I have learned in the bachelor and master programmes, and now excel at, to serve the purpose of completing the project.

The project was a great fit for me because it had the potential of being a combination of both my backgrounds; in Architecture and the Built Environment as well as Design for Interaction. The end result is more DfI than it is Architecture, which nicely reflects my switch between the disciplines. If the end result would have been more Architecture than DfI, I probably would have to revaluate my life choices.

Another interesting mirror between the project and myself is my discovery of the Vision in Product Design method. Never have I used a method that so closely resembles my own design methods and matches my strengths. It almost makes me regretful that I have not discovered it before. The method was a great backbone throughout the graduation project. The process of reframing the problem by means of metaphors and storytelling felt natural because it matches the process that I usually follow, only now it was grounded in research and an existing method.

The planning and deliverables changed a lot throughout the project, but the end result in the shape of this report and the showcase video accurately summarize, and nicely visualize, the work that has been done.

Executive Summary

This project revolves around redesigning the future mobihub for the context of the Netherlands. A mobihub (or mobipunt in Dutch) is a brand of mobility hub.
In this report, a mobility hub is defined as
"A recognizable, physical place where different context-driven functions and services (mostly shared mobility-related such as shared cars) that benefit the neighbourhood meet. A connection to public transport is desirable but type-dependant."

A typology of mobihubs was found and simplified to three types, with a special focus on the type: **"neighbourhood hub".** Along with this, a target group was defined: the **"suburban citizen"**: people that live in a smaller neighbourhood and work in a bigger city.

This type of hub and target group determined the focus of the project. This focus was on social cohesion in the neighbourhood. Vision in Product Design (VIP) was used as the main design & research method.

In the research phase, a broad literature study was done, along with case studies in the Netherlands and interviews with users from the target group (Figure 1), amongst others.
It was found that users on a transport hub always navigate the space between being connected and being autonomous, while they experience positive or negative 'friction' (events that slow them down) during their travels. The amount of 'being connected' and 'autonomy' that a user experiences or seeks, depends on that users personality.
Based on this, the design statement was formed:
"The mobihub needs to wake up people by introducing a kind of positive friction (that literally and figuratively slows them down) at their local or commute mobihub, with which they can choose to interact, together or alone"

The mobihub needs to facilitate for two kinds of pePple at the same time. The fact that the mobihub needs to be in these two states at the same time was compared to the principle of ‘quantum superpositioning’. In quantum superpositioning, a quantum particle can be in two places at the same time (figure 2).

After an ideation period a design direction was found. This design direction revolves around modular multi-purpose interactive capsules on the mobihub. With these capsules, inhabitants can combine their mobility patterns. Inhabitants can deliver packages for each other, lend or sell each other items, or pick up groceries. The capsules and the supporting app form an open-ended platform that can be used by the inhabitants as they see fit.
This design direction was prototyped (figure 3) and evaluated with users and experts. The functionalities were viewed as very beneficial, but the design direction did not provide a meaningful interaction between place (mobihub) and user (inhabitant).
After an extended period of research, it was found that the mobihub should act as a concerned parent through the app and the interactive capsules. The mobihub acting as a concerned parent gives the relationship between user and hub more meaning, because it mirrors wanted mobility patterns. The hub is a concerned parent that needs to ‘educate’ it’s users about responsible mobility usage, and ‘take care’ of them. The user, in turn, has the

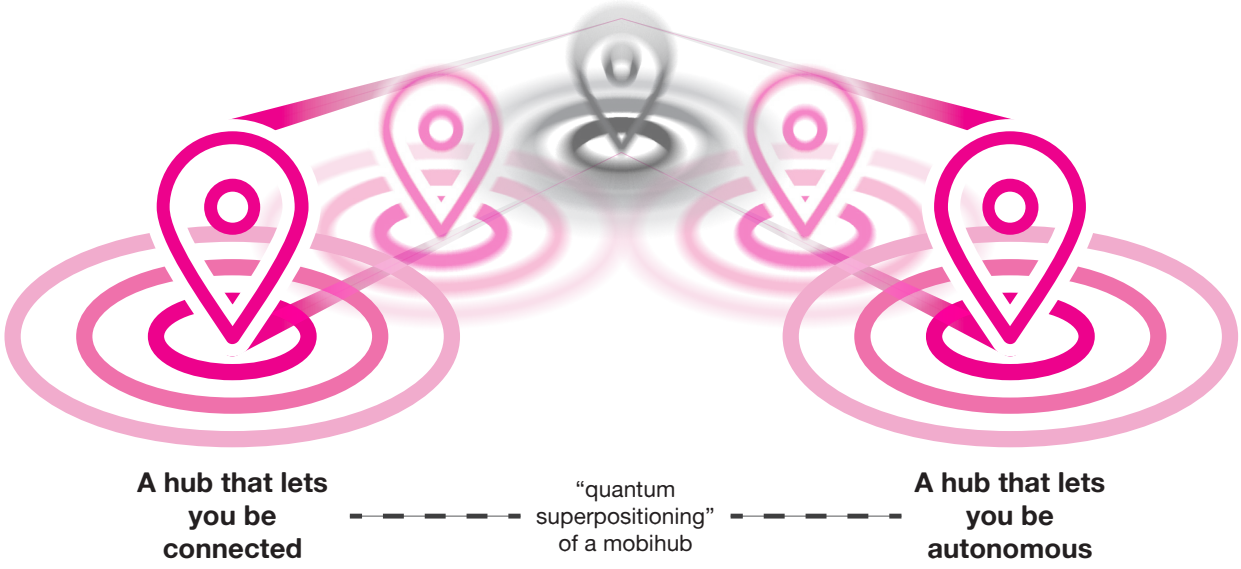


Figure 2: the “quantum superpositioning problem of mobility hubs“

Figure 1: user interviews

Figure 3: user testing

responsibility to keep visiting his ‘parent’.

The final design was dubbed “mobi+punt” (Mobipuntplus or Mobipluspunt) (see figures 4 and 5) and was evaluated with relevant experts in an expert meeting (figure 6). It was evident that social cohesion the most relevant success factor of the design is, as well as efficiency in delivery methods and extra value for the neighbourhood. The main limitations all revolved around the business model and implementation -questions. The final design is still conceptual, and there are much unknowns about its eventual realisation. The experts recognized that it is an idea with a lot of potential.

MOBI+PUNT

Figure 4: Logo of the final design

Figure 5:
Render of the final design

Figure 6:
Expert meeting evaluation

Glossary

ADVIER: advisory bureau that advises government bodies or companies about human-centred mobility, the company involved with mobihubs and the initiator of this project.

CBS: Dutch Central Bureau for Statistics

CROW: Expert organisation on transport and traffic

DDL: Delft Design Labs

DFI: Design for Interaction

DIKW: Data Information Knowledge Wisdom

EU: European Union

hub: Short for mobility hub

Hub: mobility hub initiative in the Dutch provinces of Groningen and Drenthe

IV: Interaction Vision

MARKTPLAATS: Dutch peer-to-peer reselling website

MaaS: Mobility as a Service

MOBIHUB: Brand name of mobility hub by Advier and the SHARE-North partners

MOBIL.PUNKT: name of large mobility hub in Bremen

MOBIL.PUNKTCHEN: name of small mobility hub in Bremen

MOBIPUNT: Dutch name for a mobihub

MOBI+PUNT OR MOBIPUNT+: Final design in this report (“Mobipunt Plus” or “Mobipluspunt”)

PICNIC: Grocery delivery service

PEERBY: Peer-to-peer lending app

SHARE-North: European project involving shared mobility promotion in north-European nations

TCD: Thing-Centred Design

TU Delft: Delft University of Technology

VIP: Vision in Product Design

WHATSAPP BUURTPREVENTIE: Dutch common practice of neighbourhood watch through message service WhatsApp

WIZARD-OF-OZ: Prototyping style where the researcher mimics intended interactivity

Table of Contents

1.
Introduction

1.1 Project Description

1.1.1 ASSIGNMENT

This project was offered by the company of Advier with the following description:

“Design the social interaction on the future mobihubs”

It was intended to be a broad assignment, with the basis of redesigning their brand of mobility hubs, the mobihub.
Soon, this question was rephrased during the initial stages of the project to:

“Design the mobility hub of the future”

The end result of this report and project involves a design for a future mobility hub that uses and improves social cohesion in the neighbourhood, neatly combining the two statements above.

The assignment can be summarized as follows: this project revolves around (re)designing mobihubs for the context of the Netherlands. Mobihubs (mobipunten in Dutch) are a brand of mobility hubs.

What is a mobility hub?

There are many definitions regarding mobility hubs. The Hub-initiative active in the Dutch provinces of Groningen and Drenthe defines its Hubs as *“A place where you can transfer from one transport modality to another, or wait before doing so. Extra facilities make the Hub a pleasant place to be.”* (reisviahub.nl, 2019).
The city of Burlington (2019) has a broader definition: *“A mobility hub is a location that has several transportation options and is a concentrated point for a mix of uses such as transit, employment, housing, recreation and shopping.”*

The mobihub brand in its Belgian iteration is defined by Matthys et al. (2018, p. 6) as *“a physical place where different functions (mostly mobility-related) meet. A mobihub contains a diversified offer of mobility of which car sharing, public transport and bike parking are essential parts. (...) A mobihub is made to promote and facilitate multi-modal travel on the smallest scale.”*

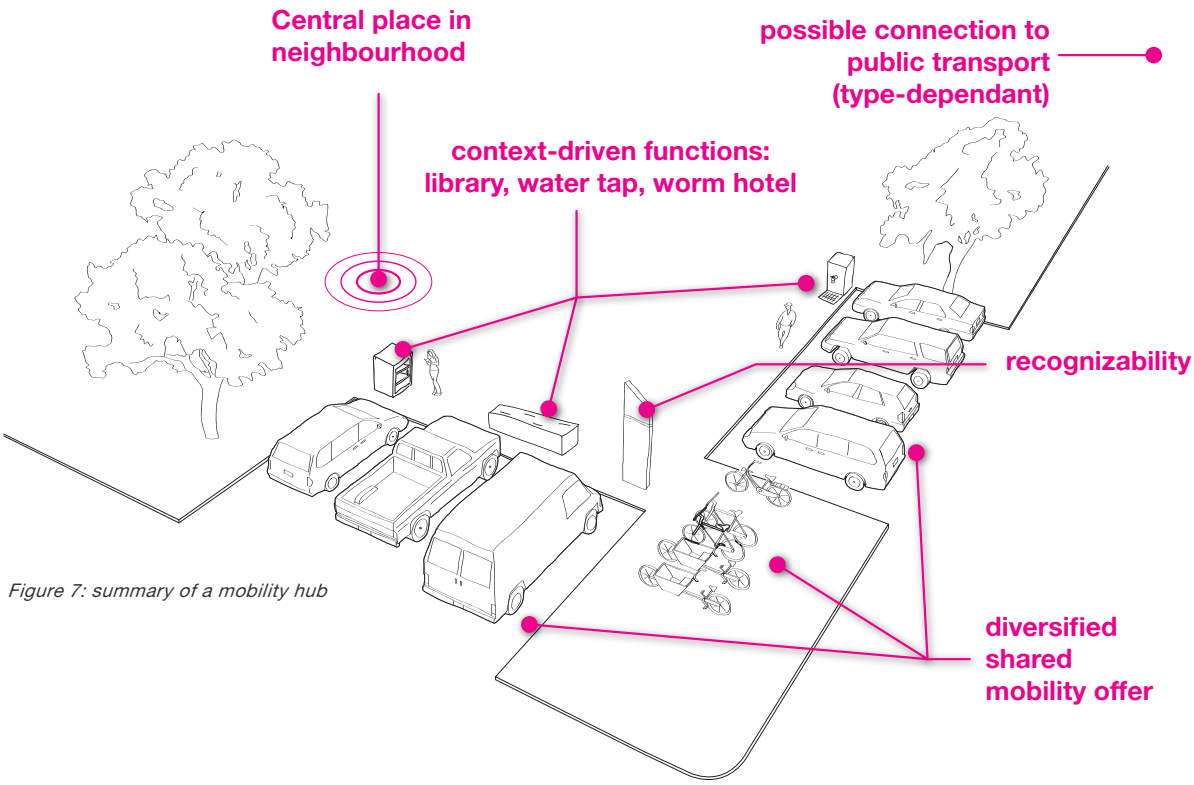


Figure 7: summary of a mobility hub

In this report, several definitions have been combined into one to focus the assignment. It defines mobility hubs as follows (see also figure 7):

A mobility hub is a recognizable physical place where different context-driven functions and services (mostly shared mobility-related such as shared cars) that benefit the neighbourhood meet. A connection to public transport is desirable but type-dependant.

What is the purpose of a mobility hub?

While useful, a definition alone is not as meaningful without knowing the purpose of a mobility hub.

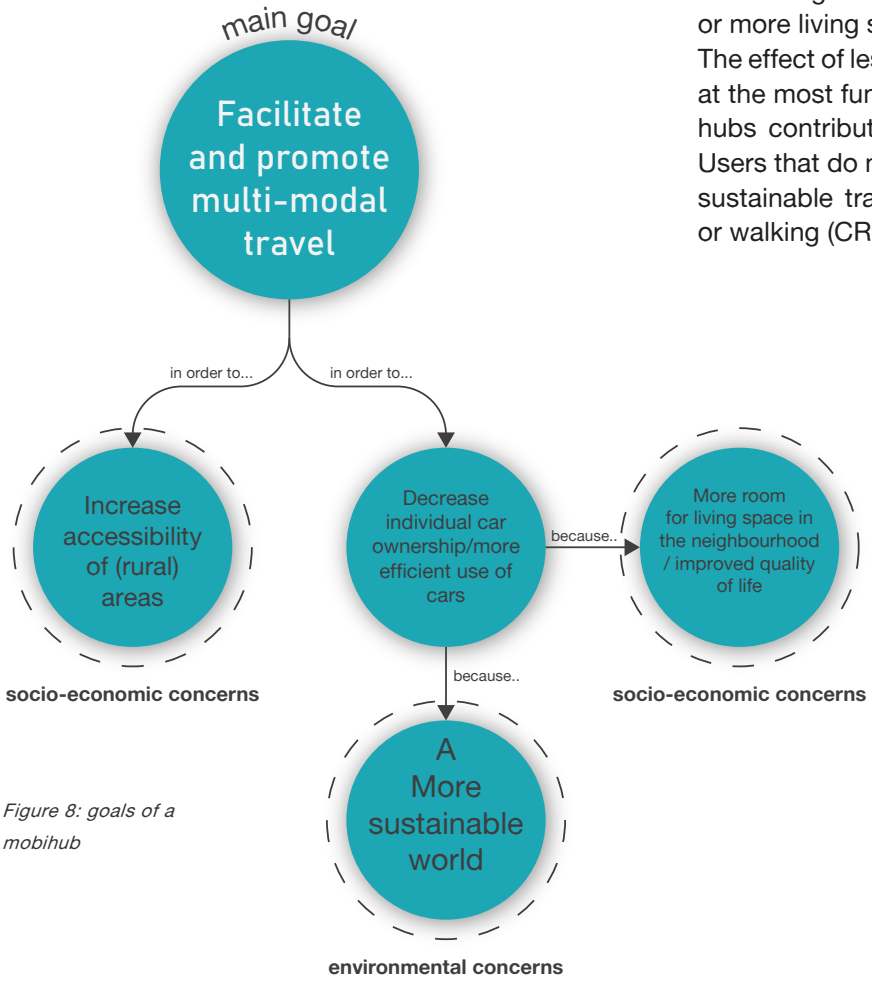


Figure 8: goals of a mobihub

Different kinds of mobility hubs have different purposes. Seeing as this project focuses on mobihubs, their purpose is explained here.

The purpose of mobihub is multi-faceted (See Figure 8).
At the surface level, the purpose of a mobihub is to facilitate and promote multi-modal travel. This has a number of benefits for the individual and the society at large.
Firstly, mobihubs that offer multi-modal travel in rural areas are well-suited to improve the accessibility and reachability of those areas. This will increase the social mobility of the people living there.
Secondly, multi-modal travel and the car sharing options it offers are aimed to decrease individual car use and ownership. Car sharing decreases individual car ownership and usage (CROW, 2019). Less cars in the streets means that streets can be used for facilities other than hundreds of parking spaces. These can be mainly facilities that improve the quality of life in the neighbourhood, such as parks, squares or more living space for inhabitants.
The effect of less cars in the streets also means, at the most fundamental level, that the mobility hubs contribute to a more sustainable world. Users that do not own a car often choose more sustainable transport options such as cycling or walking (CROW, 2019).

So what is the problem?

The problem with these hubs is that mobility needs will drastically need to change in the future, and that user-centred-ness is not always at the core of the design process of the hub (Bell, 2019).

In the future, mobility needs will change. The future calls for a different kind of transportation, and thus for a different kind of mobility hub.
There are number of large trends that lay at the foundation of these changes.
The rise of the sharing economy has seen the conception and success of many ride sharing services, such as Car2Go, Greenwheels and Snappcar. Access-based consumption has also found its way into the mobility sector (Deloitte, 2016).
Millennials care less and less about personal ownership of products, and those Millennials also have an increased need for sustainable mobility options such as renting a car or sharing an (e-)bike. (Deloitte, 2016)
Unsurprisingly, many cars sold today are electric (CBS, 2019). At the same time, individual car ownership is on the decline (CROW, 2019). Meanwhile, the Netherlands and many other countries are urbanizing, putting pressure on cities and leaving rural areas empty.
Mobility as a Service (MaaS) systems are being piloted and tried around the world. MaaS is defined by Kuiper (2020) as follows: *"MaaS offers a tailored door-to-door one-stop-shop for trip planning, booking, paying and travelling."*
The Dutch Ministry of Infrastructure and Water Management is initiating/facilitating seven regional MaaS pilots in the Netherlands (Ministry of Infrastructure and Water Management, 2019). Mobility hubs can play a role as the physical representation of such MaaS Systems.

These trends combined paint the picture of a future mobility landscape that will look drastically different. Taking these trends and user-centred-ness into account, the main question that this project and this report is trying to answer is:

"What is the role of the mobihub in the travel journey of the future suburban citizen?"

A target group was chosen to narrow the scope of the project. The 'Suburban Citizen' was chosen because of their interesting position in between rural and urban areas. Seeing as most suburban citizens work in the urban city, they have to make choices regarding mobility on a daily basis. They are not as reliant on personal cars as the 'rural citizen', and at the same time do not have an abundance of mobility options like the 'urban citizen' has.

1.1.2 DESIGN LABS

This project is done with Delft Design Labs of the Industrial Design Engineering Faculty of the TU Delft.
The Delft Design Labs *"... is an initiative of the TU Delft Faculty of Industrial Design Engineering. The Labs provide platforms for prolific collaborations with all kinds of societal stakeholders. With and through design explorations, labs create state-of-the art thematic knowledge."* (Delft Design Labs, 2019).

It is done for the Design Lab: Cities of Things. The Cities of Things Lab broadly researches the future (smart) city. In this city, the smartness may not only come from a data-dashboard of data, but also from smart "things" in the city that are co-living with the inhabitants.

Seeing as the subject of the project also intersects with another body of research at the TU Delft, there is also a collaboration with the Lab: Seamless Personal Mobility. In this Lab, new and possible futures of mobility are researched with a user-centred perspective. The current focus of this research group is on the promise and possibilities of Mobility-as-a-Service (MaaS).

1.1.3 ADVIER & SHARE-NORTH

Advier is an advisory bureau that advises government bodies or companies about human-centred mobility. Advier is asked by companies, governments and non-profits to direct projects or events in regard to mobility and location accessibility.

They are also a partner in the European SHARE-North project. This project *".. includes activities for developing, implementing, promoting and assessing car sharing, bike sharing, ride sharing and other forms of shared mobility in urban and rural areas and employment clusters."* (SHARE-North Website, "About", 2019)

Together with the SHARE-North project Advier advises, promotes and facilitates (knowledge about) the mobihubs-initiative. They are experts regarding mobility and the economical perspective. They are a partner in this graduation project.

They are not experts regarding user-centred design, and therefore seek a meaningful development of the mobihub idea with this approach in mind. They mainly seek a design, or 'language', that can unify the mobihubs.
This language can be an extension of the info-column that is now present at certain mobihubs. This language can be visual or functional, and does not need to follow the visual language established by the Belgian version of the mobihub (mobipunt).

ADVIER
MOBILISEERT

Interreg
North Sea Region
SHARE-North
European Regional Development Fund

EUROPEAN UNION

Delft
Design
Labs

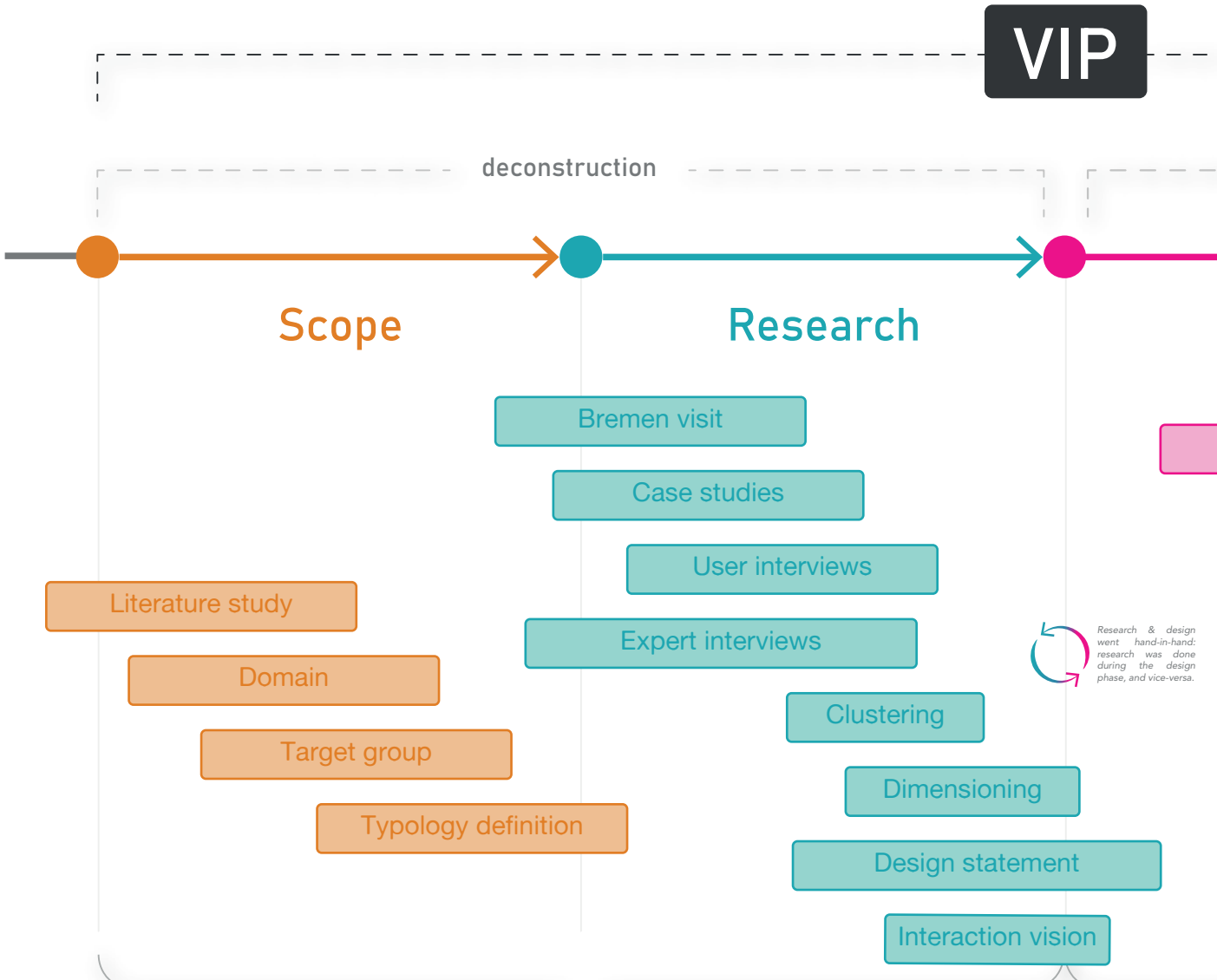
Figure 9: (colourized) logos of partners Advier, SHARE-North and Delft Design Labs

1.2. Project structure

1.2.1 DESIGN & RESEARCH STRUCTURE

Vision in product design (VIP) is used as the main design & research method for this project. This approach was not only used to simply give guidance to the design process, but also because it is suitable to craft a future scenario (Hekkert & van Dijk 2017).
A VIP process roughly has two main parts: Deconstruction and Construction/Designing.

This report consists of 5 parts described in the main chapters, of which the VIP method is three parts (see figure 10). It starts by defining a scope in chapter one, after which the VIP process is followed and described in chapters two and three. This VIP Process is described in further detail in chapter 2.0. The resulting design was evaluated with experts in chapter four. Chapter five contains the conclusions, reflections and recommendations for the project.



Chapter 1.1.1,
Chapter 2:
Research phase

1.2.2 METHOD(S)

A broad literature study forms the basis of the report. The VIP method was relied on heavily, and followed rigorously, for the research phase. During the design phase a number of other design methods were used including Thing-centred design methods, user testing and rapid prototyping. User-centred research tools such as context mapping excercises and creative facilitation were used throughout the project, and proved fruitful while user testing as well as in the final evaluation for chapter 5. This evaluation was done with the help of an animated video as a showcase of the final design.

