

MOBILITY HUBS: HOW WILL THEY FUNCTION, LOOK AND ENRICH THE CITY?

18-06-2021

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PREFACE

In front of you is the graduation report about 'Mobihubs' by Jip Schelling.

The project gained my attention because I have been interested in design for public spaces. This topic gave me the opportunity combine product design with urban design. After reading some basic info about the mobihub it made me confident that this concept could add much value to our public space which motivated me to start.

It has been an inspiring time working on this topic. In the course of the project, it became more of research driven by design rather than the design of an actual product. This sometimes felt strange because I am graduating as an Integrated Product Design student. Yet it also felt completely the right thing to do because in my opinion it added a lot to the subject of mobihubs

The project is done for and in collaboration with Advier. This collaboration has worked out well. I could use my strength as a designer to elaborate on the existing research of Advier. I'm proud to say Advier has been thinking the same about the value of my work and asked me join the team after graduation. I am looking forward to start at Advier, after I have enjoyed a well deserved time off.

For now I wish you a pleasant and inspiring read!

SUMMARY

Context

The topic of this graduation project, the mobihub is a physical place where mobility functions and other facilities meet. A mobihub is the starting place or transfer destination for every sustainable journey. From public transport to shared cars. The uniform logo and the names make the mobihub recognisable.

Advier, a consultancy working on mobihubs in the Netherlands was the client in this project. They posed the question of how should the furniture of mobihub looked and be produced?

Aim of the project

When exploring what was already know and case studies about mobihubs, it became clear to me that the mobihub itself and the implementation had to be explored in more detail before being able to design the exact furniture. This shifted the scope of the project to an more conceptual stage. Resulting in the research question. Mobility hubs: how will they function, look and enrich the city?

To answer to this broad research question, a method of research through design has been used. For three different scenarios the design process of implementing a mobihub is executed in an exploratory way. As outcome of these exploratory designs a set of design principles came about. With these design principles a guideline and toolbox are made facilitating the start of a mobihub design process.

Analysis

Throughout the project a strong background -based on literature and case studies- has been build around the topic. This background functions as a basis for the design explorations, and can be categorized into three main topics:

Mobility

This chapter sheds light on the way we travel and what influences this has on our life and planet. The main insight is the car often being used where other type mains of transportation would have been more suitable for the job, especially if you take into account all side effects.

Next to an analysis of the current situation different views of how mobility could or should evolve are presented. An understanding of the spectrum of differing predictions helps to form a strong context in what type of world a mobihubs has to function. The debate about if further and faster travel in needer, or should we be able to choose a destination closer to home and travel more sustainable?

City

Mobility shapes the city, and the city shapes mobility. Understanding the influence they have on each other is essential to be able to design something beneficial for both. The prospected growth and densification of the city can not cope with the current usage of cars, so some solution has to be found, the mobihub sound like a good candidate!

Mobihubs

Although the concept is rather new, there are some precedents and useful case studies. These are studied in this chapter resulting in a first set of design principles.

Exploratory designs

Unlike the classical design process -with a analysis, ideate, concept and development phase- this project had a customized structure. Because of the complexity, and broad topic.

To study the mobihub three locations are picked to make a design for. The things encountered during this process are the insights of the research. So it is not about the end result of a design but about the conclusions made during.

1. Idealistic

Within this first iteration an ideal version of the mobihub has been designed. This design serves as a base for the designs in the following chapters. The setting for this iteration is a regular Dutch city, within the time frame of the coming years. This process was let by questions like: How do we organize the city? Cars take up lots of space - but is this really necessary? Could this be done more efficiently by sharing?

2. Redesign of a street

How can you apply these first insights found in the previous chapter to an existing situation? In this chapter you will find a design exploration about a street in Utrecht that showcases how this could be done. By going through this fictional process the hiccups can be identified and the concept automatically becomes more tangible.

To get a complete picture the case study is rather extensive, starting with identifying the different stakeholders and their possible relationship with the mobihub and each other, followed up by a plan for the transition of the street, and including a first sketch of the design.

3. Implementation at construction site

In the previous design exploration an existing street was examined. Redesigning a pre-existing space comes with certain restrictions; for example, the fixed amount of space and the habituation of people to the current layout. To look at the mobihub from a different perspective, in this iteration a location is studied which is currently still in the project planning phase. This gives the design more freedom and allows for new explorations and approaches. The location for this case is the apartment complex in the centre of Heerhugowaard, special about this location is that project owner is already planning to facilitate this with shared cars.

Guideline & toolbox

In the course of the project, it became clear that conveying information about the strengths and design principles was more useful than solely designing street furniture. To this end, the final result of the project is a guideline focusing on the why and how to design a mobihub. The design principles coming forward from the research give structure to the document. The document is assisted with a toolbox, this toolbox facilitates a conversation about the possibilities for a specific location and can be used during the start of a process where residents and the municipality meet.

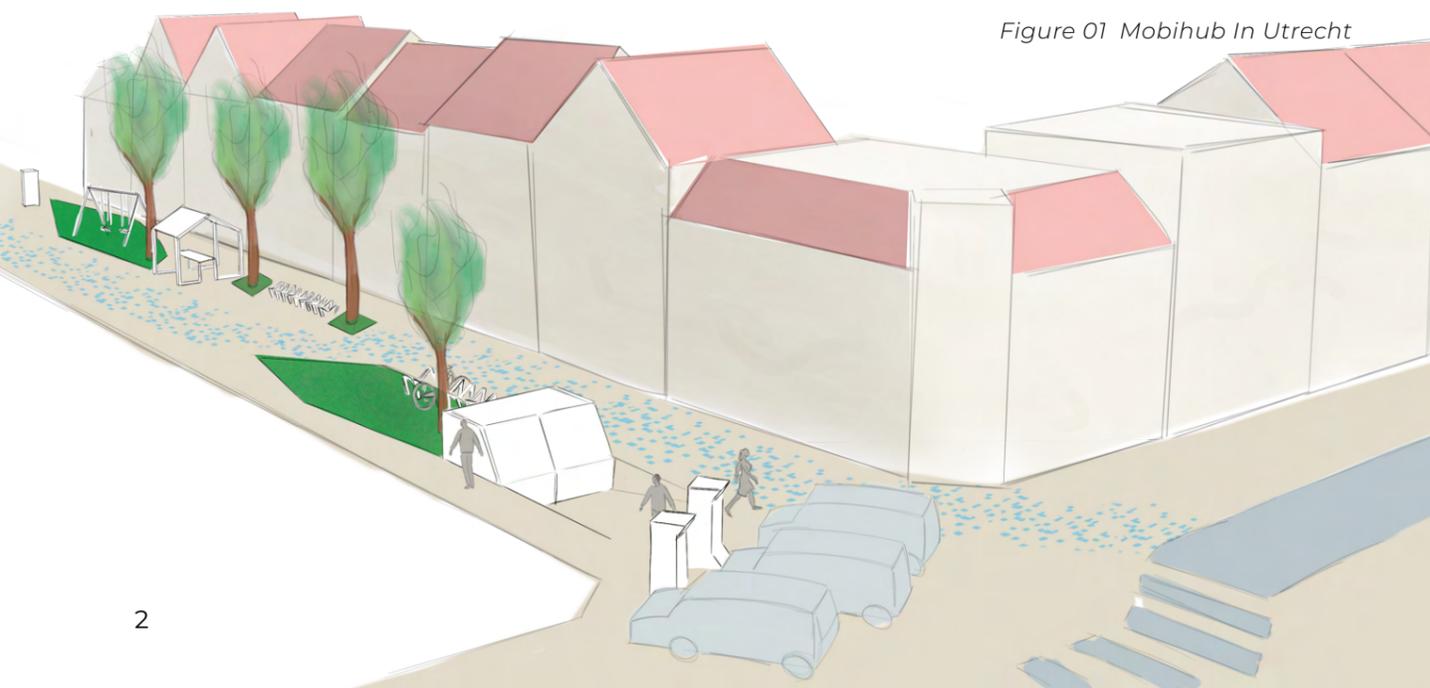


Figure 01 Mobihub In Utrecht



Figure 02 Toolbox

TABLE OF CONTENT

Preface	1
Summary	2
Table of content	6
Introduction	
Context	8
Structure	10
Analysis	
Mobility	14
The City	18
Mobihubs	22
The four blocks	
1. The role of the mobihub	28
2. Design exploration: Redesign of the street	34
3. Design exploration: Development of apartment complex	44
4. Guideline and toolbox	52
Conclusion	
Recommendations	62
Reflection	64
Sources	66
Appendix	68

INTRODUCTION

In the five months spent working on mobihubs, many ideas were formed and insights gathered. The noteworthy outcomes are captured in this report. In order to help you navigate and understand all the information in this report, this introductory section provides you the basic know-how. The section is divided into two chapters:

Context

It starts with a description about mobihubs followed by the research question, the research method used and stakeholders of this project.

Structure

Due to the method used the structure differs slightly from a standard design project. Therefore this introductory section also contains a chapter where the structure is explained. Additionally, this structure chapter serves as a reading guide for the entire report.

CONTEXT

Before going through the report it helps to understand the context in which it has been done. This chapter will provide the basic information about the topic, research question, method and parties involved.

Definition of mobihub

A 'mobihub', short for mobility hub, is a physical, recognisable place that offers different shared modes of transport, combined with useful facilities and informative features to both attract and benefit the traveller (see figure 3 for a drawn impression). The purpose of a mobihub is to increase the use and visibility of shared and sustainable modes of transport, with the associated benefits of reduction in car use. Mobihub convert space previously used only for private parking to environmental zones, waiting areas and additional facilities. These create both a better travel and city experience for the user. In addition they help to solve the issue of managing "street clutter" from dockless / free floating micro-mobility services. (Mobility Hubs Guidance, 2019)

More information about mobihubs and shared mobility can be found in the following chapter 'mobihubs'. This chapter highlights a few case studies to give a better understanding of what mobihubs are; how they look and function.

Assignment & research question

At first, Advier (see next page for an overview of parties and stakeholders involved) posed the question: 'How will mobihubs look in the future and how can they be produced using large scale 3D-printing?'. In consultation we decided to rewrite the question to something a bit broader and not fixed on 3D-printing as a production technique. We decided upon this approach as the concept of the mobihub is rather new, and I would be limited if only focusing on the design rather than including the broader context. I wanted to know more about the mobihub and its context before narrowing down the research to production and design. To narrow the scope of this assignment I chose to focus on mobihubs within the city, mainly because the city is a place which has more potential for such an innovation. All considerations above resulted in the following question:

Mobility hubs: how can they enrich the city and what is the best way to realize them

The original brief can be found in appendix 1



Figure 03 Mobihub impression



Right at the kick-off meeting together with my chair and mentor we came up with a special structure/method to tackle the broad scope of the research question. You can read more about this approach in the following pages under 'structure'.

While working on the project the aim has shifted from finding a solution for mobihub to a solution for designing mobihub/discovering their impact/consulting with stakeholders. This was chosen because, given the current state of the mobihub, it was seen as a more valuable outcome.

Team

Graduating is a project you do on your own, but obviously there are others involved. Most of them are introduced here.

Client Advier

Advier, a consultancy specialized within the field of mobility, is the main stakeholder in this graduation project. They work on projects tackling mobility issues; for example, they are researching how to make tourism in the Veluwe more sustainable. Advier is also involved in developing new modes of transport; for example, they are in the lead for the further development of the sea bubble, a new way of people's transport over water. Minze Walvius the founder of Advier has been my contact person during the project.

Chair and mentor

The two supervisors from the TU-Delft where Erik Tempelman, who has been the Chair (the supervisor responsible for all formalities) and Iskander Smit as Mentor. Erik was asked to join the project due to his knowledge about production. Although in the end he supported me on different aspects. Iskander was asked due to his experience with mobihubs and topic of his research field, which is smart cities.

Method - Research through design

The exploration of a rather new concept is a challenging design exercise. How to approach this project was an important decision to make right from the beginning. We agreed upon the fact that the sooner something tangible was on the table the better. This to incite a conversation

about the mobihub and my thoughts around the topic. The results from these conversations and first thoughts could be used to improve the early made design.

To reach this the project time was split into blocks. Each block had its own set goal - in the next chapter you can find each goal per block.

The goal of the blocks was not to come to a final and complete design of a mobihub, but to explore options. This exploration was done by starting to design and in this process see what you encounter. This way of working is called research through design or exploratory design. This type of research lends itself well to complex projects. It can combine research from different fields into an overarching insight and thus contribute at an institutional level by putting the issues and possible solution directions on the agenda. (Smits, 2021).

What to expect?

Transition towards sharing mobility, in which mobihubs play an important role, is in an acceleration phase at the moment. The function of mobihubs is until now mostly studied by mobility experts. In this study the topic has been approached from a designers point of view. This resulted in emphasis on different advantages. Instead of how the form of mobility is exactly used this research focuses primarily on the influences it has on the city.

Reading guide

As explained before, the project is split up in four blocks. The research done for all the blocks is often overlapping, to prevent recurrence the outcomes are summarised in the analysis section. This research is distributed over three chapters: Mobility, City and Mobihubs.

Following up to this analysis the blocks are discussed, in the blocks section. The blocks can be read separately or in order, according to your own interests.

More about this structure on the next pages,

STRUCTURE

Mobihubs are a rather broad concept for which there is clearly not one single right design. To get the most out of this project we decided that the sooner there was a tangible result that could be discussed and reviewed, the better. This way of thinking formed the backbone for this project; a method of many iterations. Before reading the entire report it might be helpful to get an understanding of why we chose this approach, since the structure of the report heavily depends on the method. This chapter explains the structure of the report.

Splitting the project

The complete project is divided into four separate iterations of called blocks. The focus per block differs, but all the separated blocks form one coherent research together. This chapter explains their goals and blocks.

The main reason for choosing this approach was to create tangible results as soon as possible. This to be able to discuss the toughs on this complex topics with different stakeholders. Every block was therefore concluded with a discussion and presentation about the insights and results. To summarize each iterations and make them part of the overarching project, the findings are translated into design principles.

Report structure

The report consists four sections: Introduction Analysis, the blocks and the Conclusion.

The introduction section provides context and explains the structure of the project. It is the part that you are reading at the moment.

In the analysis section the research done during all the iterations is summarised. This to prevent recurrence of information, since the iterations are overlapping. This research is distributed over three chapters: Mobility, City and Mobihubs.

This section is followed by detailed reports of each block, containing information about the process and found results.

The report ends with a conclusion of all findings combined, recommendations for further research and a reflection.

The four blocks

This part contains a summary of every block. The graphic on the right shows how each block is connected to the others. The blocks build on each other, but if you are interested in particular block, they can be read separately as well.

Block 1 : the function of a mobihub

The first iteration explores what the mobihub could look like and what its role within the city could be. This iteration is concluded with an idealized sketch of a mobihub and serves as the foundation for the other iterations.

Block 2 : Design exploration: Redesign of the street

In the second phase the idealized mobihub designed in the first iteration is translated into a redesign of an existing street. This iteration aims to gain insight into how the process of transformation and implementation could be executed.

Block 3 : Design exploration: New development

This iteration is a design exploration of the potentials of a mobihub connected to a apartment complex. An apartment complex in project planning phase is studied, so unlike a redesign of a street this iteration focuses on the possibilities when you start take sharing into account right from the start.

Block 4 : Design guideline and toolbox

As an end result of the project a design guideline and toolbox for the mobihub are made. This document summarizes the complete research into useful insights. It is designed for people who want to get involved into the topic and accelerate their knowledge.

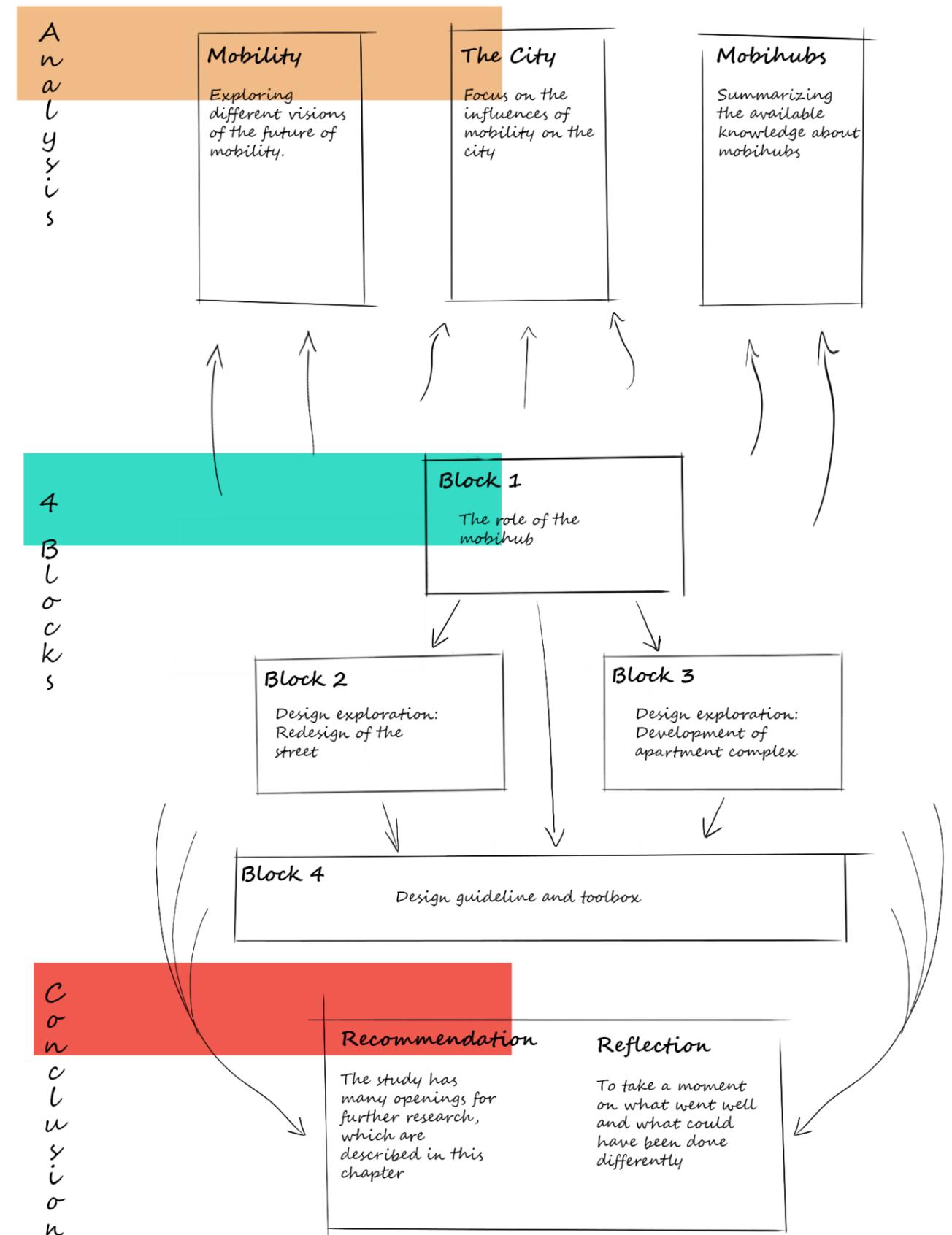


Figure 04 overview of structure

ANALYSIS

This part provides an overview of all the knowledge gathered while working on the iterations. All insights are connected to the results presented in the following chapter.