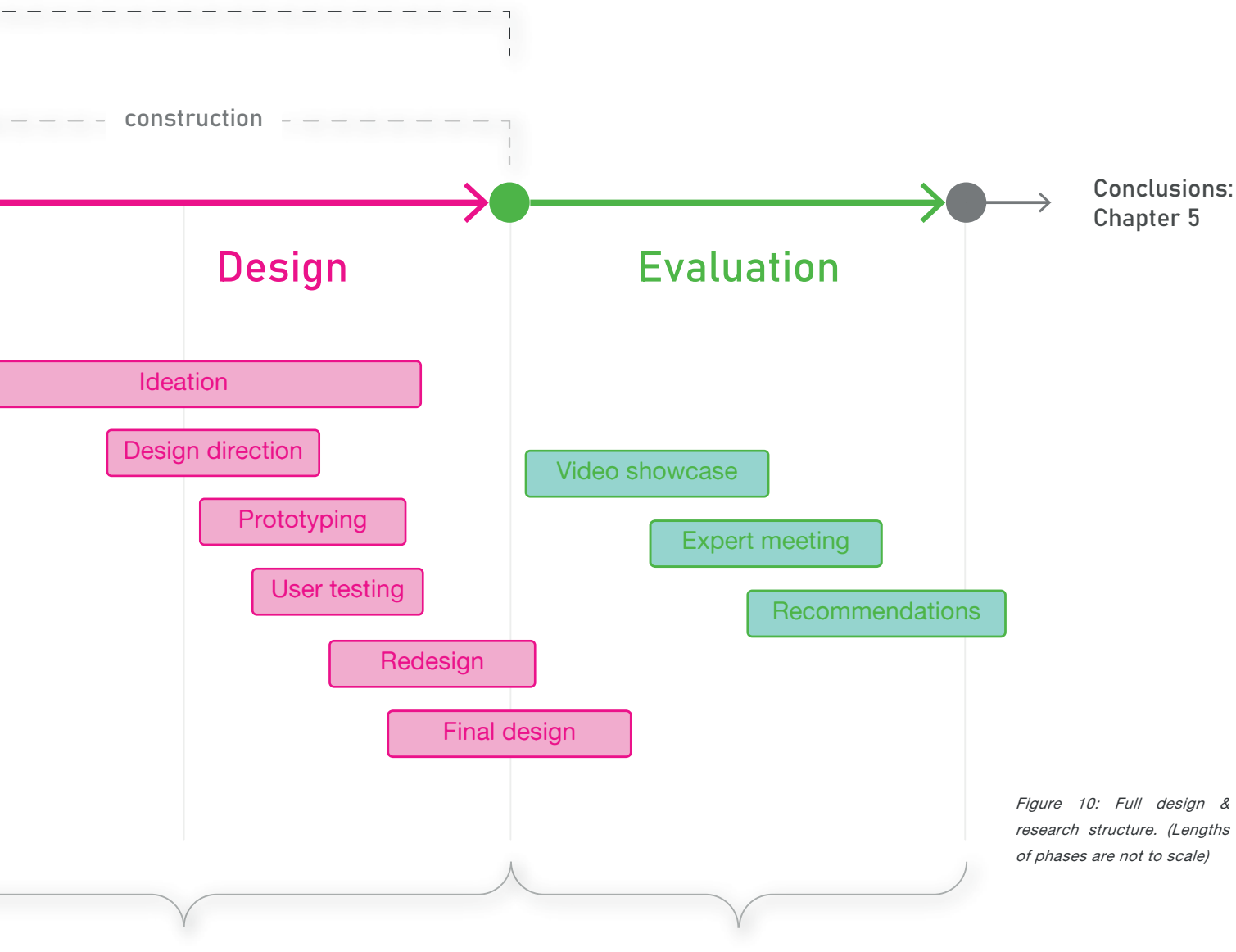


Figure 10: Full design & research structure. (Lengths of phases are not to scale)

2.
Research phase

2.0 VIP Research structure

In the research phase, the Vision in Product Design method was the (main) method for doing research. In VIP, this research part is called Deconstruction. It involves 'deconstructing' the current subject context following a series of steps (see the image on the next page) in order to then 'construct' (or: design) a sensible future context and product or service system within that future context. These steps form a long run-up to the eventual future design. It is an extensive process of specifically researching and determining what the design should accomplish without specifying what the design should be, albeit a product, model, service, product-service-system or none of the above.

Deconstruction starts by collecting useful insights, observations and considerations about the subject context in the broadest way possible. These are called **'context factors'.** Before these can be found, one must know where to look for them. In order to do so, a **domain (see also chapter 2.1)** is defined. A domain defines the area of interest for the research. Once it is defined, relevant context factors can be collected. Because context factors can be many things, many techniques can be employed to discover them. In this report literature study, (expert) interviews and case studies were done (amongst others) to do so.

Once enough context factors are found, they are **clustered.** There are different types of clusters that can be made, and it is dependant on the domain and researcher's interest how to cluster the factors exactly. What matters is that the clusters elevate the context factors to a more meaningful level of information.

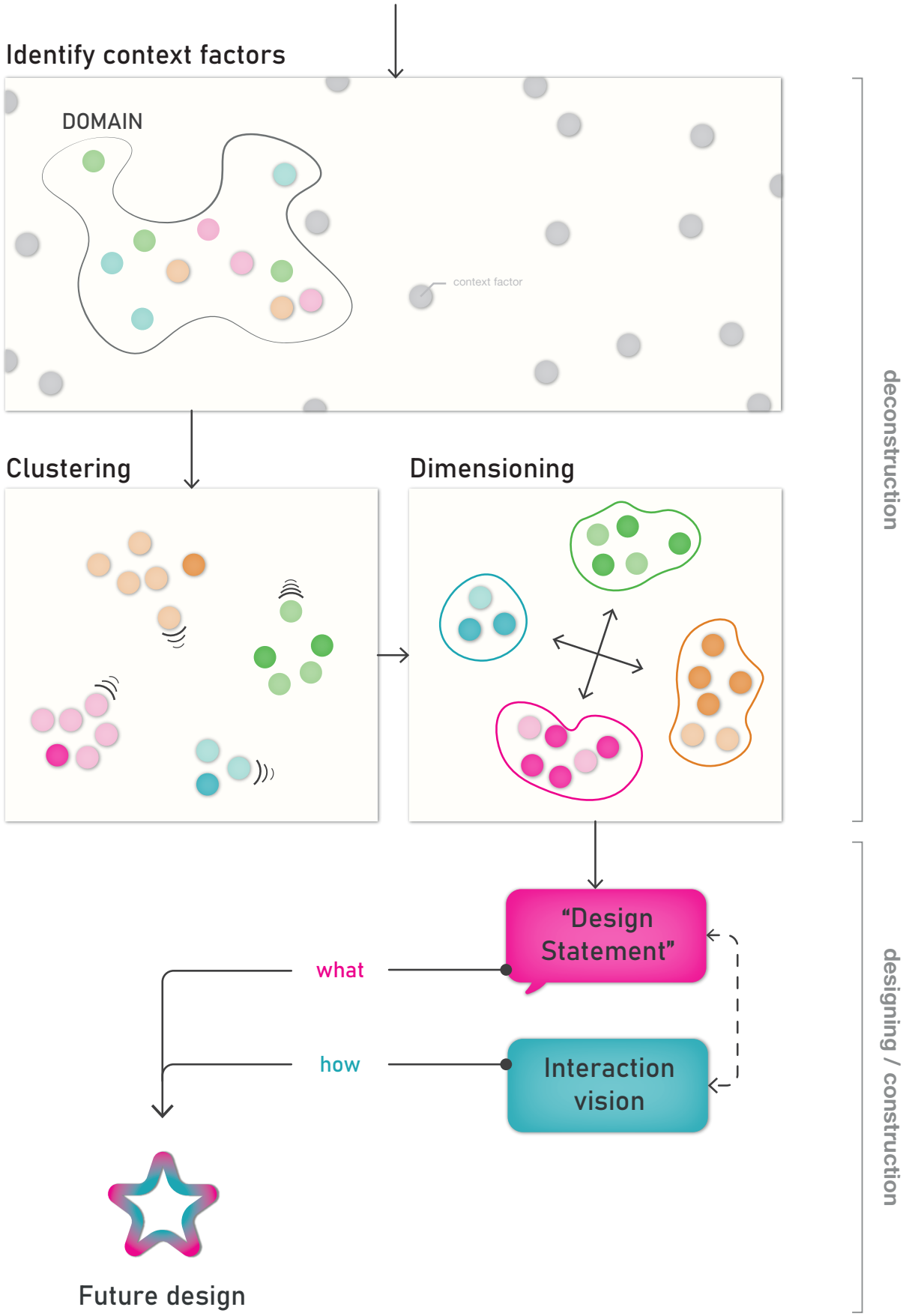
After this, the clusters are **dimensioned:** the clusters are examined to see if there are clusters that contradict each other or if they synergise in a new or informative way. The clusters are mapped on axes to construct a world view of the future context.

When this world view is constructed, it is interpreted and the **design statement** is formed. The design statement is the de facto design goal of the project, and the start of the **Construction** part of VIP (also simply called **Designing).**

If the design goal is the 'what' to be designed, the **interaction vision** is the 'how'. The interaction vision defines the qualities and characteristics that the design should have, in order to fulfill the goal set by the design statement. It does so without specifying what form the design should take.

With the design statement and the interaction vision the eventual **future design** can be developed.

The VIP Process



2.1 Project Domain

The project domain is: “(social) behaviour at a mobility hub”. The image on the next page depicts the behaviour for illustrative and inspirational purposes.

The domain determines the scope of the project, and this domain was chosen with a specific aim in mind. The conception of a mobihub or any mobility hub in general involves collaboration between a lot of stakeholders, and is often times a logistic and economic challenge (Bell, 2019). Part of the challenge is attracting bike rental owners, car sharing companies, and getting approval of local government to establish a mobihub.

However, the users, the inhabitants of the neighbourhood, are often not at the centre of the conception of such hubs. Because establishing a mobihub is a complex collaboration, the end result is often a pragmatic solution that satisfies many needs of stakeholders’ business models, while not satisfying user needs.
Often times there is looked at what can be done with minimal impact and minimal costs, instead of looking at what should be done in a neighbourhood. What is best for the inhabitants? What is best for them and the surrounding environment or the world at large?

These questions form the basis for why a user-centred approach was chosen. The user of the mobihub is the main protagonist of this story, and the mobihubs program, contents and appearance are designed for him or her. Their perspective is taken as a source of truth, and combined with considerations for a higher quality of living in the neighbourhood and a sustainable world view.

Once this design and research project is done, next steps are attracting stakeholders and researching the implementation possibilities of the design. That is also the point to which this projects’ scope ends. This project focuses on the user and the users world, and ends at the start of the implementation process.

2.2 Deconstruction

In the Deconstruction phase of VIP, the 'current product' is deconstructed on three levels; the product level, the interaction level and the context level.

First, a description and analysis of the mobihub-initiative and its context (the 'current context') is presented.
Secondly, design research was done to gain insight about the domain on the three levels. There are many mobility hub-initiatives in the Netherlands and beyond. A selection of those were used as case studies. Interviews with participants that are part of the target group were used to gain more insight on an Interaction level. Additionally, desk research and expert interviews were done. The observations on-site also provided insight in the context.

2.2.1 THE MOBIHUBS INITIATIVE

Mobihub as a brand name for mobility hubs was initiated by the "Mobil.Punkt" in Bremen, Germany (Figures 12 & 13). An on-site visit and analysis of these punkts can be seen in chapter 2.2.3.

Currently, there exist mobihubs in Bremen (Germany), Bergen (Norway) and Belgium.

Advier currently has three mobihubs-initiatives in the Netherlands in various stages of development at Hollandse Kroon, Rijswijk and the Rivium-area in Rotterdam (Figure 14).

Starting a mobihub is done differently in the Netherlands, Belgium and Germany.
In the Netherlands and Germany, local government can choose to initiate a mobihub in their region, with the help of Advier and the SHARE-North partners.
As a result of the efforts of the SHARE-North partnership, mobihubs have become a central part of the mobility policy in Flanders, Belgium (Figure 11).

A department of the government of Belgium, the Departement Mobiliteit en Openbare Werken, has written a policy vision regarding the placing and contents of mobihubs which is described in more detail in chapter 2.2.2.

MOBI PUNT

Figure 11 Belgian mobipunt logo

Figure 12: a Mobil.Punkt in Bremen

Figure 13: Another Mobil.Punkt in Bremen

= (planned) mobipunt

Figure 14: (planned) mobipunten in the Netherlands

The contents of a mobihub

There is no single formula of a mobihub. Developing Mobihubs is not one-size-fits-all. With the placement of each mobihub, the area where it is realised determines the layout and content of that Hub.
However, in Belgium, there is one element that is present at every mobihub: a recognizable pole with the mobihub branding. This pole is a standard element to make the hub recognizable also from afar (Figure 15).

Next to the mobility offer, mobihubs have shown to be good place to facilitate several services that benefit the community, such as a package drop-off, water tap, ecological place of interest, or bike storage.

Figure 15: Pole on a Belgian mobihub

Figure 16: Artist' impression of a mobipunt

2.2.2 A TYPOLOGY FOR MOBIHUBS

In Belgium the concept of mobihubs are part of the country's policy for new and sustainable transport options. In the "Rapport Vlaamse Beleidsvisie Mobipunten" a process is described for conceiving new mobihubs; where to locate them and what their contents can be. They also define a typology of mobihubs.
Mobihubs act as an "interface between the transport network and the spatial structure of the area." (BUUR cvba & The New Drive bvba, 2019).

Therefore, there are two factors that determine the type of mobihub to be built; the Transport Level and the Spatial Context. See Figure 17.
The Beleidsvisie defines 4 levels of transport: **Interregional, Regional, Local, and Neighbourhood.**
It also defines 4 types of spatial context, with two subtypes each. See Table 1.
Based on the 4 transport levels and 8 types of spatial context, the Beleidsvisie defines 32 types of mobihubs. These types make up the 'mobihubs matrix', as seen in Table 2.

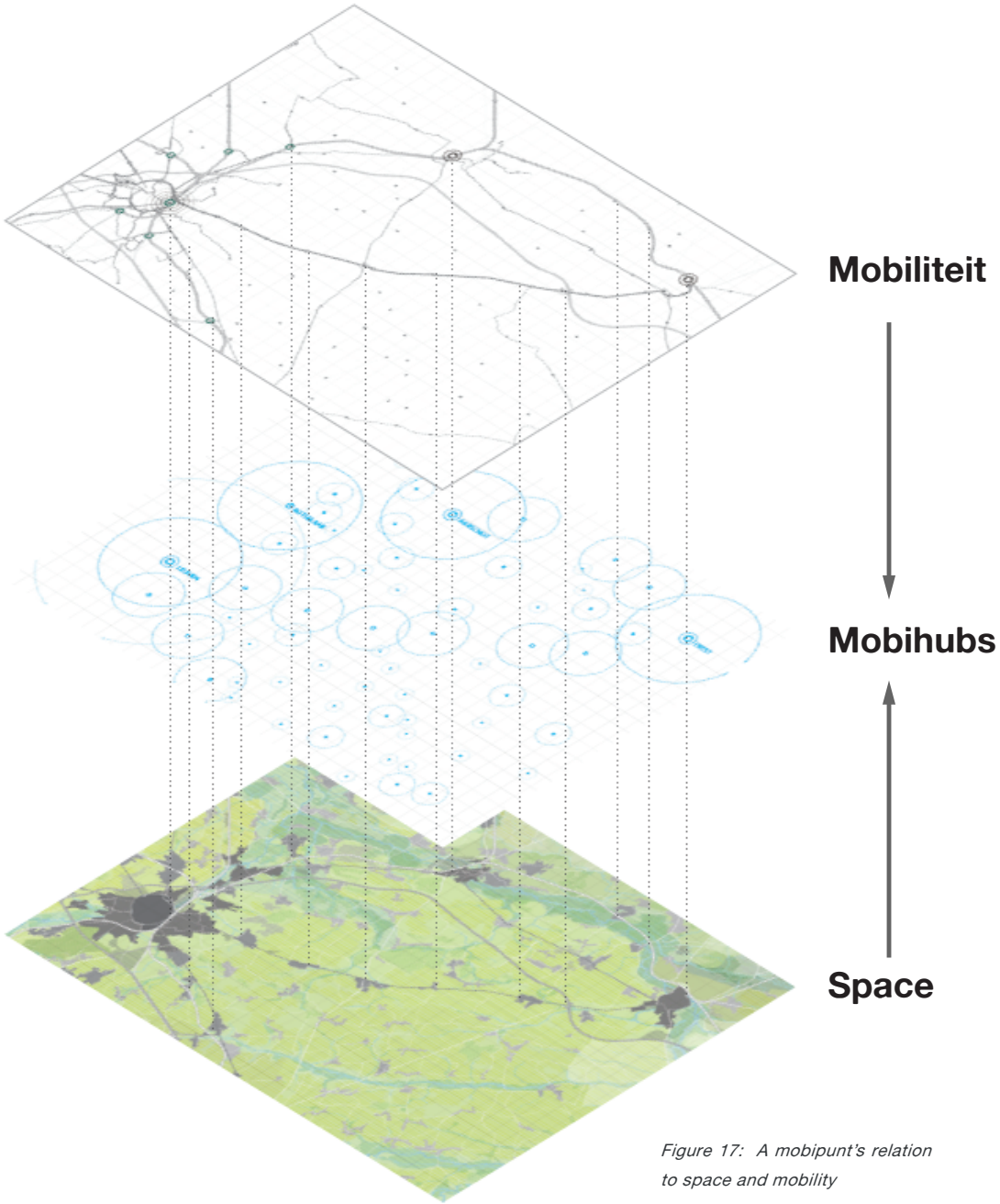


Figure 17: A mobipunt's relation to space and mobility

Spatial contexts

City	City centre
	Periferal / Agglomeration
Village	Large centre
	Small centre
Node	Industrial node
	Visitor node
Open Space	Periferal area
	Rural area

Table 1: Spatial contexts as defined by the Vlaamse Beleidsvisie

Levels of transport

Figure 18 Levels of transport as defined by the Vlaamse Beleidsvisie

Mobihubs Matrix

Level of transport / *Spatial Context*	Interregional	Regional	Local	Neighbourhood
City centre	★ *hub type*	★	★	★
Agglomeration	★	★	★	★
Large centre	★	★	★	★
Small centre	★	★	★	★
Industrial Node	★	★	★	★
Visitors Node	★	★	★	★
Periferal area	★	★	★	★
Rural area	★	★	★	★

Table 2: Mobihubs matrix as defined by the Vlaamse Beleidsvisie

The United Kingdom's version of the Vlaamse Beleidsvisie Mobipunten, The Mobility hub Guidance document (CoMoUK, 2018), specifies 6 types of mobility hubs. See Table 3. The 32 Belgian and 6 UK types overlap in some regard. To narrow the scope of the project, a simplified typology of mobility hubs was made, based on the two documents. It was discovered that all types can be roughly divided into three types of mobility hubs. This is painting with broad strokes ofcourse, but that is the intent. The simplified typology can be seen in the figure 19. The 'Neighbourhood Hub' was designated as the 'target hub'. This type of hub fits with the target group of the suburban citizen. Next to that, a neighbourhood hub is the most likely hub where social interaction can be stimulated and better controlled, mainly because mostly the same people use this hub. When focussing on a hub for the neighbourhood, subjects like social cohesion in a neighbourhood can be investigated, while a transit hub would require a different approach and perhaps subsequently a different domain.

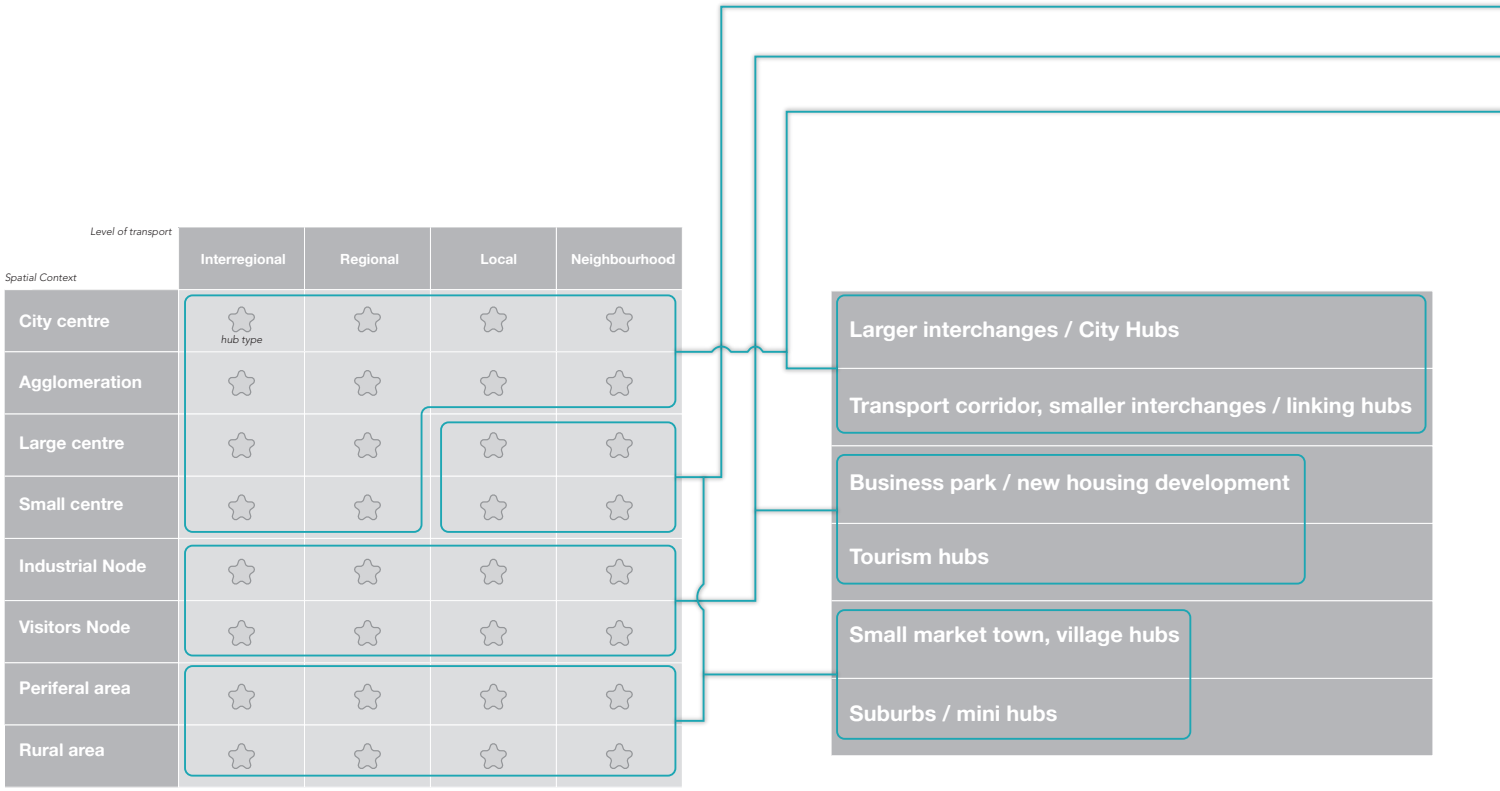
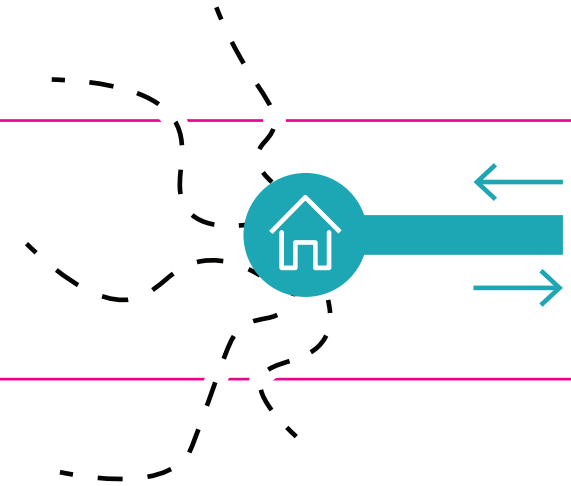


Table 3: The UK typology of mobihubs

TARGET HUB

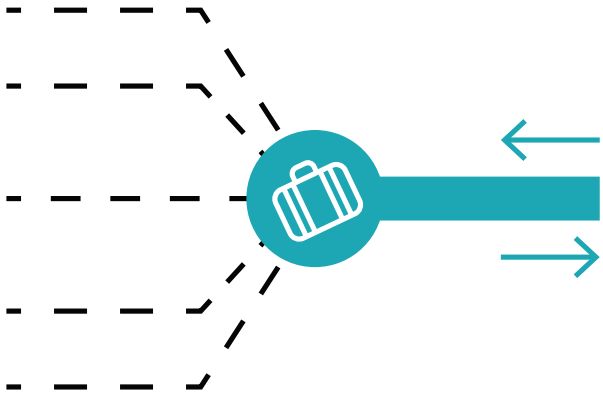
1. Neighbourhood hub

The start- and endpoint of most working days. Access point to and from the neighbourhood. Mostly used by the local residents.



2. Business hub

The hub near business centres. Mostly used by regulars working there or visiting. Sees mostly the same traffic every day, is empty on weekends.



3. Transit hub

The hub in a city that acts as a transport hub. Serves a varied audience each day. A dynamic hub all year round.

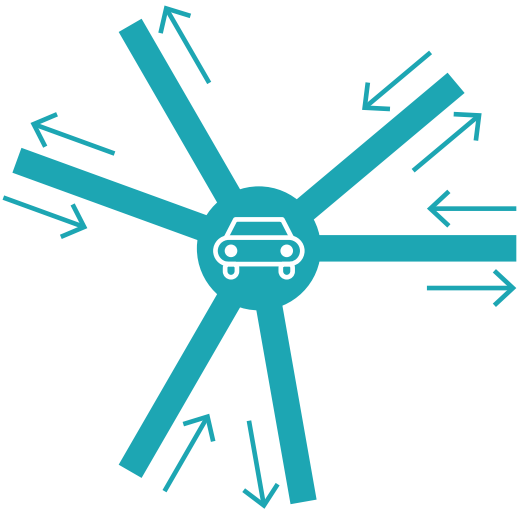


Figure 19: Three found types of hubs

2.2.3 BREMEN VISIT AND ANALYSIS OF MOBIL.PUNKTS

To gain more insight about the mobihubs initiative, the city of Bremen and it's Mobil. Punkte were visited (figures 20-25)

A Mobil.Punkt is a mobility hub in Bremen. Every punkt offers (among others): shared cars, a bike stand, and access to public transport.

The city of Bremen has been making Mobil. Punkte since 2003 (Schreier et al, 2018). The Mobil.Punkte were initiated to solve the city's car problem. There are many cars in Bremen clogging the cities infrastructure and causing (visual) pollution. In addition to solving this issue, the Mobil.Punkte are also aimed at mobilizing every Bremen citizen. The municipality aims to evenly cover the city with Mobil.Punkte and their smaller variants Mobil.Punktchens.

Mobil.Punkte are bigger mobility hubs; they offer up to 9 shared cars, shared bikes, are close to public transport, often combined with a garbage disposal and sometimes with small gardens for inhabitants.
Mobil.Punktchens are smaller mobility hubs, and most of the time they consist of 2 to 3 shared cars and a bike rack.

With the Mobil.Punkte in particular, car-sharing is positioned at highly visible, easily accessible and, therefore, safe locations in the neighbourhoods. They contribute to closing the gap in the car-sharing network in Bremen and making shared mobility services more

Figure 20: A Mobil.Punkt in Bremen

accessible to citizens throughout the city. Furthermore, each Mobil.Punkte is used to improve local infrastructure on every level. For example, at some of the newest stations, improvements were made to the paving materials to enhance rainwater infiltration of paved surfaces, contributing to climate change adaptation in the city. At other locations, pedestrian crossings for people with limited mobility and visual impairments were implemented together with the Mobil.Punkte. Bicycle parking in the areas was also improved.

The Mobil.Punkte in Bremen host only station-based car-sharing, the form of car-sharing that has the greatest impact on reducing parking pressure in cities (Bundesverband Carsharing, 2018). In Bremen, every car-sharing vehicle replaces 16 privately owned cars (Schreier et al, 2018). This is an important contributor to reducing parking problems and congestion in the city.

Currently there are 42 Mobil.Punkte / Pünktchen in Bremen. During the visit, it became clear that realizing a Mobil.Punkt is a coordinated effort between the municipality, district offices (elected neighbourhood parliaments), various contractors and other government bodies. Similar to Mobihubs, a Mobil.Punkt is not one-size-fits-all. The Punkt is tailor-made for each location and situation.

During the tour of the city of Bremen, a number of Punkte and Pünktchen were visited together with an expert from the city of Bremen.

Figure 21: A Mobil.Punkt at a crossroad in Bremen

This project's relation to Bremen

During the tour, it became clear that Bremen focusses on pragmatic solutions for each Mobil. Punkt. The car congestion issue is their main driver, combined with the goal to mobilize each citizen of the widely spread city of Bremen. In terms of technology they focus on "bricks, not bytes", which means Mobil.Punkte are outfitted with the minimal means necessary to achieve the effect. Each Punkt gets a central pole and labelled cars and bikes.

This approach is different from the approach described in this report. In this report the citizens of the neighbourhood are the main users of the same mobihub everyday, and the hub is designed for them and relies on the resilience of the neighbourhood. While Bremen mainly focusses on the Transit Hub of the typology described in chapter 2.2.2, this report focusses on the Neighbourhood Hub.

When asked who uses a Mobil.Punkt, whether it be the residents around it or anyone, the City of Bremen employee could not give a straight answer. It was a direction they would like to research one day, but have not yet.

Nonetheless, they did see that citizens appreciate the space the Punkte provide, mainly due to the increased social safety. This effect was mainly felt by women in their study.

In spite of the different approaches the visit was inspirational as well as informative to the research, especially combined with the Dutch case studies that were also conducted (see chapter 2.2.4).

Figure 22: A Mobil.Punktchen in Bremen

Figure 23: A Mobil.Punktchen in Bremen. The cars parks are marked in blue

Figure 24: A Mobil.Punktchen pole has been stickered.

Figure 25: The Mobil.Punkt pole is about 3 meters tall.

2.2.4 CASE STUDIES

Next to the Mobil.Punkte in Bremen, there are many ‘hub-initiatives’ in the world that try to optimize multi-modal travelling and increase sustainable travel. There are a lot of initiatives in the Netherlands alone to inspect and take inspiration from as case studies.
A closer look is taken at: several ‘Hubs’ of the Hub-initiative in the provinces of Drenthe and Groningen (figure 28), a ‘Hely-Hub’ in Delft (figure 29), and a number of traditional train stations that serve as transport nodes.

For observations on-site a ‘canvas’ following the VIP-method was used. A full overview of the canvas per location can be seen in Appendix A. On the next page, insights from these case studies are summarized. Five (5) case studies were done in total.

Figure 26: Hely Hub and Hub Logo

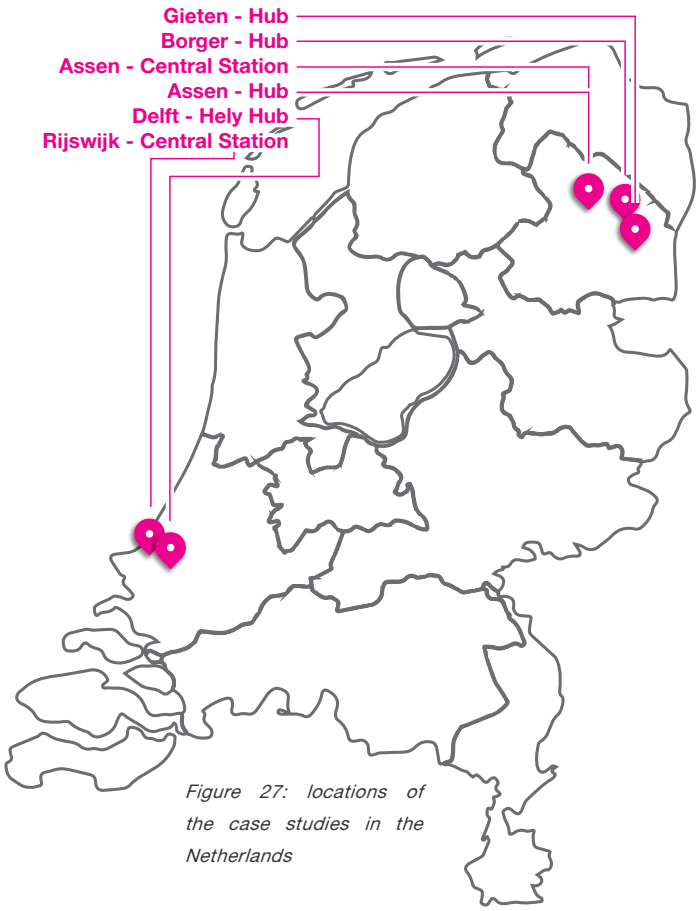


Figure 27: locations of the case studies in the Netherlands

Figure 28: Hub Gieten

Figure 29: Hely Hub Delft

2.2.5 CASE STUDIES INSIGHTS

Not all seasons

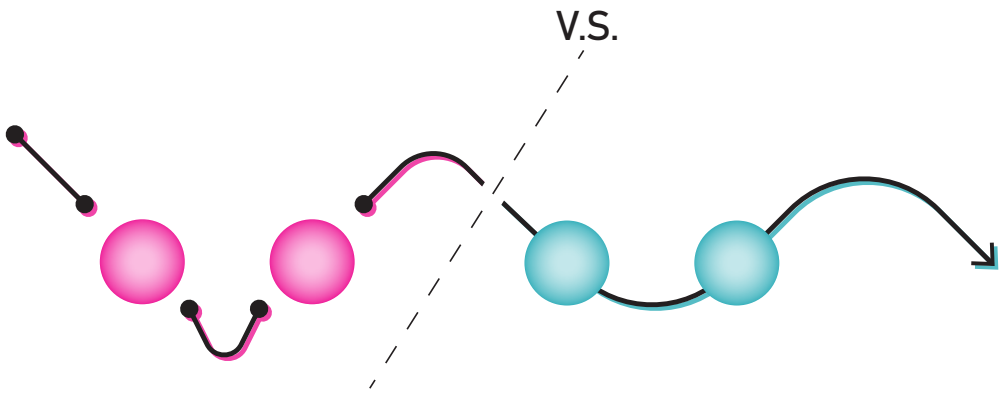
Most Hubs are not all-seasons; the Hubs were visited in autumn and looked empty and deserted. The outdoor-fitness area can not be used in autumn; it was wet at the time of visit. There were no other facilities that offered a similar experience to the fitness facilities.

It's about communication

The 'branding' of a hub is often the thing that is most coherent. Some hubs have a great deal of signage that seems to 'scream silently': there is a lot of signage and arrows and logos, but this does not translate to the spatial layout of the hub. Integration of Hubs seems to show itself mainly in colour.

Frictionless vs. travelling with friction

Interaction with a mobility hub is often frictionless / anonymous. This makes sense, because many people are on their daily commute, and involved with getting where they need to be. However, this friction can be positive or a negatively experienced. There seem to be two types of travelling: travelling that is effortless, and travelling that involves slowing down sometimes. This slowing down, this change of pace can be caused by negative events such as bad transfers or signage, but it can also be caused by positive events such as stopping to swap books with the local book-swapping community library.



2.2.6 INTERVIEWS

To gain insight in the users world, semi-structured interviews and a contextmapping exercise were done with participants that are part of the target group. Contextmapping is the collective name for a number of generative design research methods, aimed at letting the user 'map' his or her own context (Sanders & Stappers, 2016).

These interviews were mainly done to deconstruct how users interact with a mobility hub / transport hub. What do they do there? What and who do they interact with? How long do they stay there? Do they have a favourite hub? These were questions that formed the base of the interview. For a complete list of the interview questions, see Appendix B.
The interview followed these questions loosely, based on the participants engagement. Next to that, a small contextmapping exercise was used to let the user map his or her experience at a mobility hub. As a canvas for the user to construct his context, a circular design was used (see figure 30 and Appendix C).
To probe the participant's thoughts about hubs and centrality (Sanders et al, 2016), the participant could use stickers and writing tools to display their experiences, thoughts and feelings. The stickers were ambiguous shapes and forms that were open to interpretation.

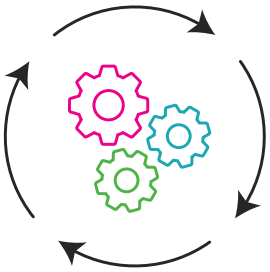
In total 5 interviews were conducted. 2 of the 5 participants described frequently using shared mobility options.
In this chapter the insights are summarized. The full results of the Contextmapping exercises can be seen in Appendix C.

Figure 30: Interview at a participants house with visual stimulant on the table

2.2.7 INTERVIEW INSIGHTS

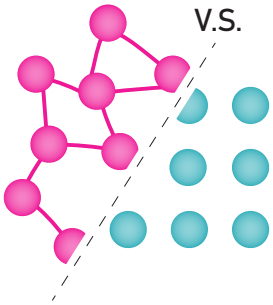
Rituals and routines

Many participants seem to have routines and sometimes even rituals when it comes to their commutes and travels. Some always walked the same route, interacted with the same person or shop, or had the same train of thought when entering a specific hub or transport node.



Connection versus anonymity

There seems to be a difference of preference of interaction levels at transport hubs. Some people value their anonymity and privacy, others seek interaction with others. Similar to life in general, this depends on the personality of the person in question. It is also related to a persons' extra- or introvertedness.



Journey and hub inseparable

During the contextmapping exercise, many participants put their home at the centre of the circles, and mapped out all of their mobility patterns around it, even though the title and explanation of the circle canvas is 'Your Behaviour at a mobility hub'. Apparently it is hard to separate the journey from the hubs. On the other hand, the visual structure is maybe not closely aligned with the title. The circles could, to many, signify something that is 'at the centre of their life'.The circles indicate distances that they travel.

2.2.8 DESIGN IMPLICATIONS CASE STUDIES & INTERVIEWS

The insights on the previous pages are a selection of many insights that resulted from the case studies and interviews. Most of the insights were incorporated into the design and the research by making them a 'context factor'. All context factors can be seen in Appendix D, and the implications of the context factors and what they mean are explained starting from chapter 2.3: Construction. Some of these insights have been deemed more important than others. For example, the third insight from chapter 2.2.5 about 'friction when travelling' emerged to be a returning theme. This insight played a prominent role in the dimensioning described in chapter 2.3.2 The same goes for the second insight on this page about connection versus anonymity. This contradiction was incorporated in the dimensioning as well and played an important part in the final design (chapter 4).

The other insights were 'demoted' to context factors, and played less prominent roles, but nonetheless influenced the clustering and dimensioning and so the ideation process and final design.

2.3 Construction

In the Construction part of VIP, firstly a future world is built from combining all insights, observations and considerations. All these are called Context Factors. They together are used, when structured, to construct a future world view or future context. The forming of this structure is a series of steps that each transform the data one level higher up the DIKW-Pyramid (figure 31). The pyramid is displayed on each page, to indicate what the step or paragraph accomplishes.

Figure 31: DIKW Pyramid

2.3.1 CONTEXT FACTORS & CLUSTERS

Many context factors were found from the case studies, interviews, literature studies, expert interviews, and personal ideas, thoughts and theories. For a full overview of the context factors see Appendix D.
The context factors are data, but when grouped into **clusters** this data can become Information.

In certain instances, clusters seemed to contradict or empower each other.
On this page the most important clusters and the relationships between them are summarized (figures 32 and 33).

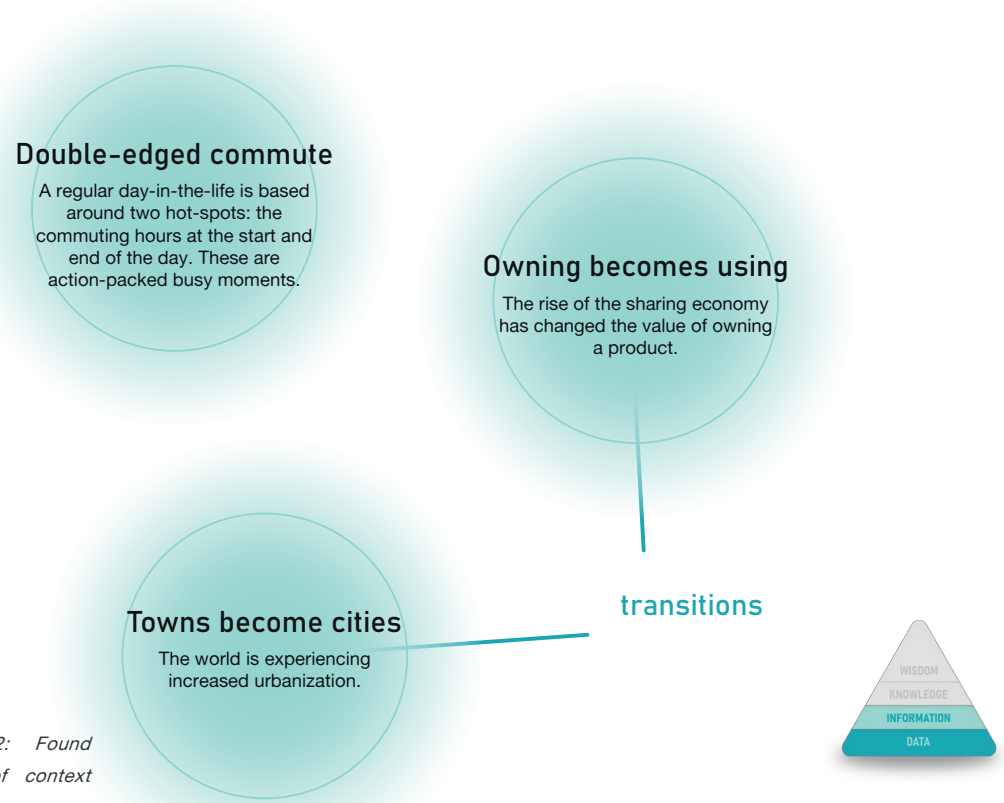


Figure 32: Found clusters of context factors (1)

Travelling is a routine.

Travelling involves many rituals and routines. This can either be positively or negatively experienced.

VS

Travelling is a tiresome

Tiring everyday travelling, or travelling to a strange city. This tiredness is contrasting with the fact that travelling can also be a routine.

Human Connection

Some people value human connection or social interaction when travelling or residing at a hub.

VS

Autonomy

Some people value their autonomy when travelling or residing at a hub.

Communication is key

Many hubs and stations are lively simply because the “the signage says so“. Calling a hub a hub is sometimes a self-fulfilling prophecy.

VS

Facilities are key

Facilities at hubs are essential. They are numerous, diverse and need to be to strike a chord with every passerby. This contrasts slightly with the fact that sometimes communication is key.

Figure 33: Found clusters of context factors (2)

2.3.2 DIMENSIONING THE CLUSTERS

The third step in the Construction process is looking for ‘dimensions’ in the clusters. This dimensioning can turn the Information that the clusters provide into Knowledge. When these clusters are examined, two main dimensions were found that seem to contradict.

On the one hand, people value anonymity when existing at a hub. On the other hand, people like hubs were they feel connected to other people. This is all quite personal.
The same is true for ‘friction’ when travelling. Sometimes travelling is a routine, and sometimes it is very tiring. Travelling as a routine is not tiresome, but also very anonymous, seeing as people are often not interacting with people or the environments. Travelling with friction ís tiresome, but also allows for human connection and reflection.
When these two dimensions are intersected, four distinct types of what a travel hub can be emerge. These are displayed in figure 34. Per dimension is indicated which clusters belong to that dimension.

The virtual hub

In the top left quadrant, Being Connected and Frictionless Travelling intersect, resulting in a hub that can be characterized as “The Virtual Hub”. In this future, people can feel as if they’re somewhere else. They can be connected to people from all over the world, or feel as if they were. But, they do not experience any friction during travelling.

The social hub

In the hub of the top right quadrant, “The Social Hub”, people feel connected to each other in the literal sense, and they can experience a kind of ‘positive friction’ from this. They interact with other people, and in doing so slow down their time at the hub. They are aware that the hub is a place and they can be in the moment.

The entertaining hub

The bottom right quadrant is the “Entertaining Hub”. Similar to the Social Hub, people are aware that they are at the hub and experience the same kind of ‘positive friction’, but this time they do it alone, because the hub itself provides the friction. They are ‘entertained’ by the hub and can do this by themselves.

The anonymous hub

Lastly, In the bottom left corner, there is the Anonymous hub. It can be characterized as ‘hassle-free travelling’. These people do not experience the hub as is, but they transition smoothly literally and figuratively through the hub towards home or work or somewhere else. They are stress-free in this scenario, but also closed to new experiences that possible friction can offer.

Being connected

Human connection

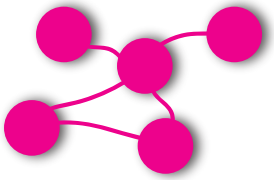
Towns become Cities

Owning becomes Using

Interconnectedness

ou're
e else

Social Interaction



Virtual Hub"

"The Social Hub"

ymous Hub"

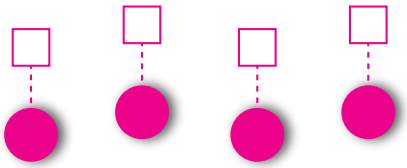
"The Entertaining Hub"

Travelling with friction

Travelling is tiresome

Facilities are key

Double Edged Commute



elling

Entertainment

Being autonomous

Travelling is a routine

Autonomy

Figure 34: Dimensioning of the clusters reveals 4 types of hubs

2.3.3 DESIGN STATEMENT

Figure 34 displays the Knowledge about types of hubs. In order to turn this Knowledge into Wisdom, a choice has to be made. What does the design need to achieve? Where on these axes does it take its place? This choice is, as wisdom itself also so often is, quite personal.

In figure 35 the location of the design statement can be seen.

The Design Statement is as follows:

“The mobihub needs to wake up people by introducing a kind of positive friction (that literally and figuratively slows them down) at their local or commute mobihub, with which they can choose to interact, together or alone”

This statement takes the position in between the Social and the Entertaining Hubs. The choice was made to introduce friction into the design for a hub.
At the same time it is recognized that there are different people with different attitudes towards social behaviour. This is why the statement is at the intersection of Being Connected and Being Autonomous.

This statement is a design goal that is aimed to improve human interaction in an sector that is becoming increasingly automated and smoothed out for efficiency optimization.
The design challenge herein is introducing the ‘positive friction’.

The design challenge can be best characterized by using a Dutch saying:

“How to design for ‘Wrijving geeft glans?’ ”

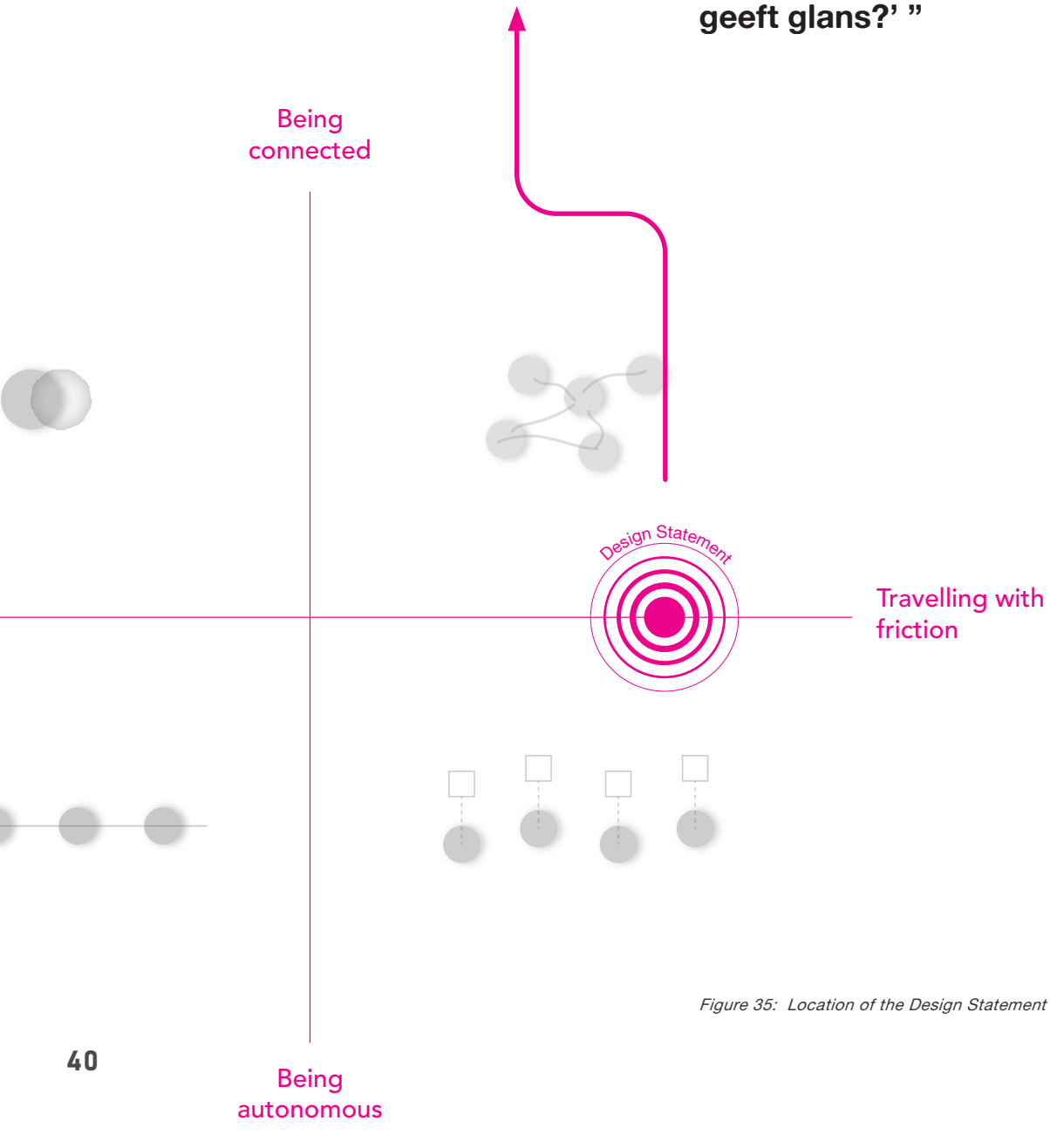


Figure 35: Location of the Design Statement

“Wrijving geeft glans” roughly translates to ‘friction results in shine’.

This is also is a signal the design should not be ‘a little bit of both’, and in being so it excels in neither. The Hub should offer both states at the same time, where it is up to the user with which to engage with.

This ‘state’ can be analogous to the concept of quantum superpositioning.
Quantum superpositioning roughly describes the situation where quantum parts can be in two states at the same time.
The question is then: how to design for the quantum superpositioning of Being Connected and Being Autonomous at a mobility hub? See Figure 36.