The information in this chapter is categorized into three main topics:

Mobility

This chapter sheds light on the way we travel, and presents different views of how this could or should change. This is a very important context to take into consideration, since mobihubs are part of this transition.

City

Mobility shapes the city, and the city shapes mobility. Understanding the influence they have on each other is essential to be able to design something beneficial for both.

Mobihubs

Although the concept is rather new, there are some precedents and useful guidelines. These are discussed in this part.

MOBILITY

Going from one place to another can be done in many ways, but the type of transportation you use is not the only variable. Also the destination of choice is part of how we shape mobility. Completely different visions exist with regards to what the world will look like and how we will travel in the future. On the one side, for example, you have Elon Musk who envisions we will shoot through a hyper loop so we can have a meeting in Barcelona in the morning drink a coffee in Paris but still be home for dinner in Amsterdam. A contrasting movement is the strategy that revolves around staying closer to home, for example in a '15 minute city' with shared mobility. An understanding of the spectrum of differing predictions helps to form a strong context in what type of world a mobihubs has to function.

Faster and further versus slower and closer

Means of transportation are evolving at a rapid pace. Tech-driven innovations like the hyperloop passenger drones will make it possible to move faster and faster. Due to the availability of data management and accessibility to internet everywhere sharing vehicles and managing passenger flows have become more efficient.

How do we use all this to create a better world? An interesting and difficult question, with many different views on it.

Faster

The simple reasoning goes as such: if we build faster cars and wider highways, people will need less time to get to their destination. This would solve, for example, the issue of congestion. This way of thinking still used by many infrastructure planners, but is too simple a reasoning. It turns out that if we move faster, we travel further, and our travel time stays the same. (Verkade & te Brömmelstroet, 2020)

If you would describe movement in an equation it would be distance/speed=time. But when increasing the speed the distance increases

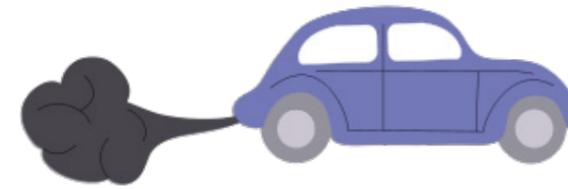
proportional. This is due to the fact that people are willing to travel around 1.5 hour a day on average, whether this is slow or fast travel. This is called the BREVER Law.

This preservation of travel time makes it that even if we build faster and cleaner vehicles they will still make the roads more crowded and in the end a lot of clean cars will still burden the environment due to their increased numbers and use.

Slower

So how do we ensure that the mobility network does not flood? Should people move slower? A car with a maximum speed of 50 wouldn't really sell. So we have to look at the other part of the equation from the BREVER LAW - making sure the destination is closer. This way of thinking is adopted by the mayor of Paris, who is trying to transform Paris into a 15 minute city. More information about this concept can be found in the following chapter about the city. Many other cities are promoting pedestrian areas and cycling.

This trend of more journeys nearby makes the everyday use of a car in the city increasingly redundant.



Downsides of mobility

Mobility brings many good things but all the movements we make come at a cost. Many users do not consider these factors - such as pollution and occupation of space - while going to their destination. The main concerns are briefly named below. The order of importance is open for interpretation. Solving these issues is not something that can be done with a stand alone solution, but will be a transition brought by many different actors. Sharing vehicles and thereby mobihub could play an interesting role in this transition.

Pollution

Pollution caused by emission of the trips we make has a negative aspect on the air we breathe in. Research tells us that walking in Rotterdam is as bad for you as smoking along 7 cigarettes a day due to all the car traffic. (Liere, 2016)

Unhealthy air in the city is not the only negative side effect of pollution. The world is heating up - and this is a problem! Nowadays we all know CO2 emission is one of the main factors. If you look at the CO2 emission of Europe, you will find that 20% is produced by passenger transport. 2/3 of this ridiculously large share, can be billed on cars. Which comes down to 12% of the total emission of Europe is due to car use only! (Macharis, 2020)

There is even more pollution due to road traffic, namely the noise it produces. Which causes sleeping and health problems for many inhabitants of the city. 'For 26,000 citizens of Amsterdam, the noise was so bad that it even disturbed their sleep' (zoelen, 2018).

The benefit of the mobihub shows in this regard; mobihubs encourage less car trips and less cars need to be produced. Mobihubs also make it easier to switch to electric alternatives that contribute to greener mobility. (Dilks, 2021)

Space

To provide room for all the movements we make we need loads of space; just think about all the endless kilometres of highway, or the incredible amounts of parking spots in an average city. More about this in the next chapter 'city'.

Once again, the mobihub could play a positive role here, as it drastically reduces the space needed for parked cars. (more about this in chapter role of the mobihub)

High coast for user

The average person in the Netherlands has to work one day a week just to cover the expenses of owning a car (meijboom, 2017).

Sharing mobility could lower the coast of car use. Depending on the amount of km you drive sharing can be cheaper. People previously not having the resources buying a car can with shared mobility use one when necessary, without high investment coast.

Figure 06 - impression of both futures

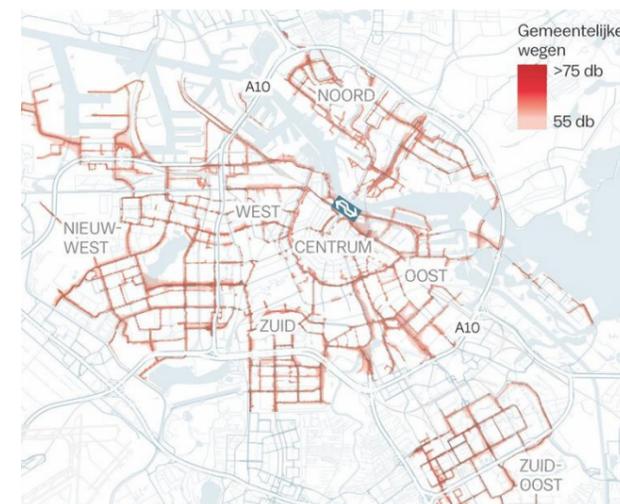


Figure 07 - Map of noise pollution

Why is sharing a solution?

The downsides of transportations is named, and the possible function of the mobihub is briefly mentioned at each sub problem. Here we elaborate a bit more on why sharing is a solution to the previously named topics.

Sharing means less cars

Case studies show that one shared car can replace up to 16 private owned cars. This helps solving the shortage of space in the city. (Karbaumer, 2021)

Not only driving a car is polluting but the production of one is a big burden as well. So if we have to produce less it would cut the CO2 emissions of the transportation sector already without driving less.

Pay per use

When you own a car you have many fixed costs, this makes it that if you use it more the fixed cost per km become lower. This is for many a big incentive to use the car.

When shifting to sharing you pay per use, this makes a larger threshold to use car. Depending obviously on the amount of km you drive and the type of sharing, but for many sharing would be an cheaper option. (Nijland, 2015) It also makes it possible for people who cant afford to have their own car to sometimes still use one.

Where the larger threshold argument might not be the best way to convince someone to start sharing, it contribute to a world in which people are less car dependant.

Facilitates transition towards electric cars

When shifting from ownership towards shared mobility, it is recommended to do this in conjunction with the shift towards more sustainable vehicles. Electric cars depend on specific charging infrastructure, this creates a boundary for an individual. Although when this shift is made with a group the infrastructure becomes less of a hurdle.

Other modes as a solution

Many car trips that could be replaced, the bike, walking & public transport are great alternatives for car trips in the city.

Link to mobihub: offers more freedom in choice of transportation mode.

Behaviour change

Cars and the way we think about them is deeply rooted in our society. This becomes clear by simply looking at our streets: they are full of cars, and designed for car use. But we can also recognize it in our language; even when we try to promote other forms we speak from the perspective of cars: 'Fietssnelweg', 'autoluw' Dutch for cycle highway and car quiet street (Verkade & te Brömmelstroet, 2020).

Decisions about new roads are mainly made by traffic experts at all kinds of institutions. They base their decisions on models, standards and guidelines, which are primarily intended to ensure travel time savings. This is the idea that we must be able to get from A to B as quickly as possible, because that saves time and therefore money. These 'rational' models, standards and guidelines form the basis for our policy. (Alphen, 2020)

Next to the institutions designing our streets for cars, the user is stubborn as well. A discussion about the parking spot near your place could quickly turn in something emotional. People feel very dependent on they car, and are close minded towards other solutions. This is often main barrier of the transition to a mobihub (Brooijmans, 2020).

What drives people to share and what holds them back? This report focus primarily on the advantages. But knowing what holds people back is important as well. Most arguments are caused by the unfamiliarity. (Wijman, 2019)

- Afraid of losing freedom and ease
- Fear that a car is not always available
- Feeling that it is more expensive
- Simply really emotionally attached to their car

These arguments make sense and not for every user carsharing will be the solution today. Later in the report this behaviour change will play an important role during. There will be looked how to deal with this when making a redesign of an existing street.



Corona influence

For many transitions - like working from home or shopping online - corona functions as a pressure cooker. These changes have a big influence on the occupancy of our mobility network. During the lock-down, working from home and less social activities, solved the congestion problem overnight (Corwin et al., 2020). In this mobility network, the public transport sector got hit the hardest. With only 20% of the normal occupation at the start of the first lock-down (Centraal Bureau voor de Statistiek, 2021). These drastic changes slowly moved back towards the old situation. An alternative that many found during the lock-down is the bicycle, which increased for some cities in the Netherlands 150%. Especially the sales of e-bike grew exponential (Centraal Bureau voor de Statistiek, 2021).

Shopping online has been a growing trend the past view years, but corona let in explode completely. This online shopping filled our empty roads with package delivery vans.

Hopefully corona and all the limitations caused by it will end soon. But the some of the trends that were accelerated will stay for sure. Surveys show that people would like to keep working from home 2 days a week (CPB, 2021). People who bought an e-bike probably wont through it at the garbage when the lock-down ends. And everybody used to ordering online probably keeps doing this more often as before the corona.

What this means for the mobihub? Some facilities like the package locker, are directly connected to a trend that has increased, so probably the demand for this will increase as well. Maybe it will even add new facilities to the mobihub like an outside working area.

When people work more from home their direct environment of the street in front of their house becomes more important. This will make the space saving capability of sharing vehicles even more important. Read more about what is possible with this space saving and how to connect this to a mobihubs in the iterations.

THE CITY

The way our public space is divided is heavily influenced by the way we transport ourselves. An average city devotes over half of its space to transportation (van de Weijer, 2018). Of this space 55% is in use by cars, and of that share a fairly big proportion reserved for parking space (van Liere, 2017). By making smarter use of parking spots we could save space to build 45.000 new houses and plant 12 million trees in the Netherlands, according to research of Deloitte (de Wit et al., 2017). Gaining an understanding of what influences our mobility habits have on our habitat is a must if you want to change this. This chapter therefore illuminates how this distribution of space happened way and what initiatives are set up to make a change.

Compact history

The first blueprints for car use in the city were made by water mains and sewer engineers. These plans were solely focused on getting as fast from A to B as possible (Verkade & te Brömmelstroet, 2020). This is where the distribution of space started to become a bit unfair. For example, nobody considered or defended the rights of the inhabitants who lived along these roads, who were forced to give up space for the sake of the roads.

From the moment the Fort T entered the marked in the begin of the 19th century the amount of car ownership in cities started to grow. Streets became for cars. One of the first movements against these busy car streets started 1970 in the Netherlands. The concept is called 'woonerf' (living area). Part of a neighbourhood in which pedestrians are prioritized and cars can only drive 15 km/h (Zomervrucht, n.d.). Other and more recent movements are discussed later in this chapter. Cities will grow even more the coming years so these problems only get more pressing.

Arrogance of space

'The way our streets are designed is no democracy but transportation dictatorship' (Colville-Andersen, 2019)

Car-centric planning is something that occurs, and has been occurring, all over the world. To show how this formed our cities, Mikael an urban designer made a tool with which you can map out an the use, see figure 08.

Of course cars are a useful vehicles, but the amount of space is they eat up -while driving and while parked- is often overlooked. A car driving 50 uses 140 m² and parked about 20 m². Whereas a passenger in a tram only uses 7 m² of the road (van Liere, 2017)

Alternatives

However, people are starting to think differently about how we should distribute our public space. The frustration cause by car-centric design is illustrated in figure 09.

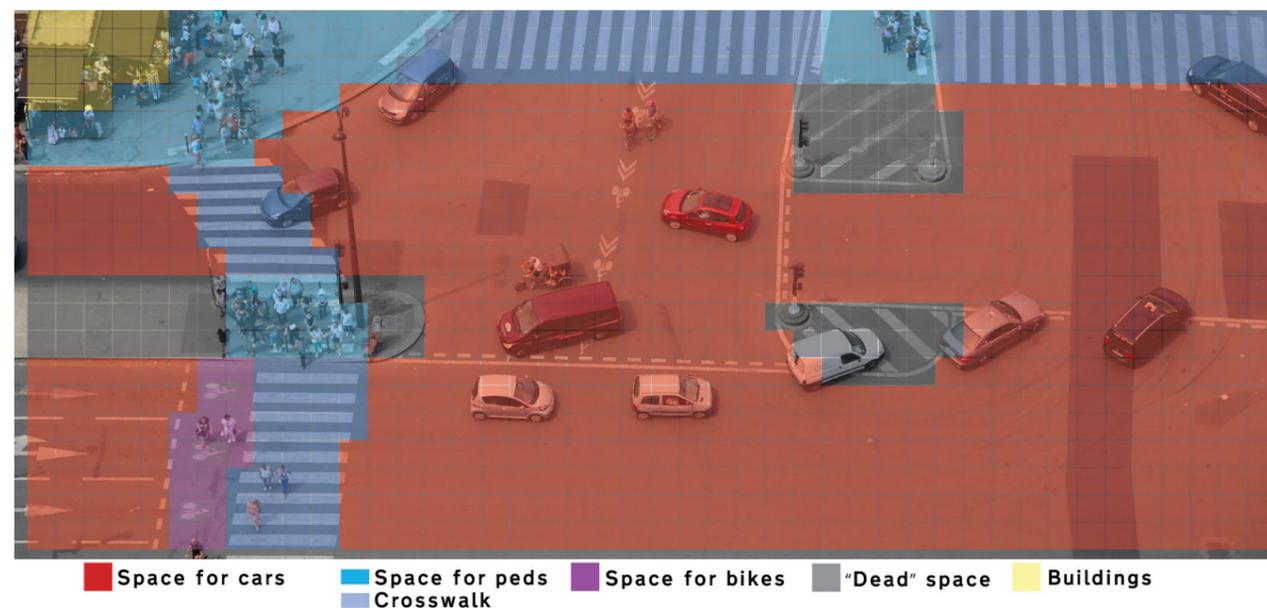


Figure 08 - Arrogance of space



Figure 09 - protest art/movements

The 15 minute city

Fortunately, the protests against car-centric planning have formalized into new designs, and complete cities are renewing their mobility schemes. Anne Hidalgo, the mayor of Paris, is redesigning the city to a 15 minute city, a concept by Carlos Moreno. (C40 Cities Climate Leadership Group & C40 Knowledge Hub, 2020) This concept entails that every location in the city must be reachable within 15 minutes walking or cycling. This philosophy focuses on reducing the amount of longer trips so less transportation infrastructure is needed and the city saves more space for other activities.

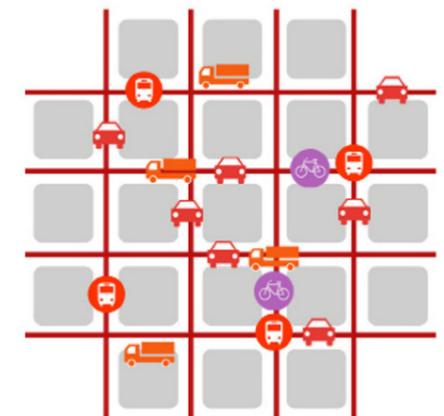
Mobihubs could play a positive role in this type of city, as sharing reduces car dependency. In such a 15 minute city owning a car would be redundant. Although to have access to one for trips outside the city or moving luggage would probably be a facility many would like.

The Superblock

Barcelona has a unique layout, the city has a perfect grid-like pattern made with its streets. See figure 10. Transportation by car goes quite smoothly with this type of layout. The only downside is that literally everyone lives with a crowded street in front of their house. In 2016 Barcelona came with a plan to make some parts less crowded by merging together 9 blocks and making the streets crossing these blocks difficult to reach by car. Making transportation that was only passing through, drive around. This makes the area way more liveable (O'Sullivan, 2020).

Link to mobihub: not all streets have to be used for transportation. This block model works in Barcelona because it has a rather special grid. Unfortunately, we cannot translate this to every other city. In iteration one will have a look if the mobihub could fulfill this role.

Current Model



Superblocks Model



Figure 10 - Barcelona grid



Figure 11 - Leefstraat

livingstreet & vacation street

Next to city scale adaptations you also have more local initiatives like the 'vakantie- & leefstraat' ('vacation and living street'). Dutch and Belgian initiatives transform the street from a transport-centred area to a street where children can play and pedestrians are prioritized. An important characteristic of the living street concept is the duration - they are always implemented for a short period of time. Because they are experiments, and offer no good solution for the lost parking space(source).

Link to mobihubs: Why only make the street more pleasant to live in for a short period of time? Until now this was due to the fact that the ease of mobility (read especially car use and parking) suffered from the concept of a living street. How would a combination of the mobihub and living street work? More about this in iteration 1 & 2.

Social, community

The bigger a city is, the more impersonal the bond between its residents often is. In a village, people from the street know each other, in a busy street in London this is completely different.

Nowadays, however, cities are trying to create more of a neighbourhood feeling by constructing community gardens or other facilities. The mobihub can respond perfectly to this.

Urban heating

Due to the high degree of paving, less wind and many heat-emitting activities, it is warmer in the city than in surrounding areas. In the Netherlands, where we do not have any mega-cities, the difference in temperature can be as much as 9 degrees. Urban heating can be counteracted by incorporating more greenery in the city. This absorbs heat. More greenery also makes the city better protected against heavy rainfall. With the climate becoming more extreme, cities need to make their climates more resilient, and this can be done by reserving more space for greenery (Klok, 2012).

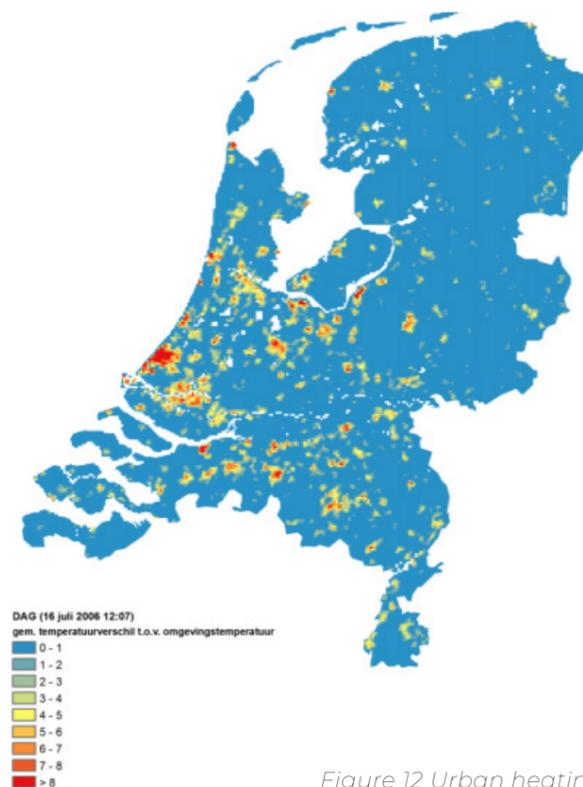


Figure 12 Urban heating

MOBIHUBS

Mobihubs are a relatively new kid on the block in the field of mobility and the central focus of this report. They stimulate car sharing and support the shift towards electric vehicles. Together with other changes they contribute to a solution to the problems mentioned in the previous two chapters. This chapter describes what a mobihub is; what they currently look like and how it functions. The rest of the report focuses on findings of what a mobihub could/should be like, according to the research done in this project.