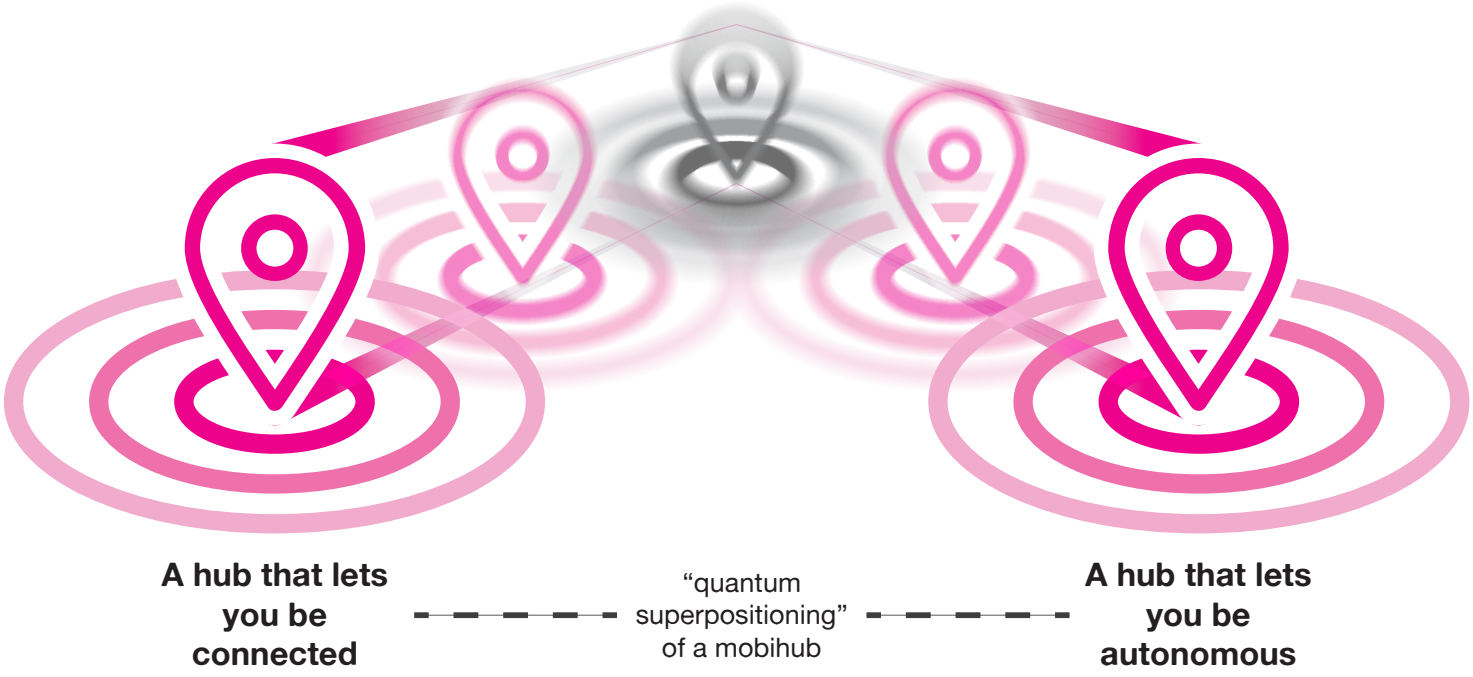


Figure 36: The quantum superpositioning problem of mobility hubs.

2.3.4 INTERACTION VISION

In addition to the Design Statement, an Interaction Vision (Pasman et al, 2011) was developed.
Where the Design Statement states the goal of the design, the Interaction Vision states in what way this goal needs to be achieved. It describes the interaction in characteristics that are needed to complete the goal. It does this by means of analogy.

For achieving the design statement, an interaction is needed that wakes people up, by introducing some sort of friction in their lives. This friction needs to be optional as well, so that they can interact with it together with others or alone (Figure 37).

This is analogous to a situation at the supermarket, where customers get free samples. These free samples are different every time, and give customers something in return.

The analogy of the interaction vision is: Like going to the supermarket and being able to get a free sample of a product (see figure 38).

This interaction in this situation can be characterized as:

Pleasantly surprising, Open-ended, Offering, and Triggering.

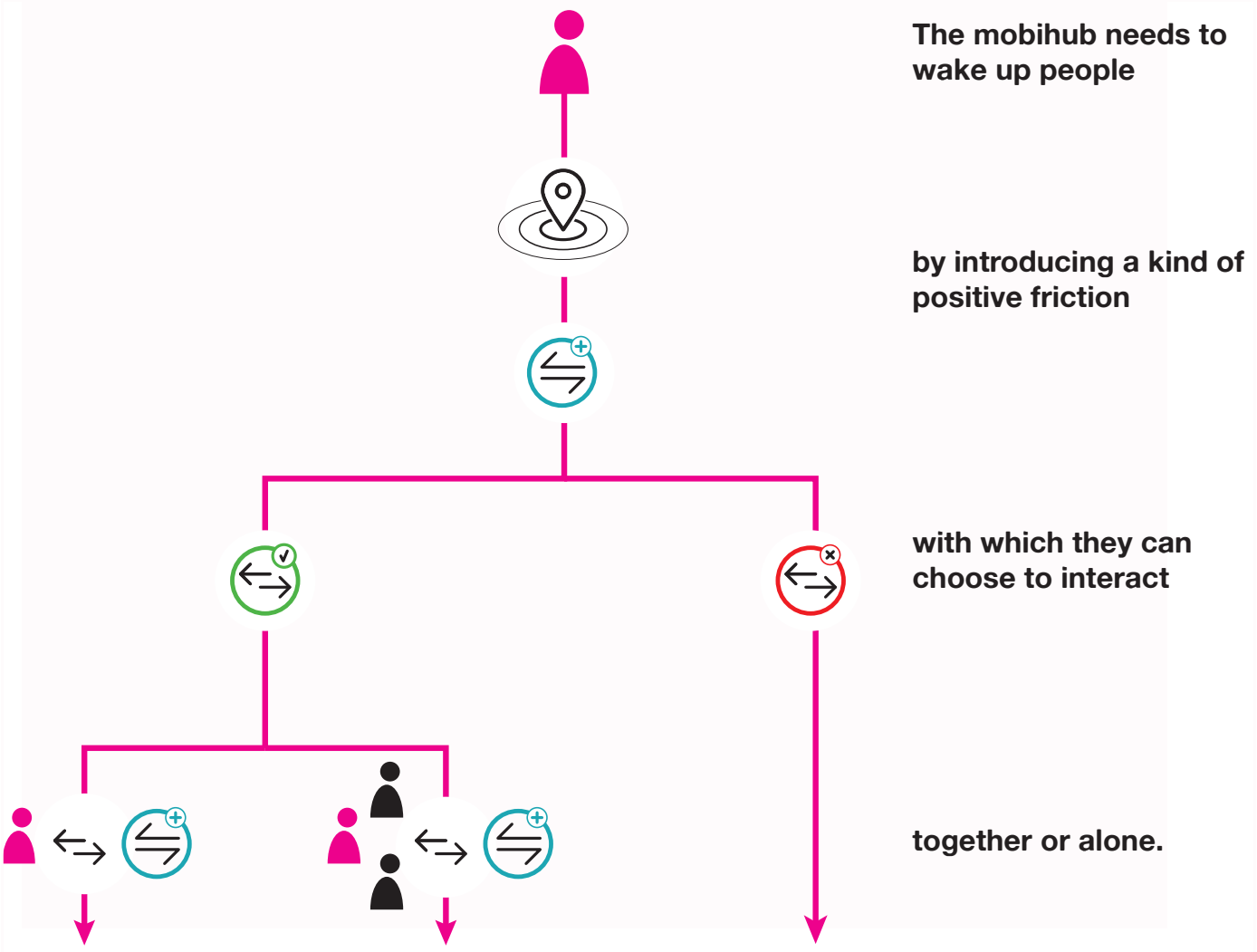


Figure 37: Sensemaking schematic of design statement

These characteristics translate to certain product qualities. These qualities are:

Friendly, Optional, Instant and Beneficial

Note: the Interaction Vision significantly changed over the course of the project. Eventually a different Interaction Vision than the one described here is used. In this chapter the one in Figure 38 is described, because it makes the ideation process and chapters following this chapter more understandable. The final interaction vision can be seen in chapter 3.4.3.

Figure 38: Interaction Vision

3.
Design phase

3.1 Ideation

With the design statement and interaction vision in mind, multiple ideas were explored. To keep track of the many requirements, characters, product qualities and small and big ideas, conceptual figures like Figure 39 were drawn up to continuously sharpen the focus of ideating.

3.1.1 THE CENTRAL POLE

As every mobihub is different, design directions initially differed greatly in what they changed or added to a mobihub.

Because the design needs to work for every Type of mobihub and should not be merely situational, it was decided that the design can manifest itself only in elements that are equal to every mobihub.
Two elements are equal on every mobihub: the branding and the central recognizable pole.

Advier has stated that they are going to use the Belgian design for the branding (Figure 11). They are open to new design directions for this branding. However, changing the branding is a large costly process. On top of that, representing the design statement and interaction vision only through branding is not in line with the focus of this project, seeing as that is solely a graphic design challenge.

Exploration: Central Pole

Therefore, the central pole was explored as something to adapt, morph or work with as a solution to the design statement.
Because the mobihub is the physical representation of a digital service, it seems natural that users can access this digital service on the mobihub. The central pole could be this access point.
Such a pole would likely see much of the

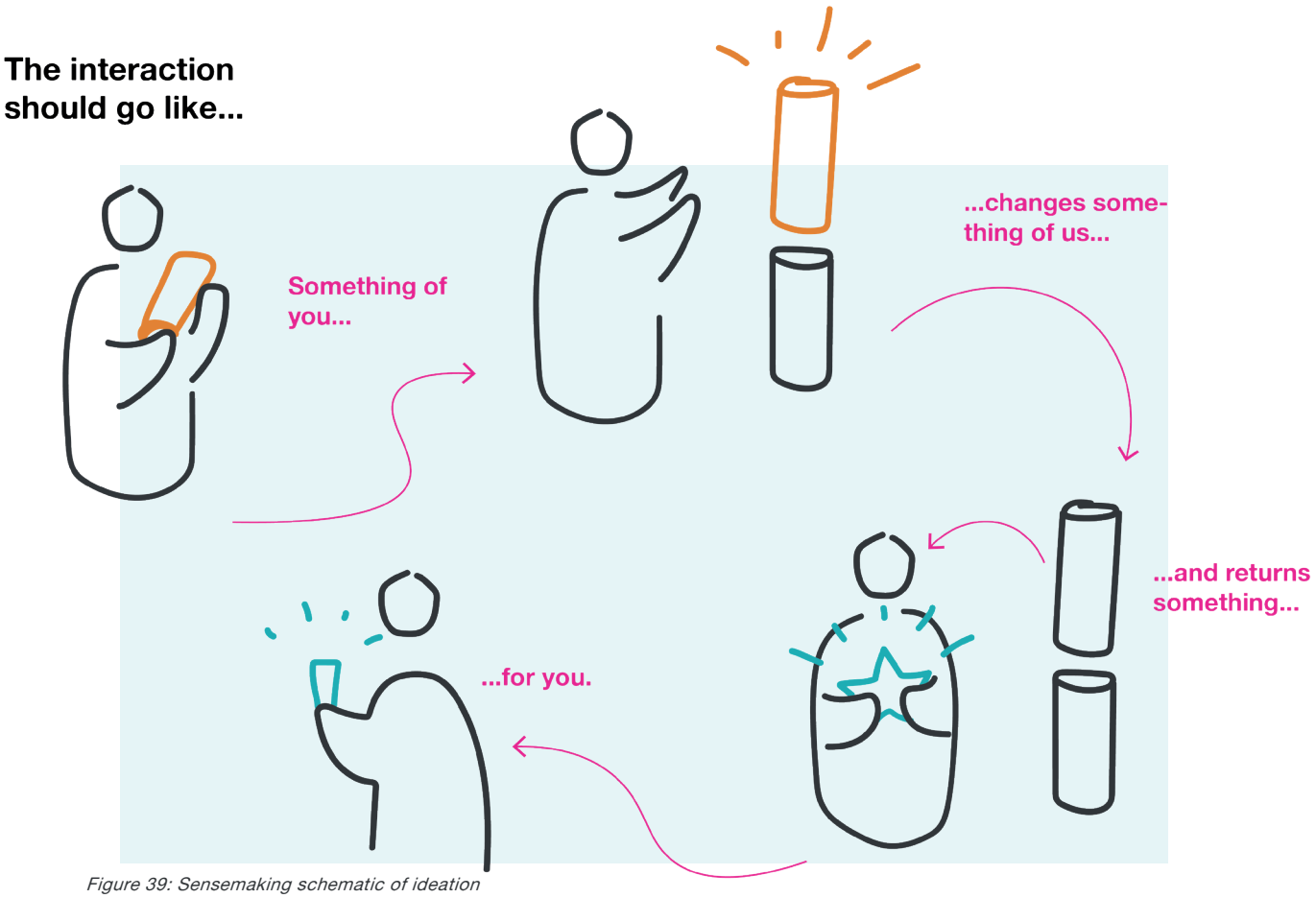


Figure 39: Sensemaking schematic of ideation

same users everyday, because it will serve one neighbourhood. Therefore, the central pole could also lead to a social media platform for the neighbourhood. In order to fulfill its role as promotor of multi-modal travel, this digital environment could be gamified to increase the user engagement (Figure 40).

The Nature of the Pole

Such a gamified experience is facilitated by the central pole, but the pole itself is not merely a facilitator in this exchange. The mobihub and the pole will play an increasingly important role in it's users lives. Pole and user could develop a relationship.
In order to explore this, three types of 'characters' of the pole were developed.
In this stage of the project, these characters provided wayfinding through the cloudy ideation process. Exploring the characters made the ideation process unfocussed and divergent. Many ideas strayed further and further away from the realm of sensibility and had less and less to do with the main offer of the mobihub: mobility. The eventual convergence to a single and sensible direction described in the following chapter was done when the focus re-shifted towards the mobility offer and the core purpose of the mobihub.
The ideas and knowledge gained from exploring the characters was eventually reused and reworked into the design principles described in chapter 4.1.2.

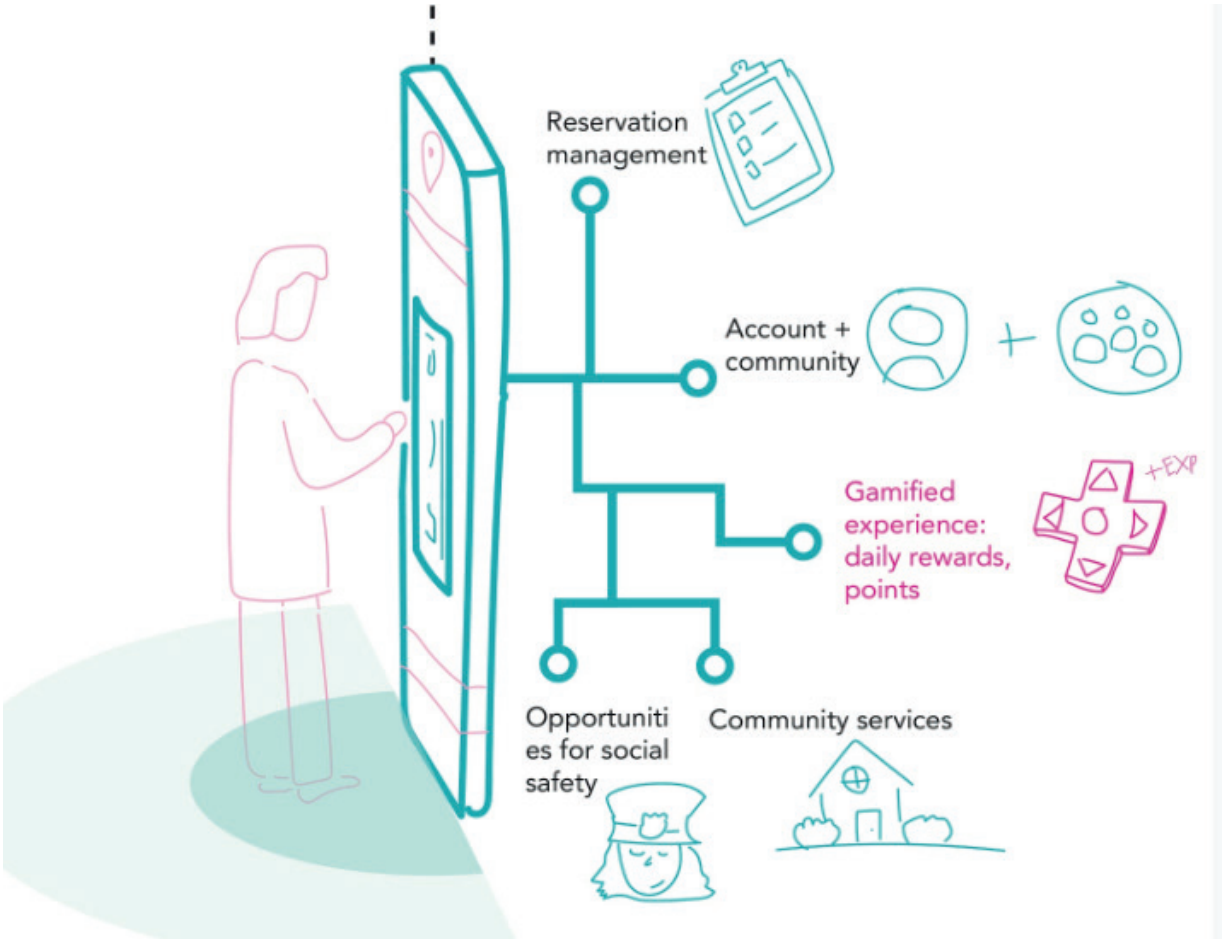


Figure 40: Concept of gamified central pole

3.2 The ‘Helper Platform’

In this chapter, the design direction of the ‘Helper Platform‘ is explained, which was tested (Chapter 3.3) with users and later developed into the final design.

3.2.1 THE IDEA / SUMMARY

After loosely ideating on different aspects, the design that was eventually tested with users was one that was still closely related to mobility. It is based on the following notion, which evolved over time during ideation and several expert interviews:

“The best kind of mobility is the least mobility”

The best mobility is the least mobility because of a variety of reasons, mainly environmental concerns, every-day efficiency and stress reduction.

The helper platform is the mobihub that acts as a platform that aims to combine and therefore optimize all the mobility in a neighbourhood.
The Platform is a place where inhabitants can lend each other items, run errands for each other, or any other thing they can think of to use it for, based on their mobility habits. It is Marktplaats (peer-to-peer reselling), Peerby (peer-to-peer lending), and Picnic (grocery delivery) into one.
Neighbours can ask for errands to be done, or run errands themselves. They are incentivized to do so by the point system; if you run an errand for someone, you can ask for an errand
The Platform aims to reduce unnecessary travelling by enabling neighbours to help each other out. In this way, it also supports the social fabric of the neighbourhood.
It does this by facilitating in two ways:

- Through the interactive capsules on the mobihub.
- Through the mobihub App

Figure 41: The Helper Platform in context

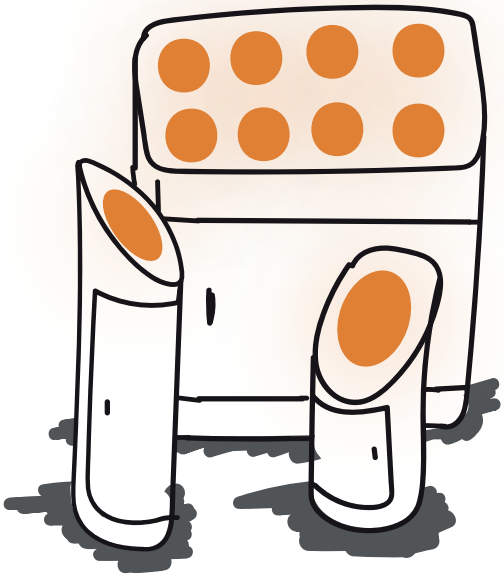


Figure 42: the capsules and central unit

3.2.2 THE CAPSULES

The capsules (figure 42) are small “lockers“ with a lit top. Items can be stored in them and they can be opened and closed through the app.
The modular nature of the capsules give the mobihub an interesting spatial appearance. This modularity is also functionally useful, seeing as each mobihub can have a different number of capsules according to scale.
The capsules come in different sizes. Capsules can be heated or cooled to accommodate for groceries.

The lights in the top of the capsule are used for feedback and -forward, as well as use cues. At night, the lit top enhances the (social) safety around the mobihub.

Figure 43 : The Helper Platform is an open ended platform that the neighbourhood can shape

3.2.3 THE APP

There is a mobihub App. All users of the mobihub get access through the app. It is an app with a closed user pool, meaning only inhabitants can use the app.
With the app, they can use the mobility facilities at the mobihub, as well as the Helper Platform and thus the capsules. The app is further detailed in chapter 3.3.3 and appendix E.

3.2.4 PERSONALIZATION

Because the helper platform is based around cohesion in the neighbourhood and open-endedness, it can be personalized by individuals or the whole neighbourhood. They can use the Platform and the hub how they see fit.

Personal: lights

The lights in the capsules can personalized to greet you when you enter, or they change based on your behaviour. With an open-source app, users can change the behaviour of the lights any way they see fit. They could even be used for a game-like type of activity.

Neighbourhood: change the Rules

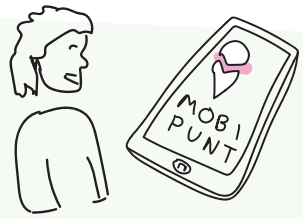
The game rules determine how the mobihub works. The app starts out with a set of standard rules, which can be changed by the inhabitants through voting. For example, a neighbourhood could want to specify that one vehicle is for heavy pick-ups only, or that a specific vehicle is for emergencies only. This also ties into the main purpose of the Platform: an emergency car always being available is a great stimulant to get rid of an individually owned car.
The game rules are another example of how the platform tries to give the inhabitant the tools to optimize his or her mobility pattern.

On the next page, two storyboards are displayed for both explanatory and illustrative purposes.

3.2.5 STORYBOARDS

Two storyboards are displayed below, depicting the process of using the capsules and the Platform in the two most common instances. The storyboards depict a delivery task being set and being completed by two different users.

Storyboard: Getting help from a neighbour →



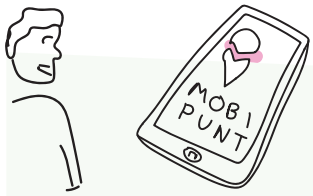
Angie lives in a neighbourhood and has a mobipunt app subscription

She needs to mail a package, but cycles to work and can't post the package for another week.

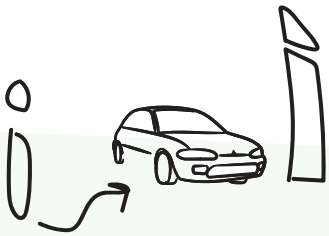
She decides to use the mobipunt and its app. She still has mobipunten from when she helped another neighbour out. She puts up a Quest: deliver her package.

She go
and it
store t

Storyboard: Helping out a neighbour →



Jan lives in a neighbourhood and has a mobipunt app subscription

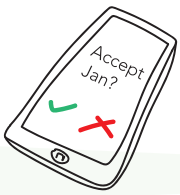


User leaves for work in the morning and uses the mobipunt

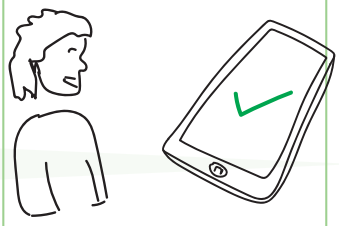
When Jan approaches the mobipunt, the app asks him if he would like to drop a package off at the Supermarket for his neighbour, Angie.

oes to the mobipunt
tells her where to
he package.

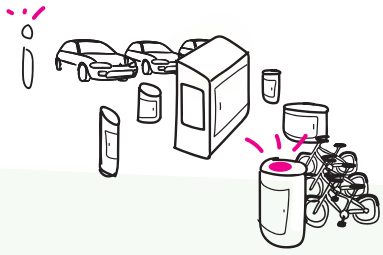
Angie puts the package in the capsule by unlocking the capsule with her phone



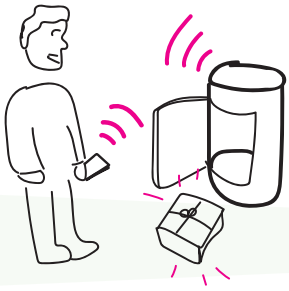
The next day, she sees that Jan would like to accept the Quest. She gives him the quest.



Later that same day, she sees the package is delivered!



Jan accepts the task on his app (it's a short detour to the supermarket at his work) and the capsule where Angie dropped her package indicates the package can be picked up



Jan retrieves the package by unlocking the capsule with his phone

Jan continues with his day and drops off the package, notifying Angie of the done delivery.

Jan receives mobipunten to be used later for when he needs something delivered.

Figure 44. Two storyboards of the helper system. The green arrows indicate chronologicality.

3.3 User Testing

In order to evaluate the Helper Platform, a user test was conducted with participants that belong to the target group (figure 45 & 47).

3.3.1 RESEARCH GOAL

The goal of testing out the Helper Platform is to gain general insight about the whole system. For this purpose, the service-system and its flow are tested as a whole. The social cohesion and feeling of community it can bring are important, but those aspects can not be tested without explaining the service system facilitating them. Therefore, the test will revolve around testing the mobility-minimizing-service and its components, in order to then say something meaningful about the feeling of community it might bring.
Next to that, 'only' testing the service-system is necessary in order to not over-encumber the participants with information beforehand.