Definition

Mobihubs have many definitions, many different names and many different faces (see image 13 & 14). The definition used in this report is as follows:

'A mobility point is a physical, recognisable place with an offer of different forms of shared mobility, supplemented with facilities and information features to both attract and benefit the traveller.' (Mobility Hubs Guidance, 2019)

Type of hubs

Within this definition you can define multiple types of mobility hubs, the two main categories are described below.

- Large interchange

These type of hub are connected to other large travel nodes, they offer options for last mile travel. This type of hub could be connected with a railway station, offering shared mobility to reach destination in the centre.

- Residential area hubs

The area in the neighbourhood where you can start your journey from. Mobility facilities are placed at a central location.

During this particular project I focused mostly on residential area hubs. These make a good starting point for change since the advantages are very tangible and visible for future users.

Advantages

The main advantages of mobihubs include:

Space saving

Sharing cars is a great solution to the overload of parked cars. Study shows that one shared car can replace up to 8-16 privately owned car's. Sharing is a rather logical option if you take into account the fact that an average car in the city is parked more than 90% of the time (Karbaumer & Metz, 2021)

Transition towards electric vehicles

When shifting from ownership towards shared mobility, it is recommended to do this in conjunction with the shift towards more sustainable vehicles. Electric cars depend on specific charging infrastructure, this creates a boundary for an individual. Although when this shift is made with a group the infrastructure becomes less of a hurdle.

Promotes other modes of transportation

As stated in the previous chapter cars are not always the right tools, so replacing cars with solely shared cars is also not the right solution. Shared mobility is offering a range of vehicles so people can use the right tool for their trips without the need of purchasing all different vehicles. For example cargo bikes, scooters and e-bikes could be shared as well. This could make your total travel cost lower than while owning a car.

The advantages of mobihubs are elaborated upon in the previous two chapters.



Figure 13 Mobihub Bremen



Figure 14 Mobipunt the Netherlands



Figure 15 mobility challenge Rotterdam

Examples

Although mobihubs is not yet a concept known worldwide, it is not brand new either. Since 2003 they are working with this concept in Bremen. To create an even better picture of what a mobihub is two examples are described below.

Bremen - Mobil.punkte

Policy makers in Bremen recognise carsharing as a valuable method for reducing parking pressure on crowded neighbourhood streets. Therefore, the city began to plan mobility hubs on public street space that link several modes of transport and provide a highly visible, easily accessible space for carsharing (see figure 13). These hubs are called mobil.punkte. The mobil.punkte always include clearly marked, reserved spaces for carsharing vehicles, secure bicycle parking places in a visible, easily accessible location by bike or on foot.

The mobil.punkte reduce the number of privately owned cars in the City. Every shared car in Bremen replaces 16 privately owned cars. The mobil.punkte and carsharing in Bremen have contributed to getting rid of more than 6,000 privately owned cars in the city. This demonstrates the added-value for non-carsharing users as well because mobil.punkte help create space and accessibility for everyone in the City. (Karbaumer & Metz, 2021)

The Netherlands - Mobipunt

The northern area of the province of North-Holland is a rural area that is facing challenges like population decline and a decline of public transport services. The municipalities want to keep the area attractive and liveable. Therefore, they need to improve the accessibility. It's not possible to connect all residential areas and business parks with public transport. Shared mobility provides solutions. With shared cars and bikes, commuters and residents can get everywhere. Therefore, a network of 40 mobihubs is being planned. The mobihubs will have a uniform and recognisable signage. (Karbaumer & Metz, 2021)

Although this mobipoint is not in the city - which is set as scope of the project - it demonstrates the option of being a link in the network. Which is an important factor.

The Netherlands - Mobility Challenge

The Mobility Challenge Hoogkwartier is an experiment at neighbourhood level in which the mobility transition and the quality of life in the neighbourhood come together.

At the Mobility Challenge Hoogkwartier (7 Sep to 9 Nov 2019), 90 local residents took up the challenge and used shared transport, such as shared cars, bicycles, cargo bikes and public transport, for two months. There were residents who placed their cars in a garage for two months and business owners who left their cars at home for two months, resulting in 20 fewer cars on the street in the neighbourhood during the Mobility Challenge.

The parking spaces that were freed up were temporarily converted into space for the neighbourhood: green and lively places. In this way, the living environment of all inhabitants of the Hoogkwartier improved. (Source: mchoogkwartier.nl).

Different forms of sharing

A mobihub hosts shared vehicles. There are many ways in which you can share every type has its own advantages. The main forms are briefly described, these forms easily mix.

Free floating

This type of system allows users to book a vehicle at any point and any time within a specified area. And later drop the vehicle within the service area. Best know example in the Netherlands are the electric scooters (felix, check or go). The larger a service area becomes the harder it is for the provider to manage all equal spread of the vehicles. Probably due to this reason it has not been done much with cars, but more with smaller vehicles where the service area of one city makes more sense. Free-floating carsharing, a relatively new market segment within carsharing. This type of carsharing currently exists in about 34 cities across nine countries (Kortum et al., 2016).

Back to base

Also called roundtrip or station base, this is the most classical form of carsharing. You pick it up at a location and bring it back to that location. This gives less freedom to the user but is more easy to manage for the providers. Example of this is greenwheels.

Peer to peer

When not a company but private owners share their car it is called peer to peer. This type of sharing is Snappcar is an example of this in the Netherlands

Community based

Buying a number of cars with a group of people

and sharing it, this for the users will be the most avoidable option. Another good thing is that people feel more responsible because it is partly their car.

Design guidelines

Relevant information about mobihubs that was described in this analyse section, is translated and summarized into design principles. These principles serve as guidelines for the design and implementation of a mobihub. These guidelines are summarized on the next page in a notable block that will come back several times in this report. Throughout the iterations these guidelines are used and complemented with more findings. These design principles form the base for the manual that is made in block 4.

The guidelines are categorized in four topics:

1 Function

What is the role of a mobihub, what should a contribute to the city? These principles focus on the what and how of the functions.

2. Ingredients

Many facilities who support these functions can be placed at the mobihub, here a list of possibilities is given.

3. Implementation

What things you should take into account when implementing a mobihub.

4. Design style

This last category focuses on how to design the looks and furniture. Themes like adaptability, coherency and recognizability are addressed.

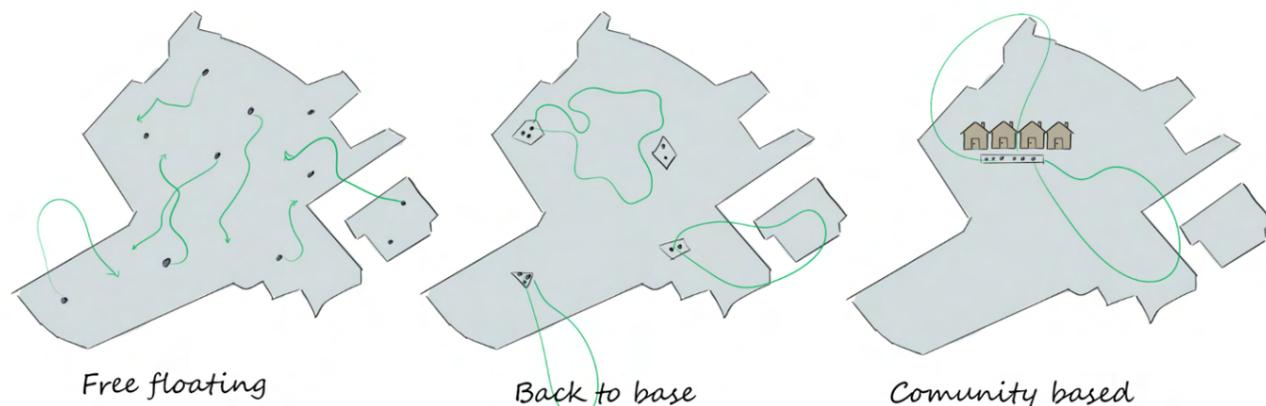


Figure 16. Different forms of sharing

Analysis

Design Guidelines

1. Function

Facilitate & promote shared mobility.

Facilitate non mobility related facilities like package locker, or garbage point.

Cluster all facilities to prevent an overload of loose objects throughout the city. This will make the mobihub recognizable place which is easy to find.

Possible also clean up the chaos free floating micro mobility is causing in many cities.

2. Ingredients

Mobility:

- Shared vehicles: cars, vans, cargo-bikes, bikes, scooters
- Connection to public transport (if possible)
- Bike storage
- Charging infrastructure

- Playing facilities
- Benches
- Picknick table
- Green space
- Workspace
- Wifi

Information:

- Landmark with logo
- Sharing app (cloud)

Facilities:

- Package locker

Not all of the things mentioned above are necessary to create a mobihub. They serve as ingredients of which you can take some to design something location specific

3. Implementation

Convincing people of the benefits of shared mobility is a difficult task since car use and ownership is something deeply rooted in our habits. Therefore it is of great importance to inform and convince the possible new users of a mobihub. Without a strong campaign, the implementation of a mobihub would probably fail.