The research questions revolve therefore around the workings of the system and its aspects.
Research questions include:

- **How willing are users to 'give away' their errands?**
- **To what extend do users see the Platform as beneficial?**
- **How is user engagement when it comes to personalization of the lights and the game rules?**
- **Does the platform invite for users to come up with their own rules / quests?**

3.3.2 TEST SETUP

These questions and more were asked through interview and are detailed in Appendix F.
As abstract concepts including social cohesion in a neighbourhood are at play, a requirement for the test is that the participant can immerse him or herself into the scenario of living in a neighbourhood.

The test consists of a number of simple scenarios performed with a scale model. The test setup can be seen in Figure 46.

Interactivity is simulated through a Wizard-of-Oz testing approach, meaning the researcher mimics interactions intended by technology.

The participant handles the app and 'him- or herself': a Lego figure. During the test, the participant is asked to express their thoughts out loud.

The main reason the model was made in Lego is to assure the participant that it was a prototype, and so enable the participant to be critical during the test. Next to that, the Lego allowed for fast-paced prototyping.

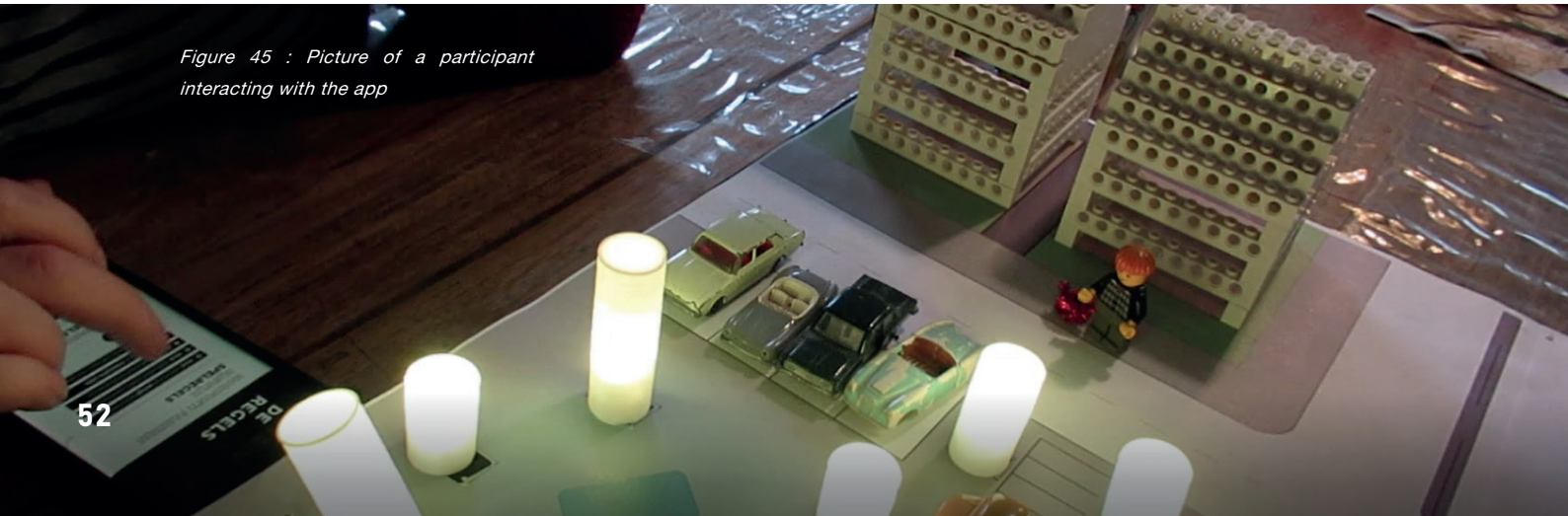


Figure 45 : Picture of a participant interacting with the app

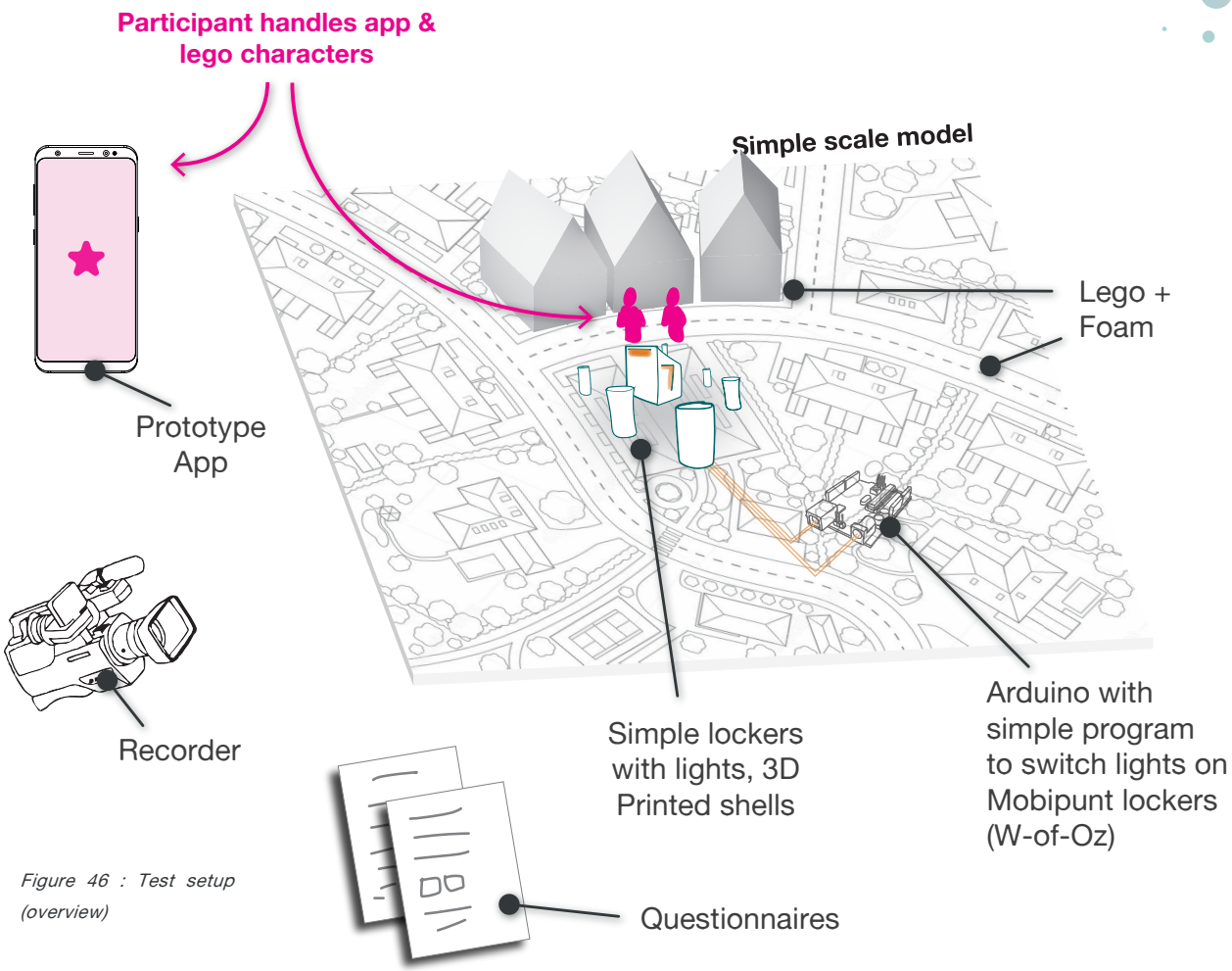


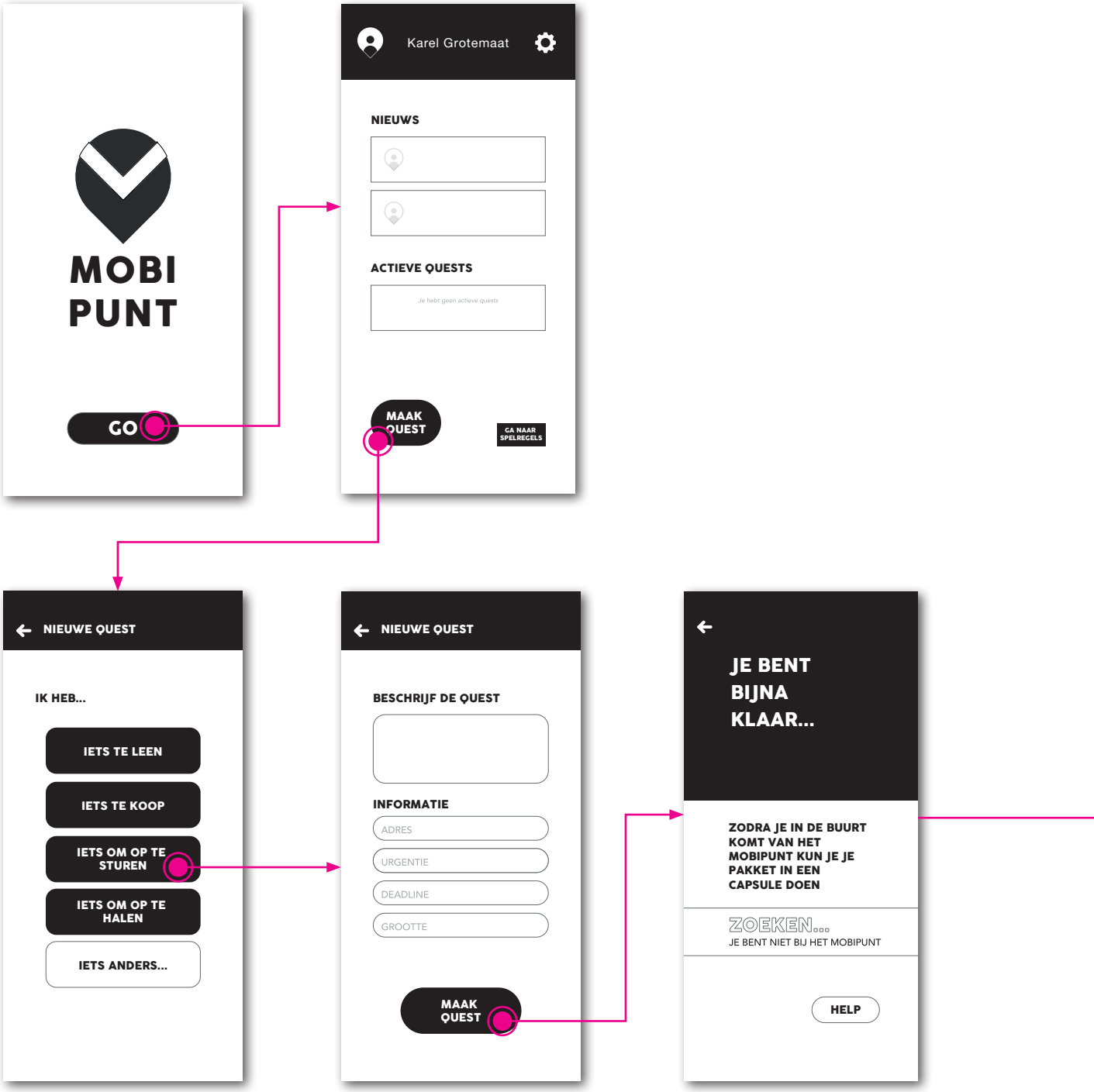
Figure 46 : Test setup (overview)

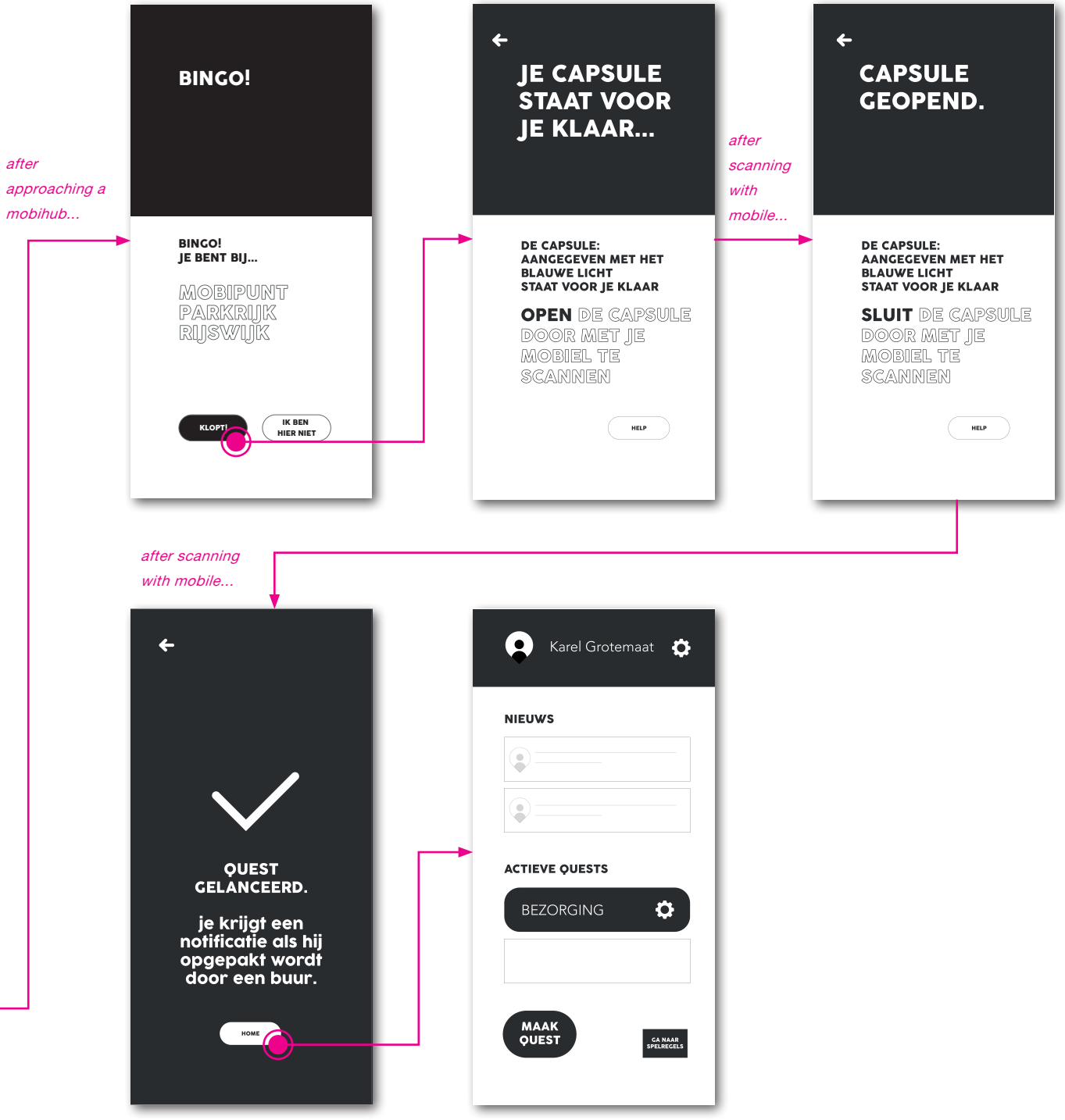
Figure 47 : Test setup (real-life)

3.3.3 PROTOTYPE APP

For the test a prototype app was built. On these pages the screens of this app are displayed. The test was linear in nature. Participants followed a scenario that guided them through the app, therefore the app has a linear flow. The app was prototyped as a ‘standard’ modern app with a focus on informal communication and community.
A simple style was used as well as a black and white colour palette, to again (just as the Lego model) emphasize the fact that this is a prototype, and that its appearance can be a topic of conversation (or debate).
The screens on these pages display the ‘making of a quest’ part of the scenario. After having made a quest, participants also experienced ‘accepting a quest’. Those screens can be seen in Appendix E.

Making a quest in the mobihub app




after approaching a mobihub...
BINGO!
BINGO!
JE BENT BIJ...
MOBIPUNT
PARKRIJK
RIJSWIJK
KLOPT!
IK BEN HIER NIET
JE CAPSULE STAAT VOOR JE KLAAR...
DE CAPSULE: AANGEGEVEN MET HET BLAUWE LICHT STAAT VOOR JE KLAAR
OPEN DE CAPSULE DOOR MET JE MOBIEL TE SCANNEN
HELP
after scanning with mobile...
CAPSULE GEOPEND.
DE CAPSULE: AANGEGEVEN MET HET BLAUWE LICHT STAAT VOOR JE KLAAR
SLUIT DE CAPSULE DOOR MET JE MOBIEL TE SCANNEN
HELP
after scanning with mobile...
QUEST GELANCEERD.
je krijgt een notificatie als hij opgepakt wordt door een buur.
HOME
Karel Grotemaat
NIEUWS
ACTIEVE QUESTS
BEZORGING
MAAK QUEST
GA NAAR SPELREGELS

3.3.4 RESULTS

In total, nine participants tested the scenarios. Of those nine, three are working in the mobility sector and can be considered experts.
Each walkthrough of the scenario and subsequent interview took approximately 30 to 40 minutes. Each session was videotaped and additionaly sound recorded. During the interview, there was opportunity for adapting the questions based on the participant's answers. The process of each session can be seen in Figure 48.
In appendix G the scenario steps are further detailed, and in Appendix F the interview questions together with the researcher's notes during each session can be seen.

These results were analyzed using Stappers' Immersion method to make sense of qualitative data (Sanders et al, 2016). The results of this analysis are detailed on the next page(s).

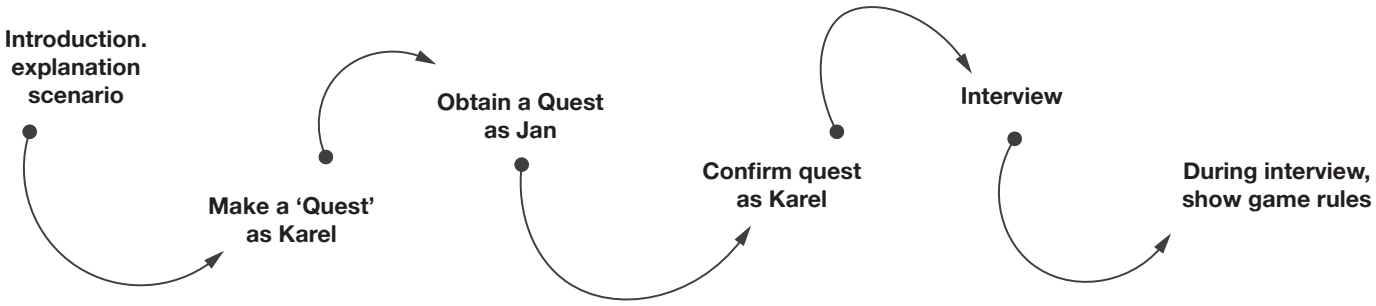
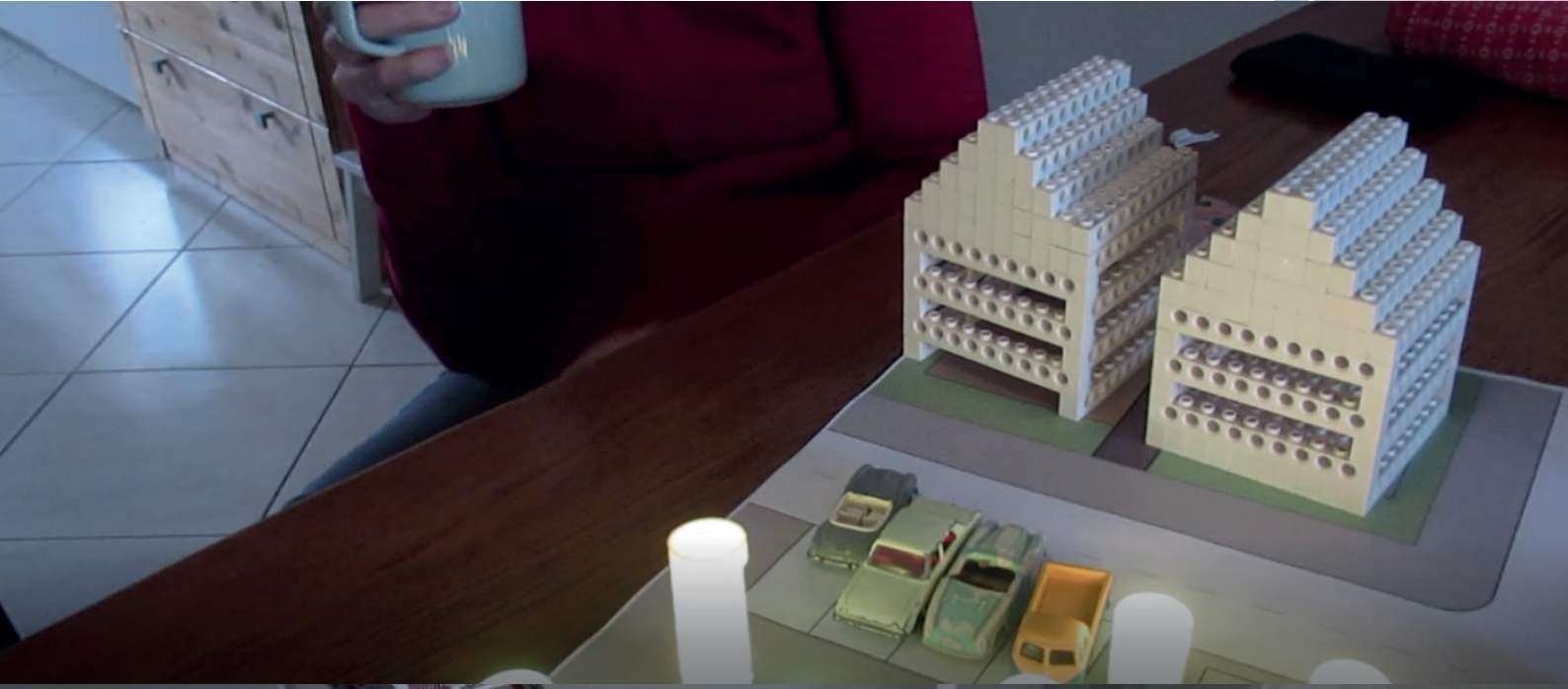


Figure 48: process of each user test

Figure 49 to 53 : The prototype in action at various test sites



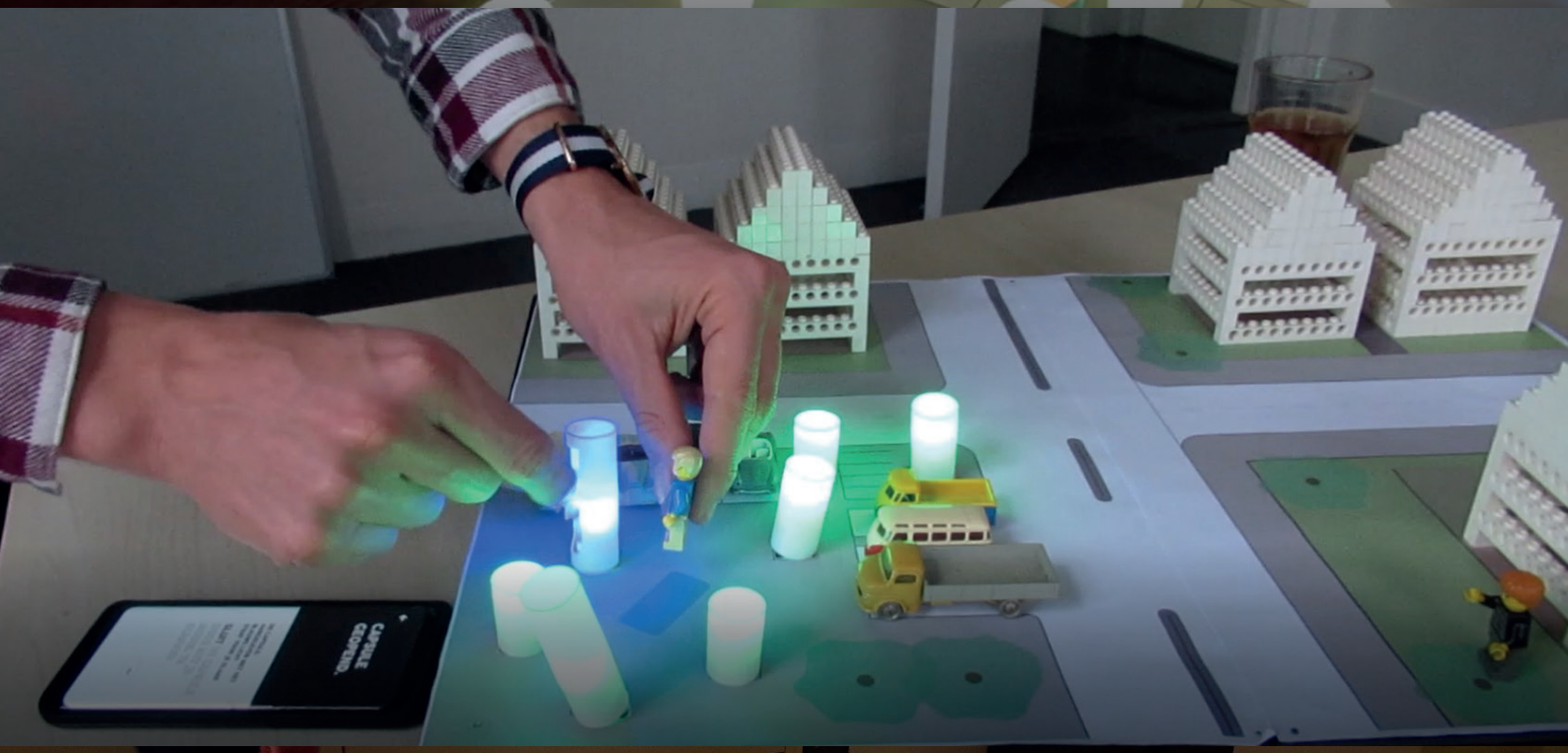
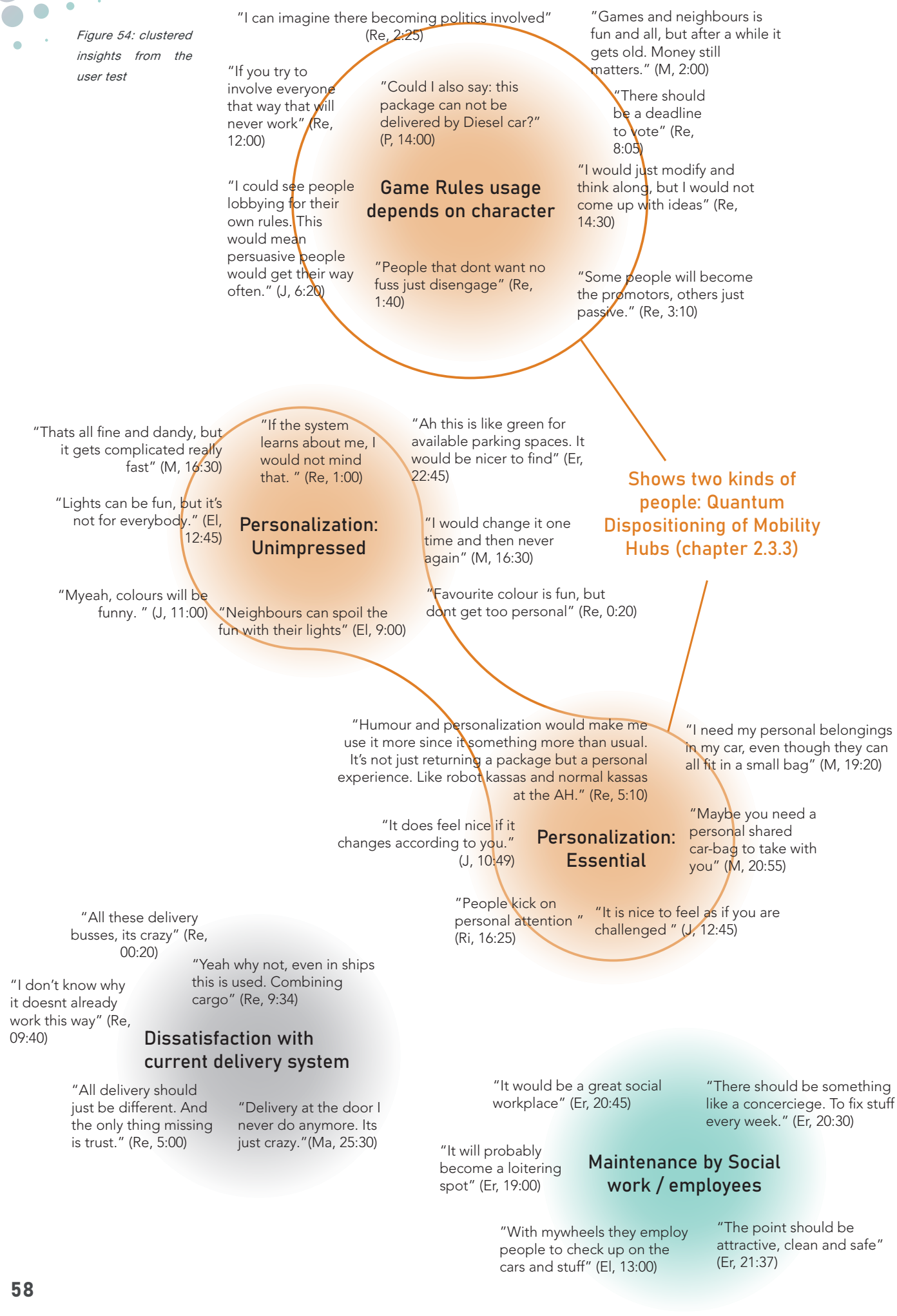


Figure 54: clustered insights from the user test



"You could have informal kick-off or something" (J, 12:00)

"You could have pilot of a year or something" (El, 11:00)

meet with neighbours for draagvlak

"You do see your neighbours a couple of times per week." (J, 9:30)

"Ownership is cultivated if occupants can co-create" (El, 11:00)

"You need to be able to see that it's a tight-knit community" (J, 1:12)

"I associate safety with cameras." (J, 11:20)

"You need to be able to see who's responsible" (J, 1:20)

Security Issues

"The responsibility is at the users. For safety." (Ma, 22:00)

"The process should not be juristified" (P, 25:10)

"The owner is the municipality, but its like a skatepark: use at your own risk" (P, 25:10)

"The responsibility is at the sender." (P, 22:10)

"If everyone uses it, trust will follow. Marktplaats also used to be scary." (Ri, 6:10)

"Trust just takes time" (Ri, 9:50)

"It is scary to give away" (Ri, 6:10)

"It will only work at the lowest level, by the people" (Ma, 40:06)

"If I get shown by my neighbour the barrier to use it is much lower" (El, 12:40)

"Mouth-to-mouth would work best. If i heard it from a neighbour i would use it" (El, 12:10)

Trust when other people use it

"If once its posted its insured, that would solve it all. Like PostNL" (J, 3:00)

Security

"I would use it for valuable stuff as well if I trust my neighbourhood" (J, 1:45)

"Trust comes when other people use it, or if its the only option." (Re, 11:30)

"For everyday packages, like return packages, I would use it regardless of my neighbourhood" (J, 2:30)

"All delivery should just be different. And the only thing missing is trust." (Re, 5:00)

"I need to know what to expect." (Re, 4:30)

"If most people use it, trust will come. 'Dan zal het wel oke zitten.'" (Re, 10:30)

"It's like paying for service for your elevator. " (M, 3:00)

"Games and neighbours is fun and all, but after a while it gets old. Money still matters." (M, 2:00)

"This is actually a monthly trade in scarcity of space." (M, 1:15)

Pay-to-use model

"The mobipunt is there to solve scarcity of space. So whoever takes that space, pays extra." (M, 0:30

"Points to use in the system is fine and all, but if the points get rewarded for good behaviour, that is just a mini-China" (M, 4:40)

"A point system will evolve on its own, no need to award or not" (M, 5:30)

"After a while, negative mobipunts will be called 'aso-points'. " (M, 8:00)

"Its kind of the same as a inner city parking license system" (M, 5:30)

Mobipunten or Money?

"You could be compensated for not using the mobipunt. That's not really left, but might work. " (M, 09:00)

"Its hard to say if mobipunten are worth it. Most people only care about money." (Ri, 8:00)

"You could pay for availibility and gebruik per kilometer or hour, and the gebruik you can trade. " (M, 8:00)

Money-related

"A social measuring system in the shape of mobipunten that is not good" (M, 5:30)

"If I damage a shared car I do not feel bad. Unless maybe we all pay for service costs or something. But then maybe poeple will not enter into it because the costs are unknown" (Er, 19:50)

"I wouldnt mind if mobipunten are just money." (Ri, 8:00)

"I would like to use the points at for local businesses" (Ma, 18:00)

3.3.5 DISCUSSION

During the interviews, several recurring topics emerged. These were 'laid bare' when grouping topics of conversation and scouting recurring concerns. Figure 54 contains the recurring concerns and their supporting quotes.

Game Rules depends on Character & Personalization

What stands out about these clusters is that they are exemplifying the Quantum Dispositioning problem of mobility Hubs (chapter 2.3.3). Both clusters contain the two groups that the Problem describes.
The Game Rules were changeable during the test as described in 3.2.4, and there was a group of people that described this functionality as essential to the experience. This group also explained that they would be the ones to change the rules, and immerse themselves in its workings. The other group expressed that they would not change the rules, and would rather stay away from changing it altogether.
Similarly, these two groups were also evident in the clusters about Personalization. Some participants described this as the most exciting part of the experience, and others did not notice.
The quantum superpositioning problem of mobility hubs once again emerged during this test, emphasizing its importance in the final design. Another piece of information that was uncovered was the fact that the two groups are aware of each other: users that did not find personalization essential described that 'some people would find that amazing, but it is just not for me'. Perhaps the two groups can complement each other in their shortcomings.

Meet with neighbours, Trust when other people use it, Security Issues

All of these clusters are about security. Often times during the interview the Security Issues came up. Security was not worked out in detail for the test, so naturally it resulted in questions from the participants. What if someone steals my package and does not deliver it?
When asked what would solve the security issues for them or give them trust in the system, the clusters 'Trust when other people use it' and 'Meet with neighbours' came up. Word-of-mouth promotion was deemed the most trustful advertisement for the system. Seeing and hearing other people in the neighbourhood use it can convince users of its trustworthiness. The 'Meeting with neighbours'-cluster contains comments of participants that all named a kick-off session of sorts to create a support base for the system, and inform inhabitants of it.
All of the clusters relating to security can be considered clusters about implementation issues.

Mobipoints or Money & Pay-to-use model

These clusters all have to do with money. The point system described in chapter 3.2 was used during the test: users can use 'mobipunten' ('mobipoints' in Dutch) to set quests and earn mobipunten when they complete quests. Next to the finding that the word 'Quest' was not appropriate for the target group, this decision had some connotations.
Some participants were motivated by actual currency, and theorized that Mobipoints would eventually not mean much to them anymore. This motivation also ties in with ownership, participants expressed, of the mobihub and its mobility offer.

One of the expert participants had many comments about the mobipoint system. This expert's contributions form the bulk of these clusters about money. Other participants did not have to say much about the mobipoints system. Other experts also commented about the business model of the Helper System, and the questions surrounding it. This is probably due to the fact that the business model was, just like the security issues, not detailed yet. Business model questions are an implementation issue as well.

Dissatisfaction of current delivery system, Maintenance by social workers

These smaller clusters represent a dissatisfaction many participants had, and a suggestion many did.
Participants were often times excited about the system mainly because they are so fed up with current delivery methods. Many of them see delivery vans come and go, sometimes multiple

times on a day. Their dissatisfaction with this excited them for the Helper System.
An recurring idea that came up was using the Helper System as a social workplace. It was not clear whether this idea was specific to the helper system or to a mobihub in general, but it was nevertheless present in many interviews. Perhaps the mobihub as a social workplace can be combined with other ideas for implementation.

3.3.6 LIMITATIONS

The user test was conducted with experts as well as participants. However, the clusters of Figure 54 are not divided in these two groups. This was due to the fact that, in hindsight, there was no distinction made or expert-specific questions during the testing with experts. However all the experts save one belong to the target group, which means they have provided relevant data as a participant. They have not provided (noticeable) relevant expert-specific data to the user test. The only expert that does not belong to the target group had many comments regarding the 'Mobipunten or Money?' -cluster. This experts' comments almost single-handedly make up this cluster. This is probably because the expert in question is quite economically focussed. The comments provide a useful insight into possible business models for the final design. However, the size of the cluster is somewhat misleading seeing as it virtually contains one participant' comments.

As was stated in 3.3.1, the test was done to gain general insight about the service-system's flow, in order to then say something meaningful about the value it can bring to a neighbourhood, community-wise.
Because the system is new to participants and was very generally tested, the results of the test mainly involve questions they have regarding implementation. The results state that participants see the value of such a system, but have several questions about it implementation-wise. These questions eclipse their ability to talk about what the system would mean to them. There is not much to say about the relationship users can develop with the System, or how meaningful the interaction is that they have with it.
There were some ideas about personalization through the changing lights during the test and changing of the Game Rules. These confirmed the existence of the Quantum Superpositioning Problem of Mobility hubs, but did not resolve it. Additional design and research has to be done on this topic. This additional research is further detailed in chapter 3.4.3.

3.3.7 REFLECTION ON USER TEST

During the first test, it became clear that the first question of the interview was too detailed to start with. This question was reversed to the back of the line during all subsequent interviews.
The use of a Lego model proved successful. Participants seemed at ease to elaborate on their feelings and did not hesitate. Next to that, the Lego evoked childhood memories for some participants, causing them to be even more talkative during the interview.

The scenarios and full test consisted of a lot of ideas and design choices as well as hypothetical situations, and for some participants this proved somewhat difficult to imagine all at once. Testing the system as a whole was the goal, but another approach could have been to immerse the participant more beforehand, perhaps with a sensitizing exercise. This approach would have required less 'brainpower' of the participant during the test, but overall a longer testing period. Such sensitization could have allowed for a deeper level of feedback, a level that does not involve only questions about implementation.

3.4. Redesign considerations

As discussed in 3.6, there are two main issues that the user test highlighted: the importance of the Quantum Superpositioning Problem of Mobility Hubs and issues regarding implementation.

3.4.1 PLACE, CHARACTER & PERSONALIZATION

There was not much to say about the users relationship to the mobihub, other than that it requires additional research. The test was 'pre-occupied' with explaining the service-system-flow to the participants that it could not say something meaningful about this relationship.
This additional research should focus on facilitating the two kinds of people that the Quantum Superpositioning Problem of mobility hubs describes. This personalization, that was already somewhat present in the Helper System, should be reworked into a more meaningful interaction. It should say something about the relationship that a place for the neighbourhood could be to its inhabitants.
This research is described in the next chapter 3.4.3 and further elaborated on in 4.1.2.

3.4.2 IMPLEMENTATION ISSUES

The test uncovered much information about implementation, both in the form of questions as well as solutions.

Security
The security issues can be fixed by building trust. The test showed that trust can be best built through showing that other people use the system. Showing that other people use it can be done by combining different aspects that participants already named, such as a kick-off session and assigning 'super-users' that act as Ambassadors of the mobihub. These Ambassadors could also act as supervisors of the mobihub as a social workplace. This system should tie in with the eventual business model of the whole system.

3.4.3 SMALLER ISSUES

Link to real currency
The mobipunten-system was received well, but could be adjusted to have some link to real currency to make sure users maintain a feeling of ownership about the mobihub.

'Quest
The 'tasks' in the app were named 'Quests'. This name was not well understood, mainly because it was in English and it does not fit the target group. It should be changed to something more clear and Dutch, or perhaps not have a name at all.

3.4.4 EXTENDED RESEARCH

The user test clearly highlighted some issues with the design. Some issues are more evident than others, as was displayed on the previous page.
One issue that emerged that was not that clear from the user test is the issue of personalization and the character of the mobihub. On these subjects, extended research has been done.

Personalization

The user could change the lights to their favourite colour in the app, and when they 'approached' the mobihub, the lights turn into their favourite colour. This was to exemplify the customizability of the lights.
Some users saw the benefit of this, others thought was a 'fun feature'. Overall users reacting 'animistic' to this: they perceived it as the mobihub welcoming them. This opened up the necessity of extended research into the character of the mobihub.

Character

Our apprehension of the world is increasingly coloured by animistic connotations: this is evident in the way we talk to our computers, smartphones and -devices (Marenko, 2014).

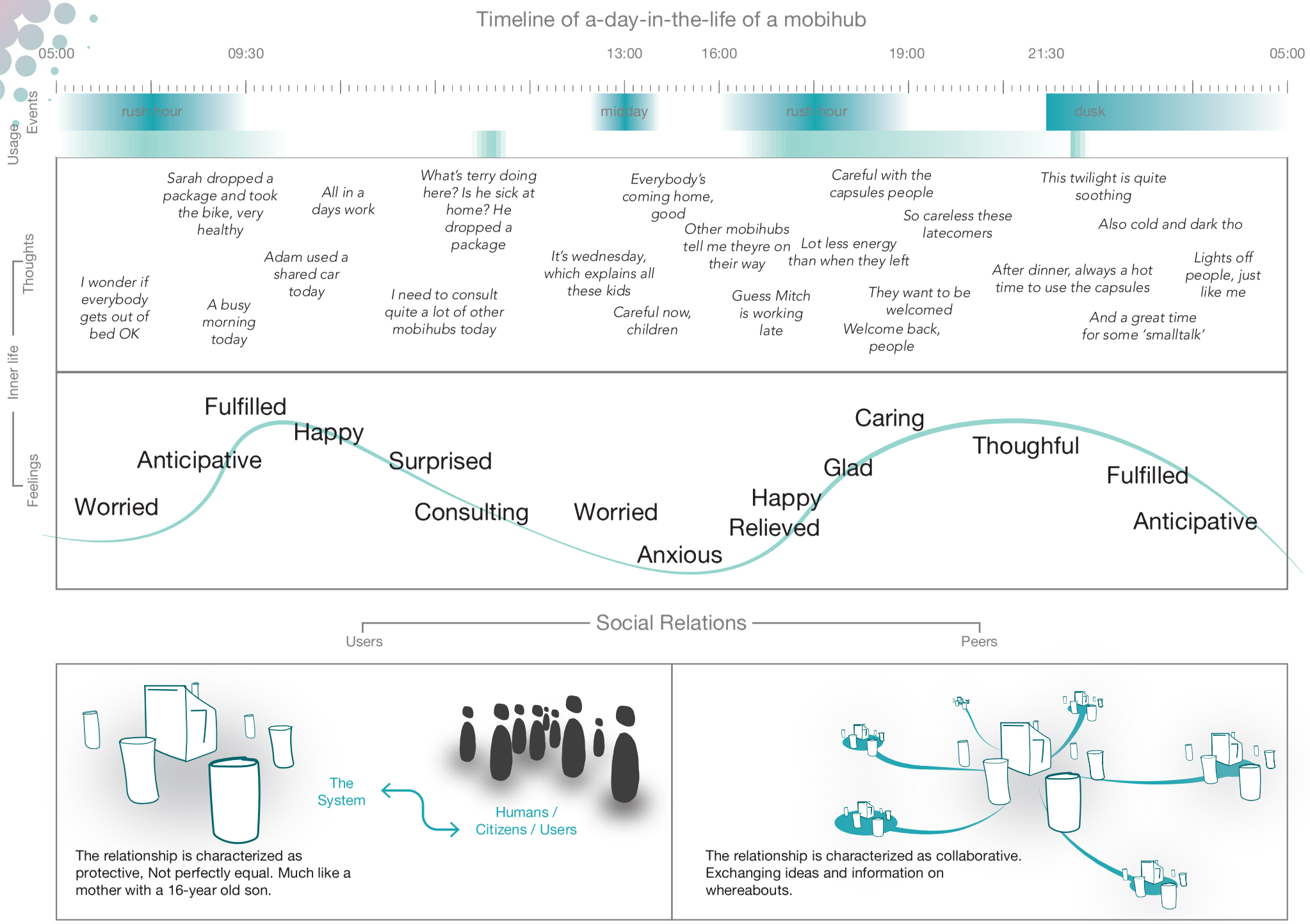


Figure 55 : Thing centred design method: object persona (day-in-the-life of a mobihub)

The mobihub sees most of the same users every day: it can be perceived as developing a relationship with them. To explore this relationship, a type of thing-centred design method is used. Thing centred design methods are methods that look at the problem from the (designed) 'thing's perspective (Cila et al, 2015) The method used is an (adapted) version of Object Persona:

"By generating object personas, designers can look into an object's life and social context to obtain a better understanding of the object's ecology and surrounding use practices. The method also stimulates creativity in the design of products and services that are based on those objects' lives, movements, and transformations." (Cila et al, 2014, pp. 1)

In figure 55 the Object Persona can be seen. The persona is a timeline of a day-in-the-life of the mobihub.

Through this exercise, it was discovered that the mobihub, like daily commuters and the users that use it, experiences two heavily loaded moments in the day: the morning and evening commuting hours. This results in the fact that the system is very anticipative of its users.
Its relationship with its users could be characterized as a parental one. It is a parental one, because the punt does not know the whereabouts of its users except for when they arrive at another mobihub (with which the mobihub is connected). This is similar to a mother that can check in on her children when they are at home or another place that has Wi-Fi, but nowhere in between.

This parental behaviour is interesting not only because it can tie the all of the emerging design principles together, but also because such a relationship mirrors wanted mobility patterns, and enforces the core purpose of the mobihub. The mobihub needs to 'learn' the user to have a responsible mobility pattern, and choose responsibly. A relationship with a parent is a two-sided relationship about responsibility, just as the use of the mobi+punt is about responsible mobility usage.
This design method was used to shape this relationship and the behaviour of the hub, its lights and the app, and to inform the final design. It is described more extensively in chapter 4.1.2

This new relationship means that the interaction vision as described in chapter 2.3.4 is no longer suitable. Based on a two-sided parental relationship, the interaction vision was changed to be:

"A trustful relationship with a mother that is always home."

See Figure 56.

This interaction in this situation can be characterized as:

Loving, Trustful, Mutual and Optional

These characteristics translate to certain product qualities. These qualities are:

Communicative, Self-evident, bi-directional and Personalized.

Figure 56 : New interaction vision

4.

Final Design & Evaluation

4.1 THE MOBI+PUNT

4.1.1 SUMMARY

The mobi+punt (mobipunt plus or mobipluspunt, see figure 57) is a mobihub combined with the improved 'helper system' (chapter 3.2)
Next to offering a wide range of shared mobility options, the mobi+punt aims to complement this by reducing unnecessary travelling among occupants of a neighbourhood, by giving them the tools to combine their trips.

Those tools include:

- Interactive multi-purpose capsules on the mobi+punt that can be used for dropping or picking up a variety of items, as well as provide interactivity to be used for social safety, personalization or gamification.
- A digital environment for the neighbourhood that facilitates use of the capsules.
- A closed user pool app for occupants of the neighbourhood.

The mobi+punt connects similar users to each other based on how they use the mobi+punt. Engaged users will get more involved with the mobi+punt and each other. Less engaged users will be left alone but nudged towards more usage. In this way the mobi+punt improves social cohesion in the neighbourhood (further detailed in chapter 4.1.2).
Users will develop a noticable relationship with the mobi+punt and the mobi+punt with them,

emphasizing its importance as a starting point for every trip from the neighbourhood. This relationship is likened to a parent and child (further detailed in chapter 4.1.2).

Before a mobi+punt is initiated in a neighbourhood, a kick-off session will make sure all inhabitants are on board and provides an opportunity to assign Ambassadors. The Ambassadors guide (new) users and oversee the social workers that maintain the mobi+punt. This is facilitated by the fact that they are paid through the subscriptions of the mobi+punt.

Each of these aspects is further explained in this chapter.

MOBI+PUNT

Figure 57: mobi+punt logo

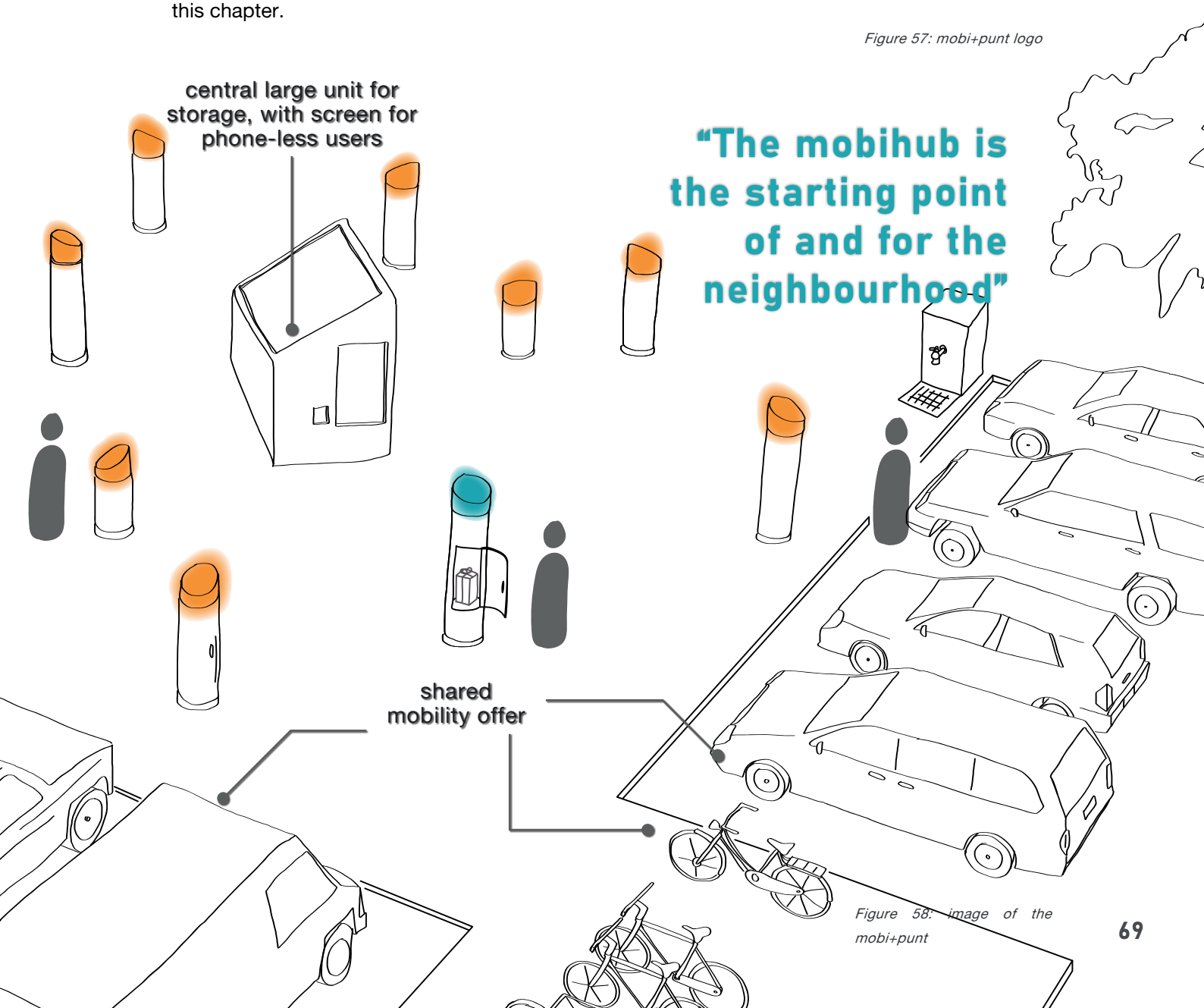


Figure 58: image of the mobi+punt

4.1.2 INTERACTION & DESIGN PRINCIPLES

As explained in chapter 3.4.3, the mobi+punt and the user engage in a mutual relationship.