As been found from the recommendations of the mobility challenge, people need time to adjust to such a transition. Therefore the duration of the implementation is important. Rather start with something small that can expand when used, instead of a large but short experiment.

Concluding from the guidelines mentioned above, adaptability, coherency recognizability came forward.

The mobihub should be adaptable, because not every street ask for the same facilities. Next to this the mobihub should be able to grow.

The mobihub should be coherent because when gathering all these facilities, it would be nice to prevent it from becoming a collection point of many different styles and colours.

Should be recognizable because that way mobihubs can be found.

4. Design style

THE FOUR BLOCKS

This part of the report contains a detailed analysis and report of each of the five iterations. The blocks build on each other but can also be read separately, in any preferred order.

Block 1 :

The first iteration explores what the mobihub could look like and what its role within the city could be.

Block 2 :

In the second iteration the idealized mobihub designed in the first iteration is translated into a redesign of an existing street with a focus on the implementation.

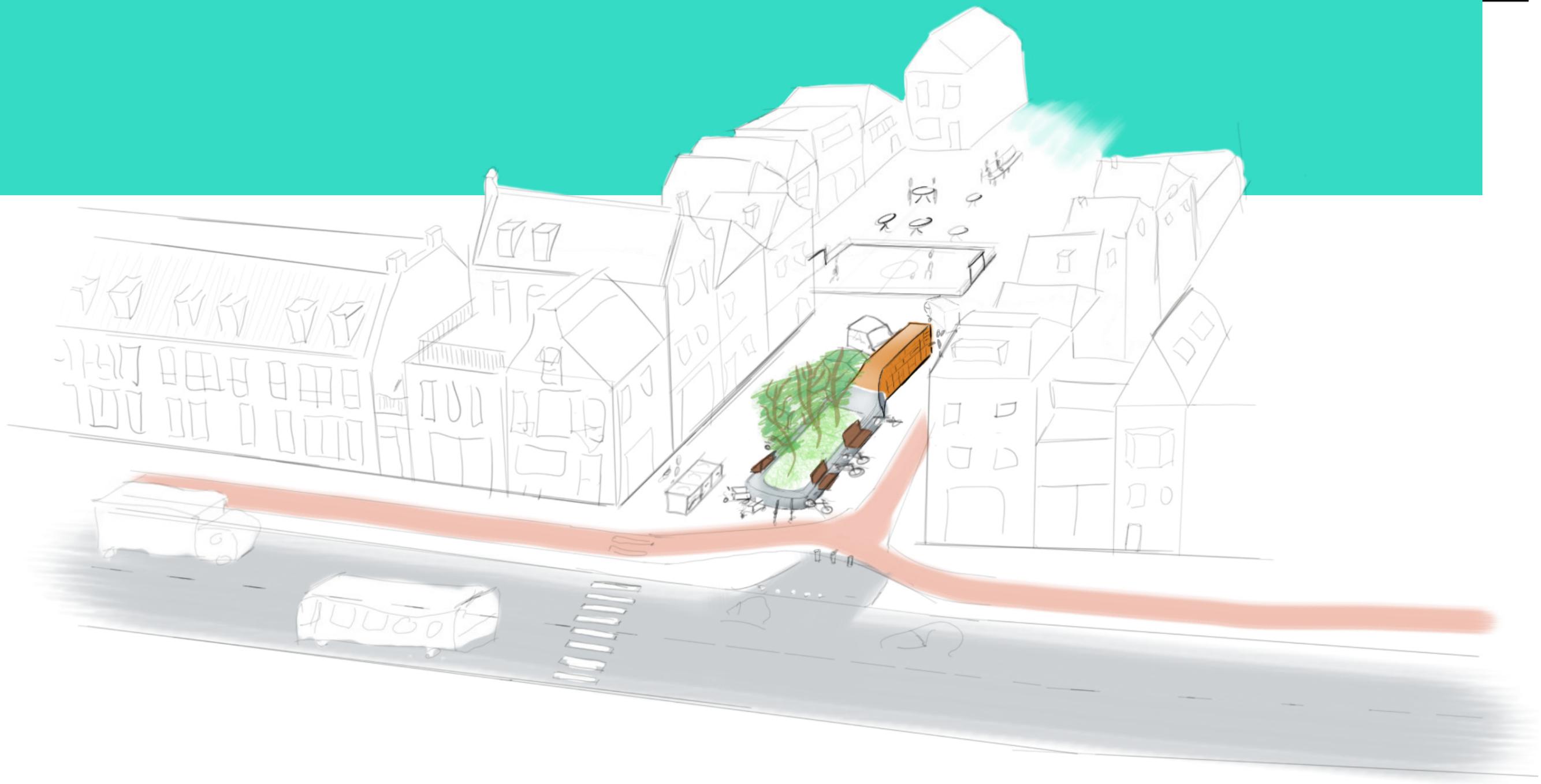
Block 3 :

This iteration is a design exploration of the potentials of a mobihub connected to a apartment complex. An apartment complex in project planning phase is studied.

Block 4 :

As an end result of the project a design guideline and toolbox for the mobihub are made. This document summarizes the complete research into useful insights. It is designed for people who want to get involved into the topic and accelerate their knowledge.

THE ROLE OF THE MOBIHUB



How do we organize the city? Cars take up lots of space - but is this really necessary? Could this be done more efficiently by sharing? And how can we facilitate this sharing? Within this first iteration, I will explore the context of the mobihub by analysing these questions. With the gained insights I designed an ideal version of the mobihub, which serves as a base for the designs in the following chapters. The setting for this iteration is a regular Dutch city, within the time frame of the coming years.

Research question and approach

This iteration is the kick of the project, by exploring the function of a mobipoint it provides a base for the other iterations. The research question for this iteration is:

How would a mobihub function in the city in an idealistic situation?

Why to change the current system?

The mobihub is an adaptation to the city to facilitate mobility in a different way. Before you change something, it is important to understand why it currently looks the way it does. Equally -or maybe even more- important is that you know why you want to change it and what values you want to bring to the new situation.

The why it looks this way can be found in early chapters. Where the chapter 'the city' zooms in on the skewed distributions of space and why cars own so much of this precious space.

The why we should change is based on my belief, that with alternative set-ups that stimulate other modes of transportation and sharing of vehicles the cities will become more liveable. Certainly if cities keep on growing it is important to reserve some space for living. Therefore during the design of this ideal mobihub these values are taken into account.

What role does the mobihub have in this?

Sharing of vehicles has pros and cons. From my point of view, the most important and visible advantage is that you need way less cars: 1 sharing car can replace 16 privately owned vehicles as discussed in chapter of mobihubs. This saves up a huge amount of parking space. Until now this hasn't been a primary selling point

for sharing services. In fact, shared vehicles have become infamous for 'littering the city' (source Newspaper). See figure 17, here an example of antisocial parking of shared mobility. An essential point therefore in the implementation and design of mobihubs is to both translate the claim experts make about saving space, and to answer the people who believe sharing services litter the city.

Concept

In this ideal version of the mobihub, I want to make clear that this new approach can save a lot of space.

How do you make saved space visible?

To answer this question I took inspiration from the initiatives of the living street and vacation street, (described in earlier chapter 'the city').

When merging the mobihub with these concepts, the living street does not have to be temporary anymore and the gained space will become nicely visible. The mobihub becomes a transition point between the part of the road where transportation is central, and the part of the street where residents can relax and enjoy. A little bit comparable with the superblocks in Barcelona.

Neighbourhood level

Here on the right (figure 18) is an illustration of how the infrastructure at the neighbourhood level might look different after the implementation of a mobihub.

- A main street with mainly public transport
- Side streets are for cyclists, pedestrians and especially playing children
- The mobihub serves as a transition area, between the main street (transport street) and the side street (living street)
- Facilities that must be accessible to vehicles, such as the parking places for shared cars, parcel service and waste containers are placed in the transition area (mobihub).