The mobi+punt experiences two heavily loaded moments in the day: the morning and evening commuting hours. This means the system is very 'anticipative' of its users.
Its relationship with its users can be characterized as a parental one. It is a parental one, because it is oblivious to the whereabouts of its users except for when they reside at another mobi+punt (with which the 'parent' mobihub is connected). This is similar to a mother that can check in on her children when they are at home or another place that has Wi-Fi, but not anywhere in between.

Such a relationship is interesting because the interaction between the user and the mobi+punt can be characterized by it, but mainly because such a relationship mirrors wanted mobility patterns. The relationship gives the workings of the mobi+punt meaning, and ties the interaction with the punt and its core purpose together.

Mirroring wanted mobility patterns
A relationship between parent and child is a two-sided relationship about responsibility. The parent is responsible for the child, and vice versa. The parent should care for the child, and handle in its best interest. But if the child does not recognize its own responsibility toward the parent, the relationship becomes one-sided. The parent will push back, get in fights, try to steer the child, and get nothing in return. Everyone has experienced a time of puberty when all you want to do is stay out late, hang out with friends, leave your room a mess, and only come home for dinner (this is, of course, an exaggeration). Once your mother sees this behaviour, she'll scold you for never being home, and wonder what you are doing all day.
The child should also care for the parent, be there in hard times for him or her, come home for more than just dinner, and generally live in synergy with the parent and not in conflict.

Such a relationship is analogous to the current users of a mobi+punt. One could argue that users have to be educated ('brought up by') by the mobi+punt ('the parent') in their mobility patterns.

Figure 59: the mobi+punt develops a parental relationship with the user

Parent and purpose
The core purpose of a mobihub is to facilitate multi-modal travelling, and all the benefits that that brings. The user is still just a 'child' that only uses its two cars unwisely, clogging the streets and pavements with cars and polluting the environment. The mobi+punt is the parent that has to educate the user in responsible mobility patterns.

Behaviour & interaction manifestation
The basis of how the 'parent' talks to the 'child' is an algorythm that determines how engaged a user is with the mobi+punt (figure 60). This algorythm is necessary to differentiate between users. Because of the principle of 'Quantum Superpositioning Problem of mobility hubs' (chapter 2.3.3) that states that there are different kinds of people with different levels with engagement, this difference is necessary and will present itself. There are two extremes: some users that will be very engaged with the mobi+punt, and some that never will be. The algorythm places the user somewhere on a spectrum between these two extremes. A users level of engagement will determine its

interaction with the mobi+punt.
The parental character of the mobi+punt then manifestates itself through the interactive capsules and through the app based on that engagement.

Engaged users
When an engaged user enters the mobi+punt, the lights in the capsules will light up more intensely and more specific to that users liking, exemplifying an excited parent welcoming a child home.
The app was redesigned to be a chatservice where you can 'talk' to the 'parent'. In this conversation engaged users will notice a more engaged parent and get a different experience. Next to that, the app also offers more tasks from the neighbourhood to an engaged user. He or she will get asked if they want to deliver a package for a neighbour, and receive suggestions for how to use the mobi+punt. They will get more engaged with the mobi+punt, and thus with their fellow neighbours. This way they get more involved with the neighbourhood and contribute to strong social cohesion in it.

Less engaged users
Less engaged users will get a different experience.
The lights in the capsules still welcome them on the punt, but less intense than an engaged user. Users can see how the punt reacts to other users, which also has an effect.
The app provides a more bare-bones conversation. It will less actively try to involve them in delivery for the neighbourhood.
Because of the 'Quantum Superpositioning Problem of mobility hubs', less engaged users will mostly never become a fully engaged user. However, they can or should be nudged into more usage of the mobi+punt, because it brings the neighbourhood and the society at large many benefits. The mobi+punt will take on an active role in subtly involving them more in the neighbourhood, by reminding them to use it once in a while (figure 64).

The interactive capsules are further detailed in chapters 4.1.3.

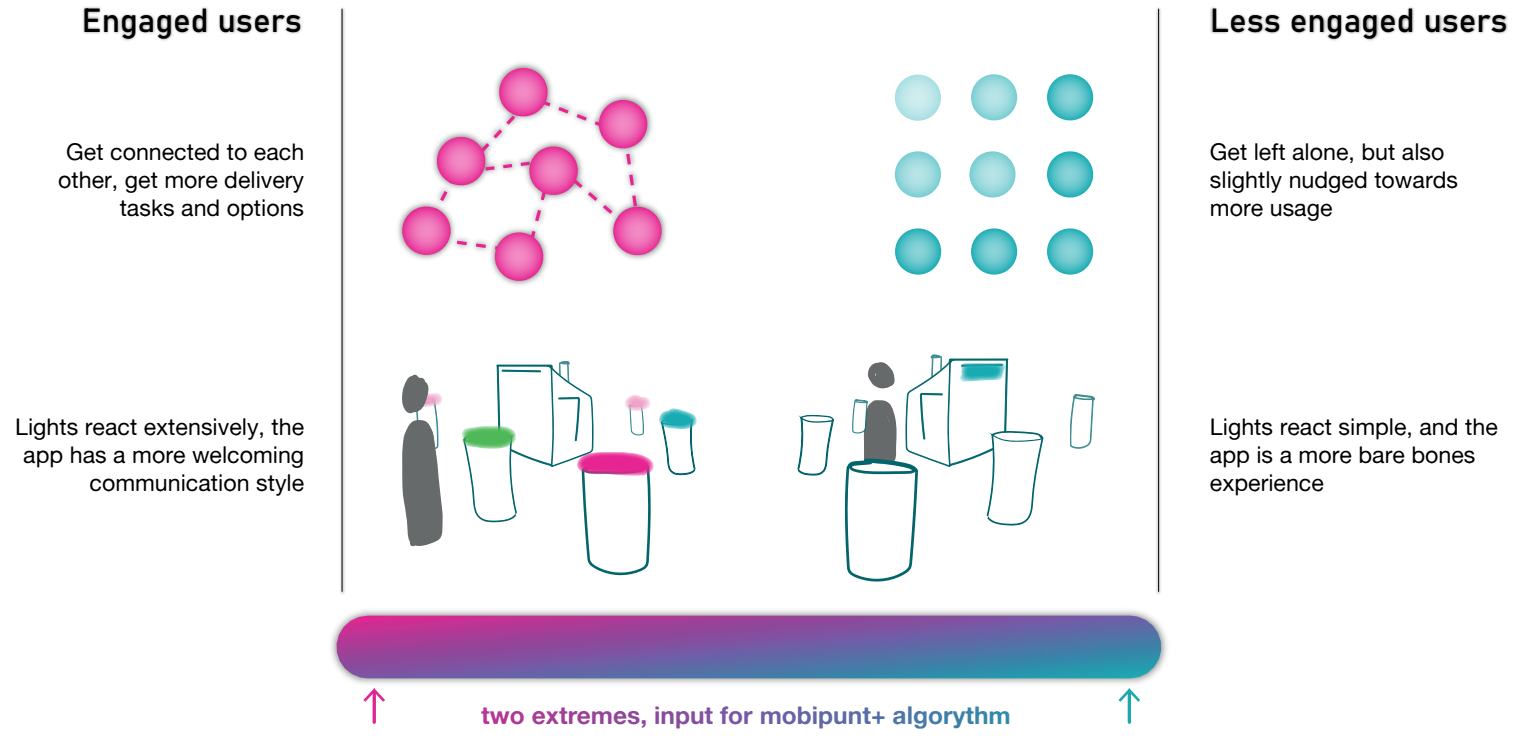


Figure 60: Design principles of types of users and the mobi+punts interaction

4.1.3 CAPSULES

The capsules (see below) are, in short, interactive lockers. Items can be stored in them. Neighbours can use them for delivery and sharing and buying items. Neighbours are encouraged to come up with their own usages for the capsules. Their purpose is open-ended. Their top is lit, which not only can be used for simple use cues, but also to display the character and behaviour of the hub described in chapter 4.1.2.

The modular and scattered nature of the capsules gives the mobi+punt an interesting spatial appearance. Modularity also means they are usable on every type of mobi+punt. Larger mobi+punts have additional capsules, smaller mobi+punts have less. Furthermore, the lights provide social safety on the mobi+punt at night.

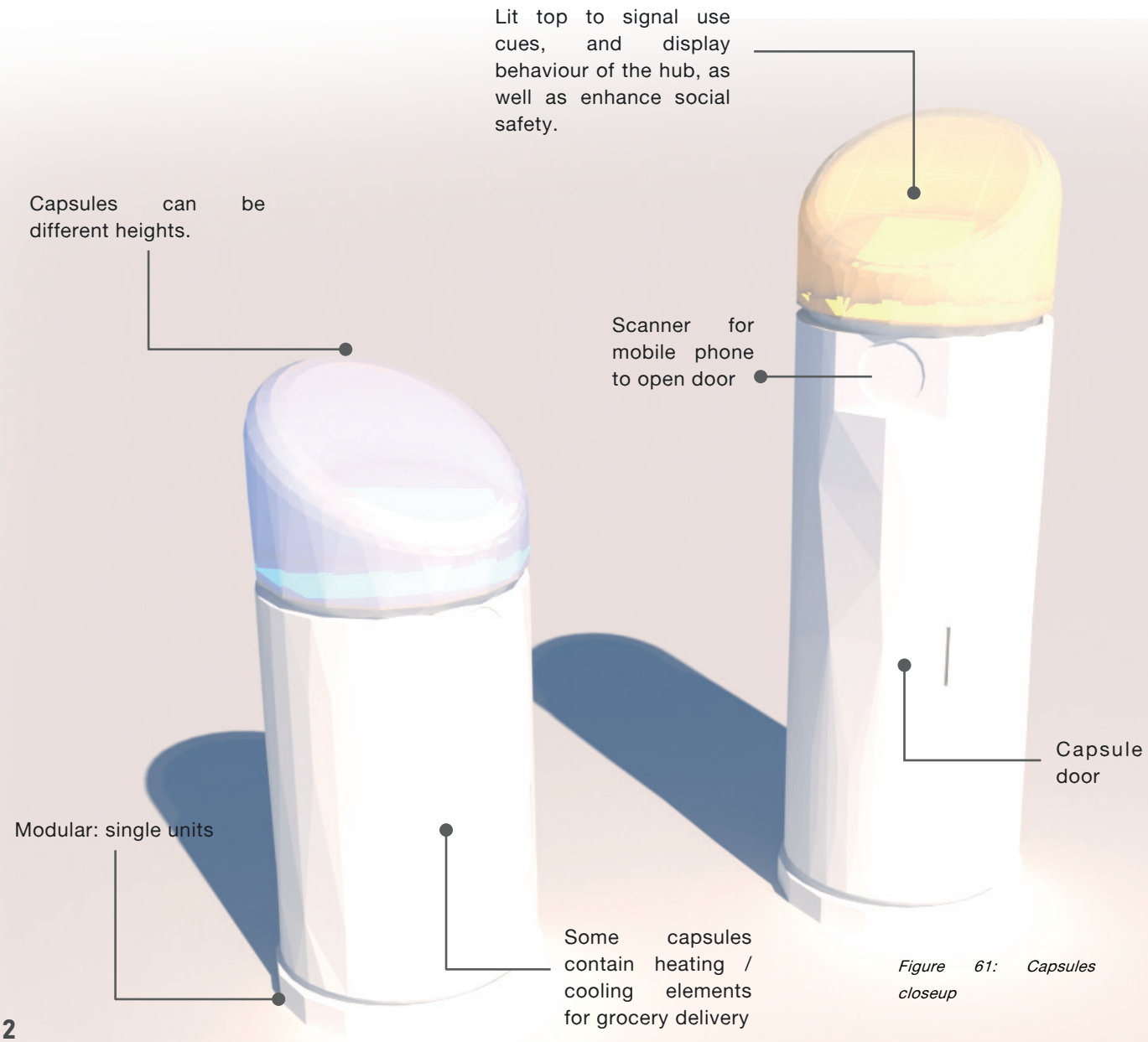


Figure 61: Capsules closeup

Figure 62: images of the mobi+punt at night

4.1.4 THE MOBI+PUNT APP

The mobi+punt app is a closed user pool app for all inhabitants of the neighbourhood. With it, users can access the mobility offer on the mobi+punt, as well as use the capsules. The app handles all functionality of the mobi+punt. It can also be accessed through the central unit on the mobi+punt, for users that do not have access to an app or otherwise.

Because of the nature of the interaction and the design principles in chapter 4.1.2 the 'app' is actually a chat service. In the chat service you can 'talk' to the mobi+punt. This chat service is embedded in a dedicated mobi+punt app, but can also be embedded in existing communication infrastructure of a neighbourhood, seeing as often times such services are already present in an established neighbourhood. The chatservice can be linked with any existing service, such as a Facebook group or the -in the Netherlands commonplace- 'WhatsApp Neighbourhood Prevention'.
The app is the access point to 'talk' to the mobi+punt for neighbours. Cars and bikes and others are unlocked through the app.

They can launch or take on tasks that other inhabitants have set in the capsules, such as delivering a package, picking up groceries, lending power tools, and selling or buying second-hand items.
The experience users have with the chatservice depends on their level of engagement following

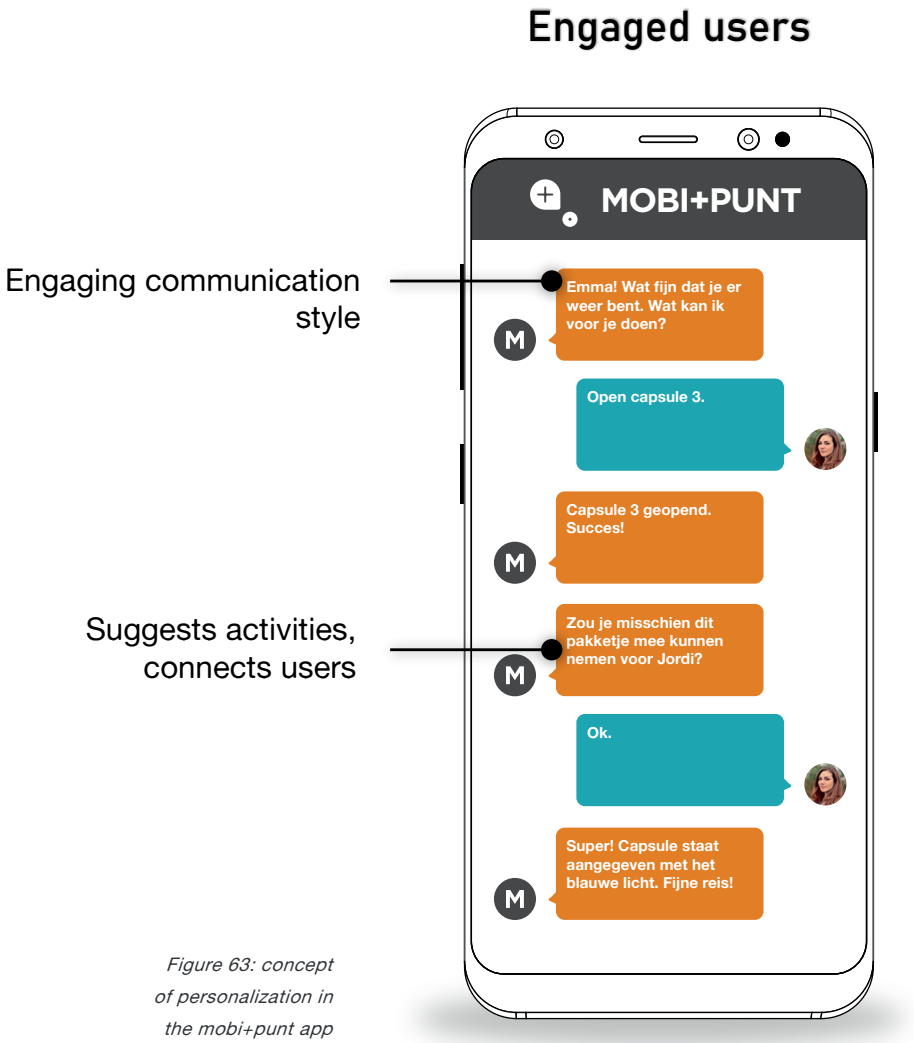


Figure 63: concept of personalization in the mobi+punt app facilitating two kinds of people

two extremes, spe

from figure 63 (see also figure 64). Engaged users will notice a more engaged parent and get a different experience. Next to that, the app also offers more tasks from the neighbourhood to an engaged user. He or she will get asked if they want to deliver a package for a neighbour, and receive suggestions for how to use the mobi+punt.

Less engaged users will get a more bare-bones experience from the app.
Because of the 'quantum superpositioning problem of mobility hubs', less engaged users will mostly never become a fully engaged user. However, they can or should be nudged into more usage of the mobi+punt. In the app this is done through gentle nudging (figure 64). It is important that in detailling this behaviour of the app the user does not perceive it as 'nagging', and the effect backfires. Similar to a parent and child's relationship: *it's all about communication.*

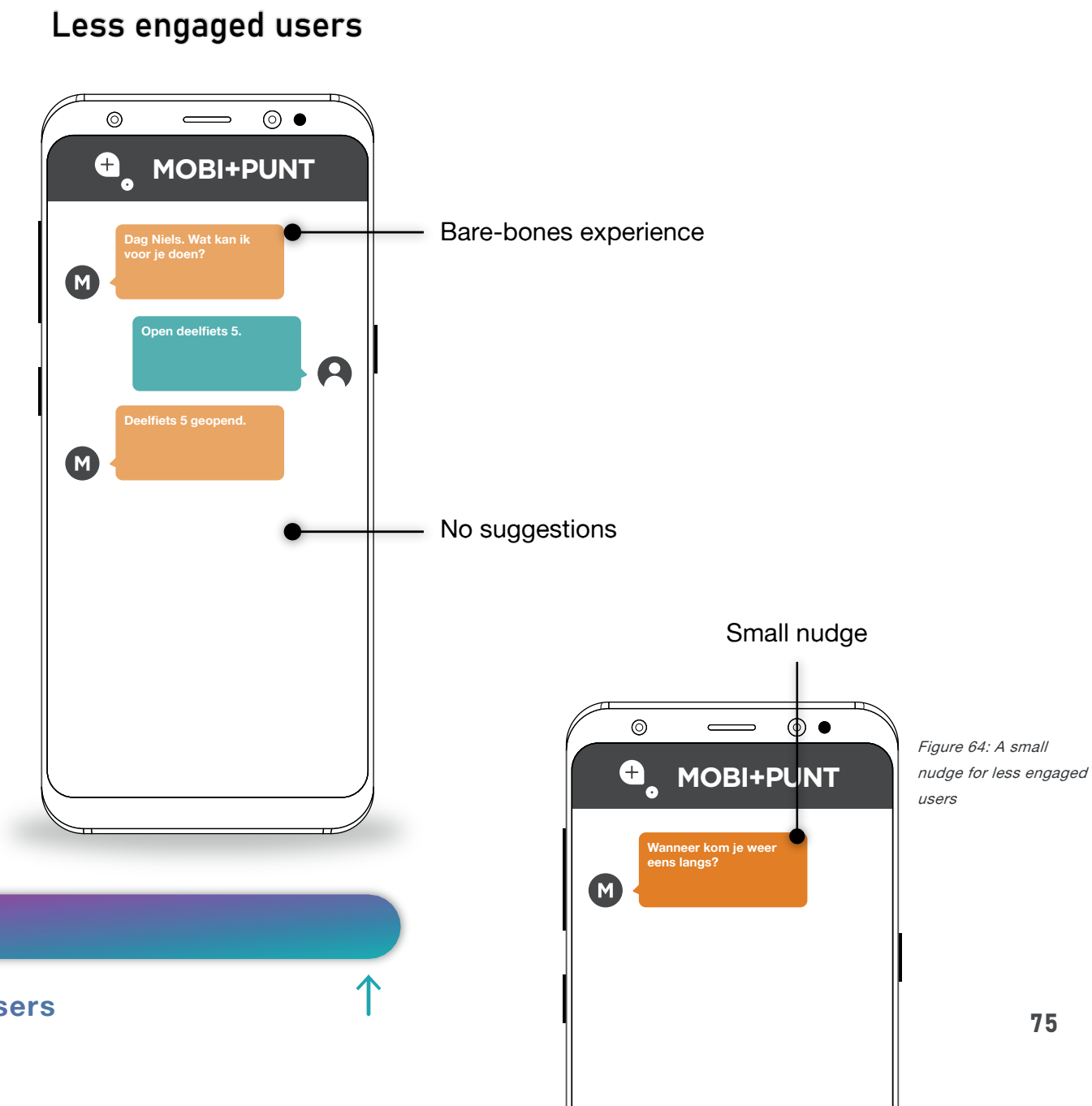


Figure 64: A small nudge for less engaged users

4.1.5 IMPLEMENTATION

While doing user testing a number of ideas about implementing the mobi+punt in the neighbourhood arose. These ideas are still just ideas, and further research and work needs to be done to fully flesh them out. They are described here conceptually. Further details and reflection on implementation can be seen in chapter 5.

Kick-off session

User testing has shown that the most effective way to engage users with the mobi+punt while also solving security issues is by word of mouth Therefore, when a mobi+punt is initiated in a neighbourhood, it is essential that all the inhabitants kick-off its use in a centralized session (Figure 65).
During this session, people from Advier or the municipality explain the mobi+punt, how to use it, and why this is so important. This can be done through emphasizing the flaws of a conventional delivery system, which many users found disturbing.

This session will not only kickstart the usage of the mobi+punt, but can also be a great opportunity to assign the Ambassadors of the mobi+punt.

Ambassadors

The Ambassadors are assigned during the kick-off session. An Ambassador is someone that invites and excites new or current users.
Ambassadors are inhabitants of the neighbourhood. The Ambassadors are a solution to the “quantum superpositioning problem of mobility hubs”. The Ambassador should be someone that likes to be ‘connected’, and in his promoting can enthuse those that like to be ‘autonomous’ (figure 66).

As an Ambassador, you oversee the maintenance of the mobi+punt. The mobi+punt is a ‘social workplace’: it lets people work that would be otherwise uneligible to work. These people maintain and clean the mobi+punt to ensure it remains a clean and safe place.
The Ambassador and social workers are paid a (small) fee through the subscriptions of users.

Subscription and costs

To use the mobi+punt users pay a monthly subscription fee, and usage costs.
To use the capsules, users can pay each other with ‘Mobipoints’ to perform a task, which can then be used in the system again. This means the mobipoints system is a closed loop and, because the mobipoints have value, they relate indirectly to real money.

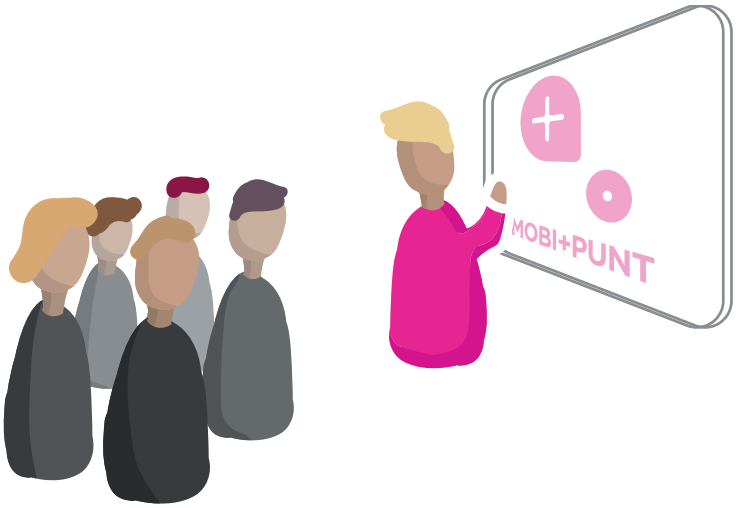


Figure 65: concept of personalization in the mobi+punt app facilitating two kinds of people

Figure 66: concept of personalization in the mobi+punt app facilitating two kinds of people

4.2 Evaluation

As a final step in this design process, the design of the mobi+punt was evaluated with people that work in a field relevant to the design, or have expertise relating to the design.
The goal of the evaluation is discovering the real-life limitations and strengths of the design. This says something about the viability of the design and its weaknesses. The experts that attend can provide this information.

To invite the experts as well as to 'sensitize' them to the mobihub initiative and the mobi+punt, a 'teaser' was sent to them as an invitation. This teaser can be seen in appendix G.

4.2.1 PROCESS

The evaluation was executed in a group session that consisted of two presentation, a collective brainstorm, and final remarks.
Firstly, the mobihub initiative was presented and explained. Not all attendees were familiar with the mobihub initiative, so they had to be brought up to the same knowledge level. In a short presentation the main goal and contents of a mobihub were highlighted, followed by background information about the inception of the initiative, supported by statistics and case studies from the broad knowledge and experience of Advier.
After that the mobi+punt was presented, as well as the design process leading up to it, a video detailing the premise and workings of the mobi+punt concept was shown.