Figure 17 free floating shared vehicles littering the street

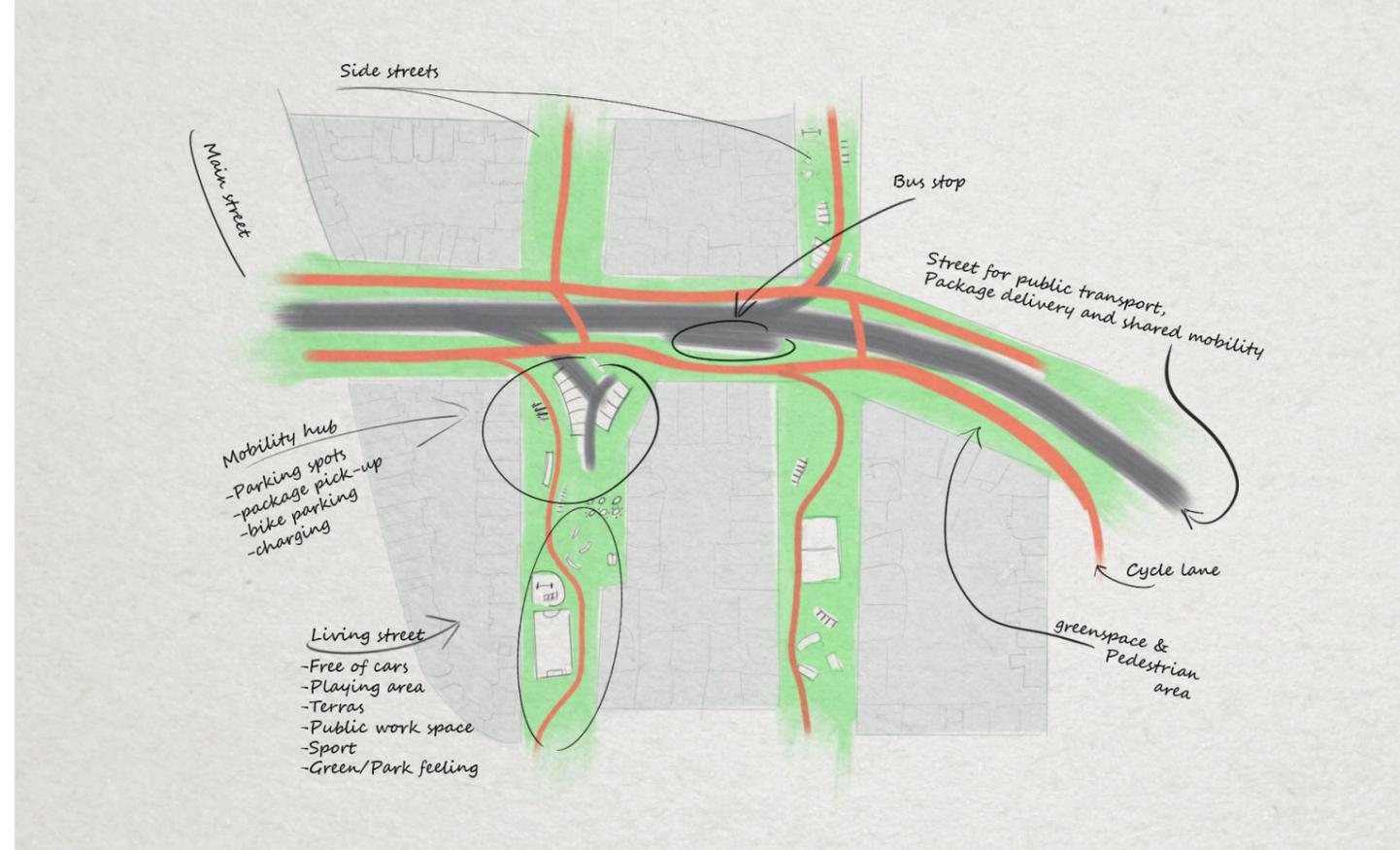


Figure 18 - Neighbourhood level

Street view

Figure 19 is illustrated a close up of what a street could look like. Where the side street crosses the main street, a mobihub has been placed. This discourages through traffic in the side street and makes it accessible only to cyclists. In this way, the street becomes a living street where people can play and walk.

Besides the facilities of the shared cars and other vehicles, the Mobihub offers a place for parcel service and waste collection. As a result, large vehicles no longer need to enter the street. However, the bicycle path can be used as a motorway when, for instance, emergency services need to enter the street.

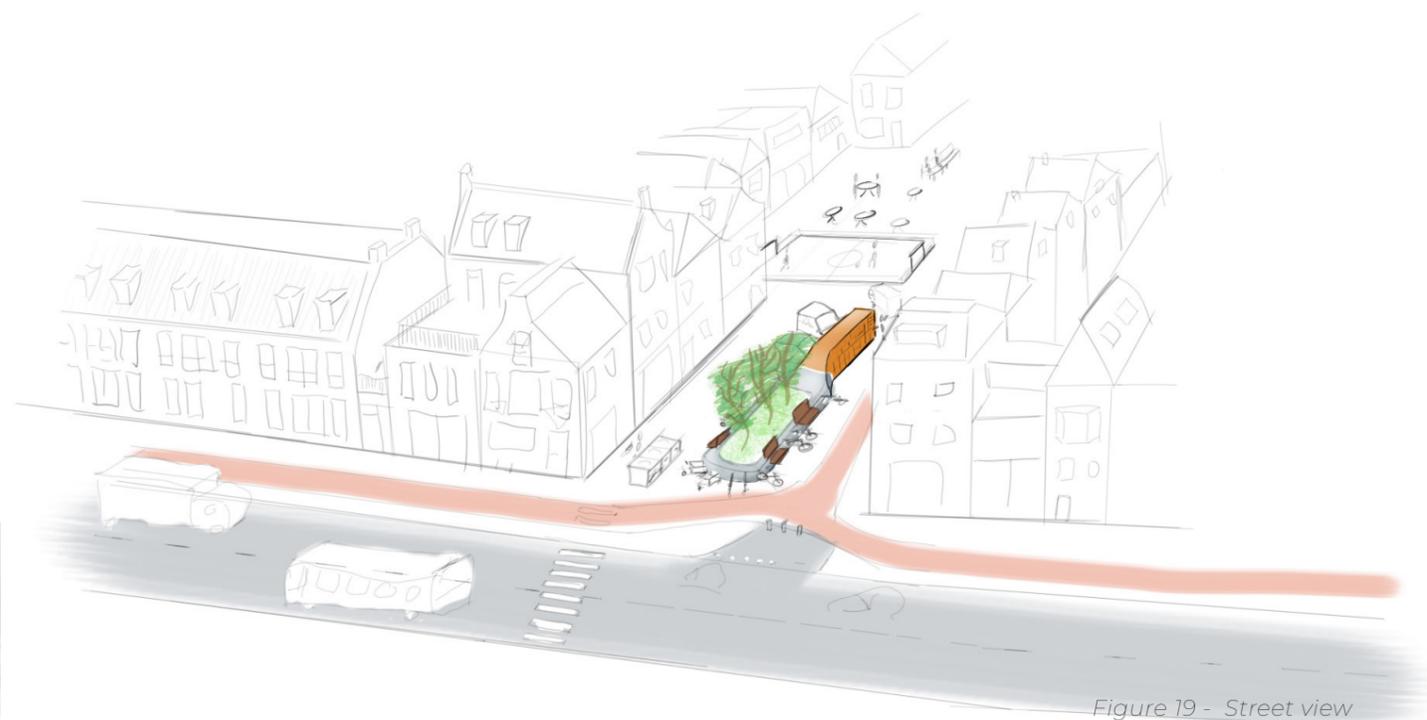


Figure 19 - Street view

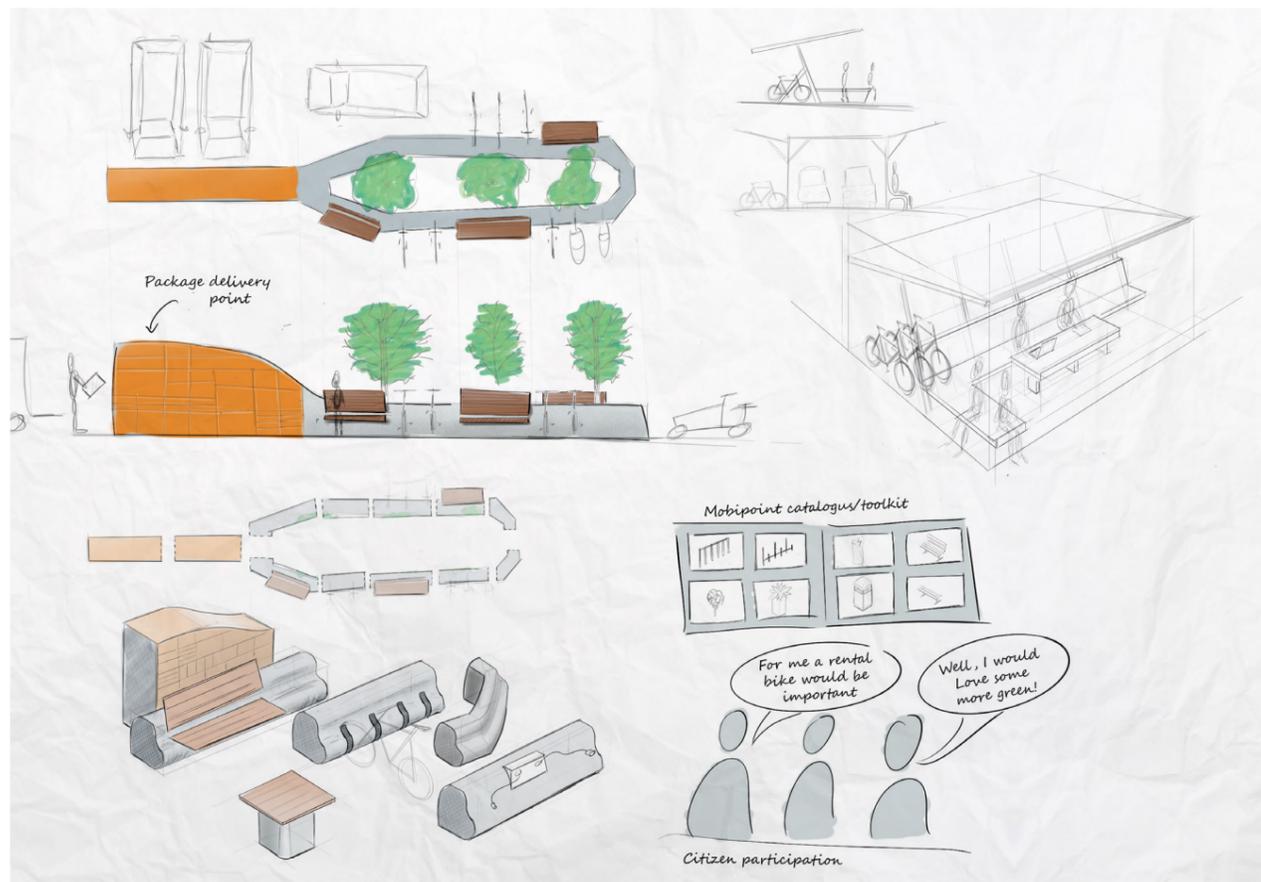


Figure 20 - Spatial design

Spatial design

Above you can find a number of first sketches for the possible layout of the mobihub, in which multi functionality, recognisability and environmental concerns play a central role.