Scan to view the video

The process was presented including all the design steps of the VIP method. This was done to tell the 'complete story' to the experts and immerse them in the design process, in order for them to be able to critically review the concept design.

After the presentation and subsequent questions, the collective brainstorm began. Each attendee was asked to write down one or two success factors and one or two limitations of the mobi+punt (see figure 67). Then a short discussion followed about the topics that arose. Next, all the success factors and limitations were collected and clustered on the wall (see pictures on the next page) (Sanders & Stappers, 2012). This was followed by yet another discussion. The session ended with final remarks by everyone involved.

Results

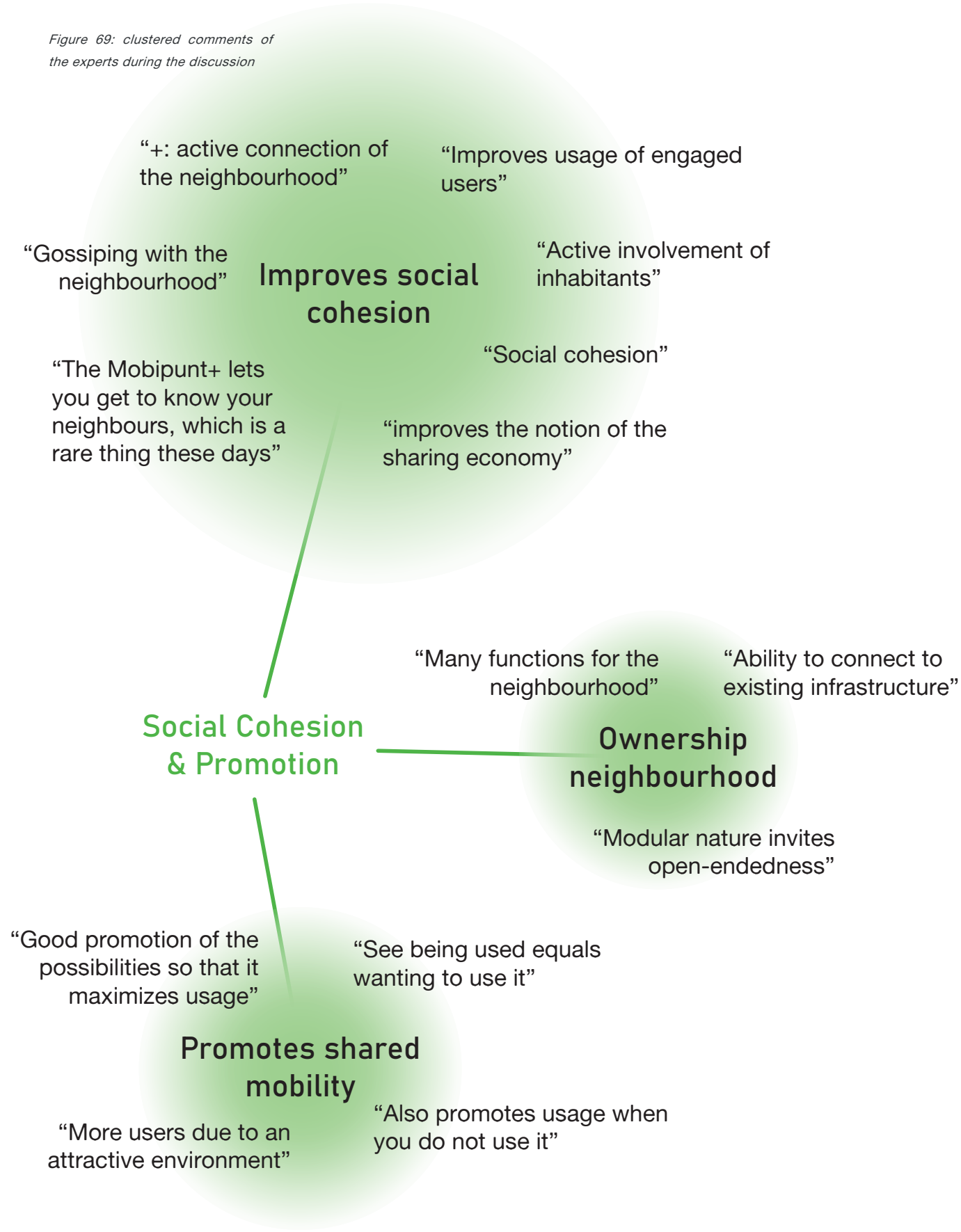
All attending experts showed an interest in the design concept and were active participants in the session. There was little hesitation in writing down factors and limitations. All of the success factors and limitations and the resulting clusters can be seen in figure 69.

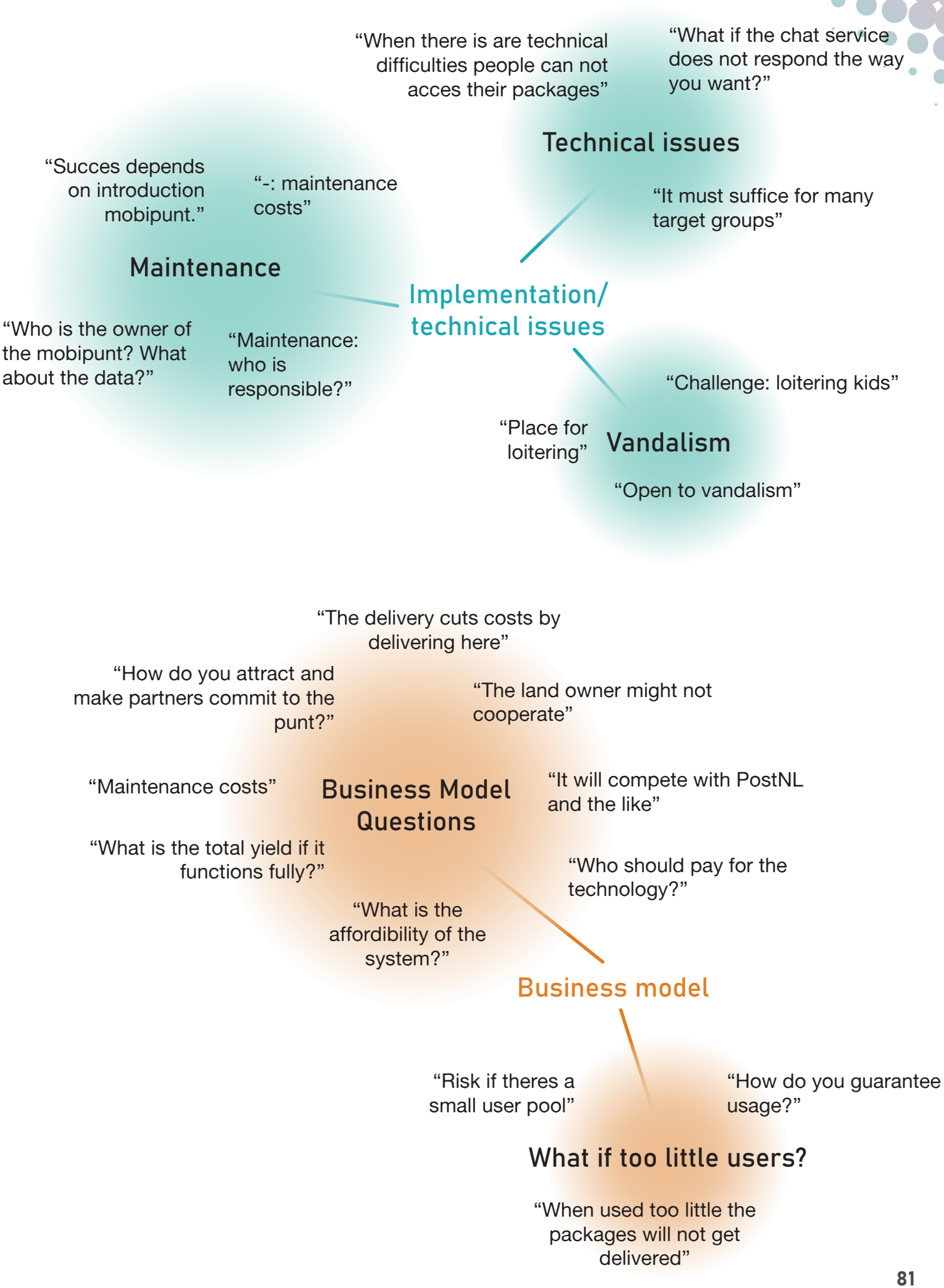
Figure 67: The slide in the presentation inviting for comments

Figure 68: The presentation setting


Garderobe

Figure 69: clustered comments of the experts during the discussion




"When there is are technical difficulties people can not acces their packages"
"What if the chat service does not respond the way you want?"
Technical issues
"It must suffice for many target groups"
"Succes depends on introduction mobipunt."
"-: maintenance costs"
Maintenance
"Who is the owner of the mobipunt? What about the data?"
"Maintenance: who is responsible?"
Implementation/ technical issues
"Challenge: loitering kids"
"Place for loitering"
Vandalism
"Open to vandalism"
"The delivery cuts costs by delivering here"
"How do you attract and make partners commit to the punt?"
"The land owner might not cooperate"
"Maintenance costs"
Business Model Questions
"It will compete with PostNL and the like"
"What is the total yield if it functions fully?"
"Who should pay for the technology?"
"What is the affordibility of the system?"
Business model
"Risk if theres a small user pool"
"How do you guarantee usage?"
What if too little users?
"When used too little the packages will not get delivered"

4.2.2 DISCUSSION

All attendees recognized the positive impact the mobi+punt would have on social cohesion in the neighbourhood. Those comments form the biggest cluster: Improves social cohesion & promotes shared mobility. This cluster also relates to the cluster “Neighbourhood Ownership”, which describes the ownership that users can experience when the mobi+punt enters the neighbourhood. Both of these clusters relate to the central design theme in the concept, which is social connection in the neighbourhood.

There are two clusters that relate to issues with maintenance and implementation: “Maintenance”and “Technical Issues”. These types of clusters also appeared during the user testing of the ‘Helper System’. With such a new design it is only natural that participants and experts wonder how to implement such a system. Most voiced concern about the viability of the system in a financial regard. The cluster of “Business Case Questions” contains more of such concerns. A number of experts highlighted the fact that other parties need to be attracted or collaborated with on the Hub in order to establish a business model and ensure that the extra costs that this system will have do not end up with the inhabitants of the neighbourhood.
Another concern that arose was the data management of inhabitants (location data). Some experts rightly pointed out that the data should reside with a public party to prevent other more questionable parties from obtaining or misusing this data. This connects to another small cluster of ‘Too invasive?’ which describes the concern that the ‘parental relationship’ that users develop with the punt can be experienced as too invasive, and therefore backfire.

4.2.3 LIMITATIONS

During the session, it became clear that the attending experts had little prior knowledge about the mobihub initiative. This prevented a lot of them to go in-depth with their analysis of the mobi+punt concept design. A lot of topics consisted of remarks having to do with implementation, security and costs; all topics that also arose during the user test of chapter 3.3. Most of the questions that were asked were asked to clear things up about the usefulness of the mobihub itself, let alone the mobi+punt. Perhaps this prevented the group discussion from reaching its full potential.

A solution to this could have been to more thoroughly ‘sensitize’ the attending experts to the mobihub initiative. They could have been sent more material explaining the mobihubs initiative in detail. On the one hand this could have provided them with the necessary knowledge to go more in-depth about the mobi+punt, but on the other hand is it hard to remotely sensitize attendees on the initiative thoroughly, seeing as Advier already tries to educate (and ‘sensitize’ in that way) many parties about the mobihub initiative, and that process often takes months to eventually resonate within those parties.

Furthermore, some comments were not success factors or limitations, but merely advantages or disadvantages of the system. This could have been due to the fact that in the presentation those were marked by “+” and “-” (see figure 67). However, this is an assumption. The task was stated clearly and perhaps it was only misunderstood.

4.2.4 CONCLUSION

The mobi+punt was evaluated with experts and the main success factor was, as intended, that it improves social connection in the neighbourhood. The main limitation was the fact that there is much unknown about what business model the mobi+punt will have. This business model will also determine how the mobi+punt is maintained and in the end its success in the neighbourhood. The business model should attract partners that can cover the likely extra costs of the mobi+punt so that the inhabitants of the neighbourhood do not have to.
The outcome of the expert meeting was processed further into the Recommendations (chapter 5.2).

5.

Conclusion

5.1 Conclusions

This project started with the question:

“What is the role of the mobihub in the travel journey of the future suburban citizen?”

The title of this report and this project already reveals what this role was discovered to be. The mobihub can act as a social connector in the neighbourhood, letting inhabitants combine their mobility, and by behaving as a concerned parent. This behaviour is experienced by the inhabitants through the way they interact and communicate with the mobihub via de app and the capsules.
Additionally, the parent role is fulfilled through the functionality of the capsules; inhabitants can use them to minimize their (unnecessary) mobility.

This role was discovered through a Design & Research process that was guided by the Vision in Product design method. This method was adopted because it suits ‘designing for the future’, and gave guidance in the ‘fuzzy front end’ that many design processes start with.

Along the way of the VIP process many metaphors and storytelling tools were adopted to help with the design process; relationships to mobihubs were defined as having ‘positive friction’, the design statement was related to quantum mechanics, and the eventual design’s experience was likened to a concerned parent.

To limit the scope of the project a target group was defined as well as a ‘target type’: the suburban citizen that uses the ‘neighbourhood hub’. Every hub is different and the mobihub initiative does not use a one-size-fits-all design. This is necessary because mobihubs are so closely related to the spatial layout of the place they are in, but does make the room for solutions limited.
The design initially tried to be one-size-fits-all, until it was discovered that a more modular design was needed to fit more types of mobihubs. Initial ideation sessions focussed on adding functionality to the mobihub. The ideas strayed further and further away from the core purpose of the mobihub; mobility.
These ‘wild ideas‘ were also fuelled by the fact that mobihubs are a melting pot of functionalities for the neighbourhood, and so much is possible and can be done. But those wild ideas were often unfocussed and seem to add to the complexity while not adding much else.

With brainstorm sessions and input from experts the eventual direction of the ‘helper platform‘ returned to the core purpose of the mobihub: reducing unnecessary mobility.
This direction was iterated on with rapid prototyping methods and a user test which resulted in the final design, the ‘mobi+punt’.

The relationship of the user with the platform was discovered using a Thing-centred Design Method. This relationship is characterized as a concerned parent. Such a relationship mirrors wanted mobility patterns, because a son or daughter also has the responsibility of maintaining a relationship with his or her parent. It is a two-sided relationship about responsibility, just as the relationship with the mobihub should be. Users have the responsibility to think about their mobility pattern responsibly. The relationship with the hub as parent ties all of this together.

The relationship as with the concerned parent also ‘solves’ the design challenges that were stated in the Design Statement.
The design statement in chapter 2.3.3. was as follows:

“The mobihub needs to wake up people by introducing a kind of positive friction (that literally and figuratively slows them down) at their local or commute mobihub, with which they can

choose to interact, together or alone."

There were many challenges in this statement. The first segment of the statement talks about waking people up and slowing them down. The mobi+punt talks to the user through the app, and in doing so wakes them up. The app is designed to facilitate this, to be the happen-to-passer-by in the busy morning or evening commute. It calls out to users and often asks them a question, slowing them down and waking them up. Unless ofcourse the user does not respond, or does not care. This divide between users became clear very early on in the project. It was characterized also in 2.3.3 as the

"Quantum superpositioning of a mobility hub",

where the mobility hub should let users be connected and autonomous at the same time. Although 'connected' and 'autonomous' appeared to be more representative terms of two kinds of people; people that are usually very engaged with new technology, new things or new people, and people that are more content by themselves or with the way things are.
The mobi+punt in its parent role is two mobility hubs at the same time, because it has a different interaction and relationship with each user. One could argue it is many mobility hubs in one. It connects these 'engaged' users more to each other and the neighbourhood, and leaves the 'autonomous' users alone. This distinction between types of people is what makes it so that people can choose to interact with the 'friction', together or alone. The 'friction' is personified by the mobi+punt as concerned parent. The concerned parent is adaptable and treats all of its users differently, and in doing so is many mobility hubs in one. Users choose themselves if they are slowed down by the 'friction' or not.
Whether a user chooses to be slowed down is not or should not be influenced, because it is so tightly intertwined with one's personality and character traits as well as the current moment in that users life or even the time of day.

The mobi+punt can resolve the design statement as well as the quantum superpositioning problem of mobility hubs. However, the key word there is **can;** it does so when it works perfectly and as intended. Before it can do that a lot of questions still have to be answered about implementation and technical specifications. These possible problems are further discussed in the Limitations in chapter 5.2.

The final design of the mobi+punt was evaluated with experts. These experts acknowledged the value the design has, while simultaneously raising a lot of questions about implementation, security and the viability of the concept. The implementation goes hand in hand with the eventual business model of the mobihub. These issues are valid, and they and more are discussed in the Recommendations in chapter 5.2.

5.2 Limitations & Recommendations

5.2.1 LIMITATIONS

This project followed a Vision in Product design process. The VIP method is a great tool for designing conceptual future concepts. However, this method also has its limitations. Because the method has a large run-up to the actual designing, this design stays fairly conceptual. This conceptual design is well-grounded in research and storytelling-wise, but nonetheless conceptual. This is also why there are many questions still left unanswered regarding implementation.

The design was done with the focus on a 'neighbourhood hub' (chapter 2.2.2). In this sense the design is also limited, seeing as the same design for the 'transit- and business hubs' will need to be adapted to suit those types.
In those hubs the social cohesion will have to play a smaller or different role. The social cohesion on a transit hub could be worked into a feeling of 'cityness' among users, seeing as they all use the same transit node in the same city.
On a business hub, one could adopt a more corporate approach, and focus on the commonality between the potential users that are working at the same area, and perhaps the same industry.

Because the design focusses on social cohesion, it is important to note that the mobi+punt was designed for the Dutch context. In other cultures social cohesion in the neighbourhood might work drastically differently, and the design will need to account for that. This is especially important to note because the mobihubs-initiative is active in a number of different countries in the EU.

5.2.2 RECOMMENDATIONS

A number of subjects in the project are important to keep in mind when developing the project further. Next to that, there are interesting topics for further research.

Current delivery system dissatisfaction
The topic of a different delivery system for packages is a topic that resonates with a lot users. There seems to be a great dissatisfaction with the current system. This dissatisfaction can be used when promoting the project to users or future inhabitants of neighbourhoods with mobihubs. It is a great 'leverage' tool for creating a support base for doing things differently.

Data: open source, ownership
Seeing as the mobi+punt uses location data of its users, it is important to find a ethical way to use that data. During the expert meeting it became clear that a public party could be suitable as owner of that data. This could be taken even further by investigating other ways of tracking personal data while not owning the data itself. The blockchain or blockchain-like methods can be worthwhile to look into. Those methods keep the data distributed. Perhaps the neighbourhood itself could function as the 'data bank' where all the inhabitants own their data but pool them together in order to use the mobi+punt.

Business models
The eventual success of the mobi+punt depends on the business model. When developing a business model for the mobi+punt, it is paramount that the extra costs, that the new technology will undoubtedly bring, do not end up at the inhabitants of the neighbourhood. The threshold for using the mobi+punt should stay very low in order to guarantee a strong user

base, as well as secure all the benefits that the mobi+punt brings.
Therefore, partnerships have to be sought that can make use of the capsules, and that are attracted by that strong user base.
The delivery functionality can be partnered with existing delivery services such as the postal service (PostNL in the Netherlands). For delivery of groceries and similar, partnerships can be set up with supermarkets.

The functionality of the capsules should stay open source and open for new suggestions. In this way the neighbourhood can decide for themselves what kind of services they need there, and is it easy to attract new partners.
Other possible partners include Tikkie (instant paying of bills peer-to-peer), Marktplaats (a reselling site), Facebook Marketplace, Peerby (lending service), Picnic (grocery delivery service), or various equipment rental parties.

About stakeholders
The realization of a mobihub is a complex cooperation between many types of stakeholders. Although this project did not focus on this collaboration, it could be an interesting direction for further research. A Design for Interaction (graduation) project could focus on developing a discussion / meeting tool for these stakeholders to come together. Such a tool could streamline the realization process of a mobihub, and therefore improve the quality.

Further research and projects
There are a number of topics in this project that could be further developed.

Firstly, the interactive capsules on the mobi+punt could be further designed and detailed. This could be done in the context of a Design for Interaction or Integrated Product Design (graduation) project.

One of the challenges in designing the capsules is how different they can be. How could the capsules keep the mobi+punt spatially interesting, while not making them too expensive to produce? The capsules should stay in different sizes, and maintain their lighted top. Their shape, sizes, and material can be iterated on.

Secondly, a direction for further (design) work is the appearance of the street under the mobi+punt and capsules. What kind of relationship do the capsules have with the street profile, if any? How can the mobi+punt blend into the street layout of the neighbourhood while still standing out and being recognizable?

Thirdly, the app as a chatservice can be further designed and detail led. The chatservice should function as an intelligent chat ‘bot’. Seeing as this bot also handles car reservations and -unlockings, it is imperative that the commands are well understood by the algorythm. The chat service should be able to talk to existing communication infrastructure in the neighbourhood, such as the facebook group, or neighbourhood watch groups such as ‘Whats-App Buurtpreventie’.

And lastly, topics that are beyond the scope of this project can be further researched and designed for. The mobi+punt could be adapted to fit the two types that are not investigated in this project in chapter 2.2.2, the transit hub and the business hub, or perhaps those types require vastly different approaches.
Furthermore, how would the mobi+punt work in an international context? The mobi+punt deals with many culturally-defined topics such as social cohesion, so perhaps each country or cultural group requires its own version of the mobi+punt.

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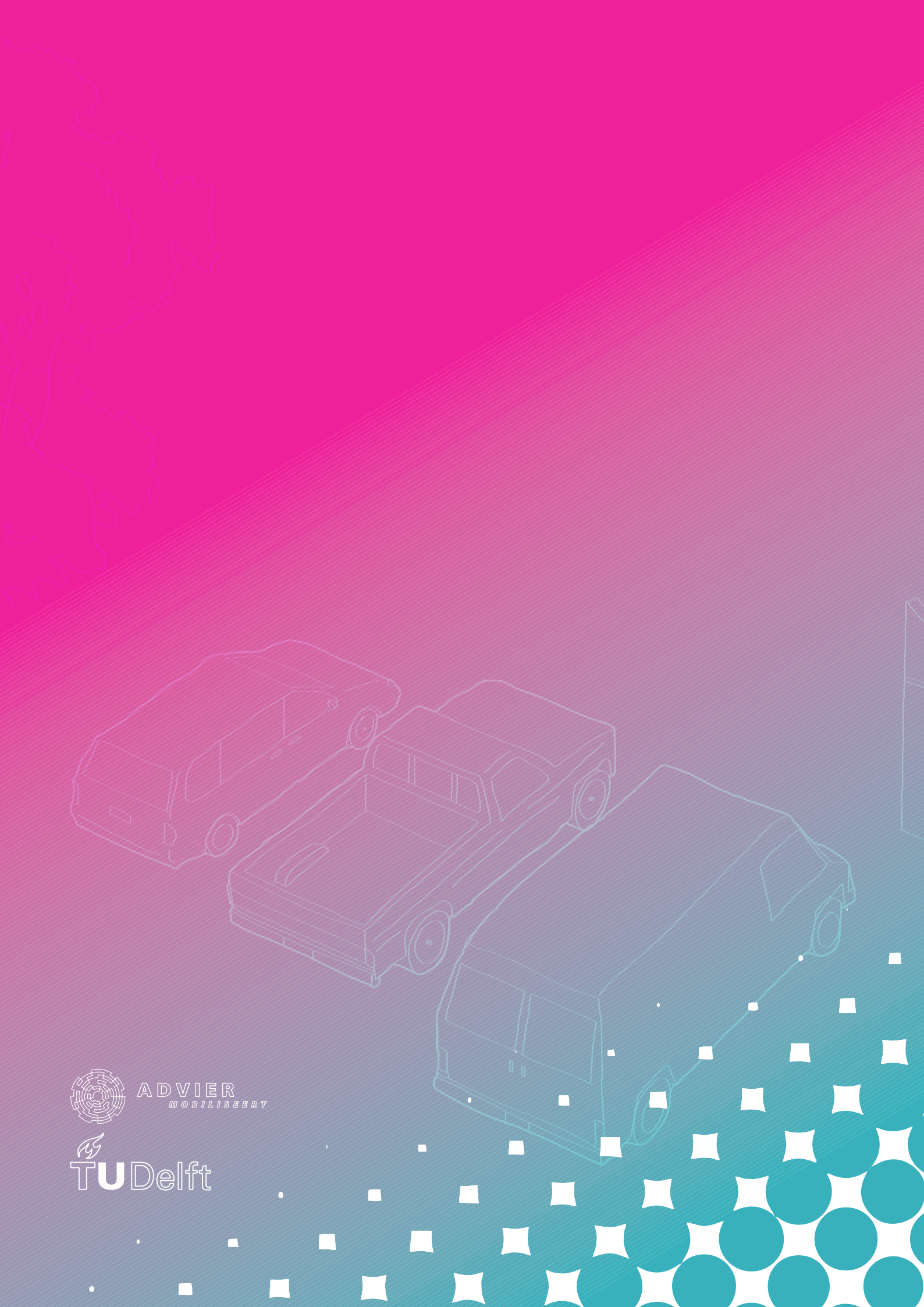
Appendix

The appendix is a separate document (available through the TU Delft Repository).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