Every neighbourhood is different and has different residents with different needs, so the desired functionalities of a mobihub strongly depend on where it is placed.

This is why it is important that the design is easily adaptable and perhaps partly open to the neighbourhood to fill in the details themselves. This could be done, for instance, by means of a tool kit from which certain modules can be selected. A shared element in the form of the mobihubs will be added for recognisability.

This first design is made with modular block which build up a bigger object. It creates parking spots for cars and bikes around the object, next to seating facilities and a package locker.

Turning around a street that has already been built will always be met with resistance, which is why it is extra important to make clear what the advantages of the mobihub are.

To explore the factors that contribute to this resistance and find ways how to cope with this. The next iteration this idealistic design is translated to a street in Utrecht, focusing on the implementation.

What forms of shared mobility

Community based shared cars are the closest to owning a car, thereby to make a transition from ownership towards sharing this will probably be the most accessible. This will be discussed in more detail in the next iteration.

Free floating is a form with an extreme growth over the past years. With also a negative aspect of littering the city, described on the previous page. To prevent this free floating mobility should have a dedicated place at the mobihub. The main characteristic is of free floating is that you can park it anywhere. Although it would be possible to motivate people to park the free floating micro mobility at places designated. GO Sharing, a provider of free floating scooters recently started with mapping discount zones, to get more grip on where the scooter are parked.



Figure 21 - Managing free floating vehicles

Insights and feedback

As explained in the introduction, these iterations serve as a method to make it possible to discuss my thoughts around the mobihub in an early phase. After the first month the insights from this chapter were presented at Advier, architects at SVP and my supervisors from the TU. The most important takeaways of this chapter and the feedback are listed below.

The idea of combining the mobihub and living street, was well received by everyone. The focus on this space saving quality of sharing makes people enthusiastic. Where the Superblocks in Barcelona transform their streets into a more lively area, the mobihub could do this with streets in other cities while functioning as a transition space between transportation and recreational area.

Since this was an idealistic version in which assumptions have been made quite easily, (for example that the street is wide enough to build all this and still pass with emergency vehicles). As mentioned before a next step would be translating these ideas into a more realistic scenario. This idea for a follow-up was supported by Advier and SVP and consultation a location was selected. One that they are working on simultaneously so our insights could be shared.

Design guidelines

A base of these guidelines has already been made during the analysis. In every iteration these guidelines are complemented with the insights from that iteration. At the end of the report a complete overview is presented.

Role of mobihub

Design Principles

1. Function

An important function of the mobihub is showing saved space as a the benefit. This to convince people of the advantages of sharing. This could be done by designing the mobihub in such a way that it become a transition space, from transportation to recreation area. Mobility facilities towards the area of the street where transportation is central, social facilities towards the street where people use the street for outside living.

2. Ingredients

Within this iteration no new type of facilities are added, the focus in on placing them in such a way that you create more space for social actives

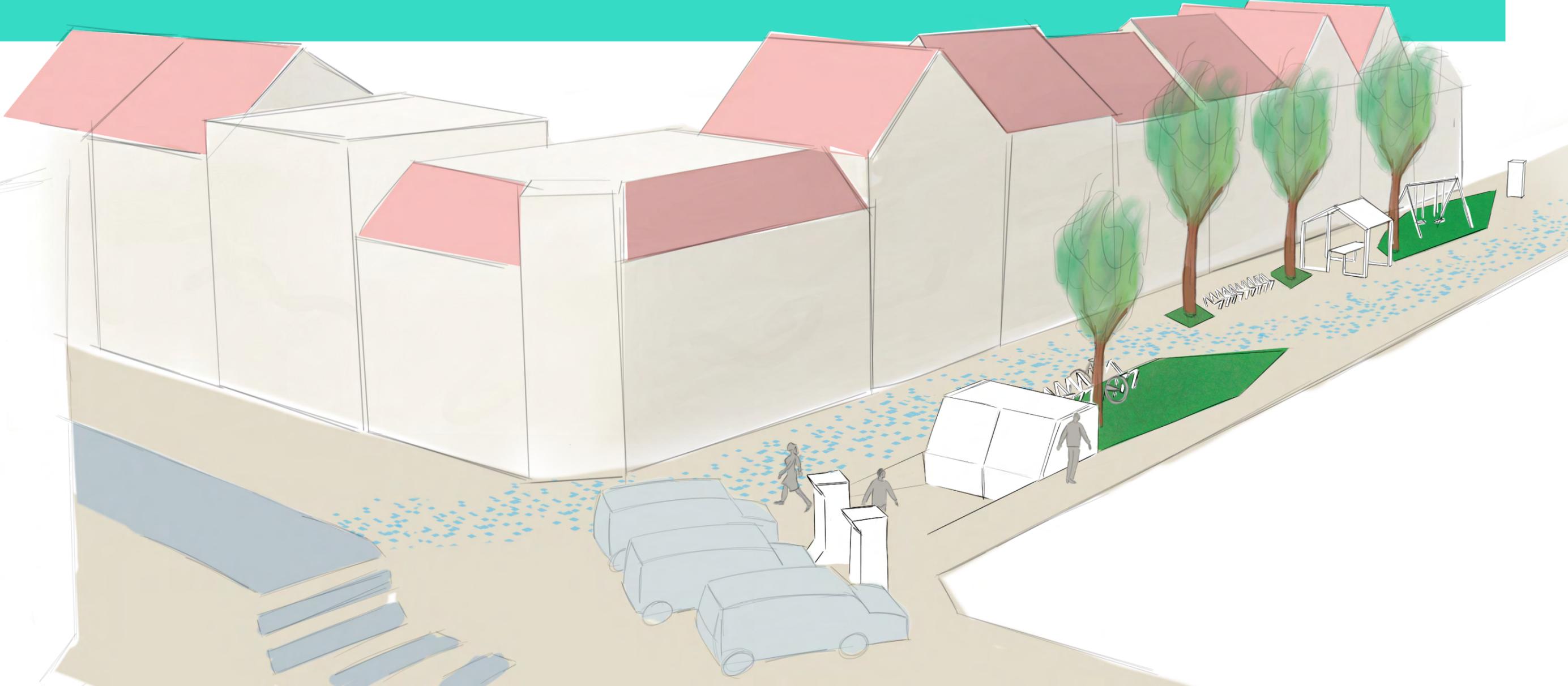
3. Implementation

This iteration shows the implementation can be more than only adding a point where facilities are gathers. It has the potential to change the infrastructure of a neighbourhood

4. Design style

Coherency and recognizability are maintained by making one larger object that includes many facilities of the mobihub. The adaptability is covered by designing the larger object out of smaller modules.

DESIGN EXPLORATION THE REDESIGN OF A STREET



How can you apply these first insights found in the previous chapter to an existing situation? In this chapter you will find a design exploration about a street in Utrecht that showcases how this could be done. By going through this fictional process the hiccups can be identified and the concept automatically becomes more tangible. To get a complete picture the case study is rather extensive, starting with identifying the different stakeholders and their possible relationship with the mobihub and each other, followed up by a plan for the transition of the street, and including a first sketch of the design.

Research question

The research question for this iteration is a first validation of the ideas made in the previous iterations.

How to apply the design guidelines from the idealistic mobihub design into an real scenario.

A project Advier was working on has been taken as real scenario. Within this design question the implementation plays a important role.

Introduction

To explain the context of this iteration, first some background information about the project is given.

Advier and SVP are currently executing a project about mobihubs for the Utrecht municipality. Four locations have been allocated for this project, each in a different type of neighbourhood. To add to the existing project, I continued with one of these four locations. My research was conducted simultaneously with the project that Advier and SVP were and are working on, to draw inspiration from each other's work.

Type of neighbourhood

For this project four type of neighbourhoods are studied.

- 1 Suburb with excessive parking
- 2 Vibrant fast-growing neighbourhood
- 3 Socially vulnerable neighbourhood
- 4 Original centre neighbourhood

All these neighbourhoods have their own interesting problems to solve and features a mobihub could add. The neighbourhood in the centre suffered the most obviously lack of space.

Selection

This fourth type - the original centre neighbourhood - lend itself well to test the findings of previous iteration. For this neighbourhood a street was selected as an example street. This is Zandhofsestraat in Wittevrouwen, due to its clear spatial problems.

Current situation

The Zandhofsestraat is a very narrow and filled with parked cars on both sides of the street (see pictures on next page). It is a one-way street and almost solely used by destination traffic. Aside from the spaces used for traffic and parking, hardly any street space is left. So little that there isn't even enough space for bike parking. This is pushed out to the corners of the street. However, people are trying to make it more pleasant by putting some greenery in the existing space. Next to that car sharing isn't a new concept for this neighbourhood, there are already a couple of shared cars in the street!



Figure 23 - Zandhofsestraat



Figure 24 - Zandhofsestraat



Figure 22 - Zandhofsestraat location

Stakeholders

To be able to say something about the transition in a street it is important to know everything about the stakeholders involved. For that reason I started out by mapping who the stakeholders are in this particular street and how they interact with each other (see figure 25 on the next page)

This mapping led to an interesting insight into the friction between the top-down (governmental) and bottom-up (local) approach. The government proposes a long term vision and implements this (top down). On a smaller scale, however, the user should initiate the change (bottom up). For a proper transition it is necessary to take both perspectives into account.

Municipality

First of all, the municipality is responsible for the long term zoning/spatial plans on the street, neighbourhood and city level. The transition to shared mobility is not something that only depends on the construction of a mobihub, but is a combination of many things. For example, a mobihub often integrates a connection to public transport, which is something that is planned on a national, rather than local, level. Next to this mobihubs will make a real difference when they are connected in a network, this something the municipality has to plan for.

Municipalities are responsible for the zoning plans for specific neighbourhoods. If car-sharing or mobihubs are not included in those plans, not much will happen. This is the top down

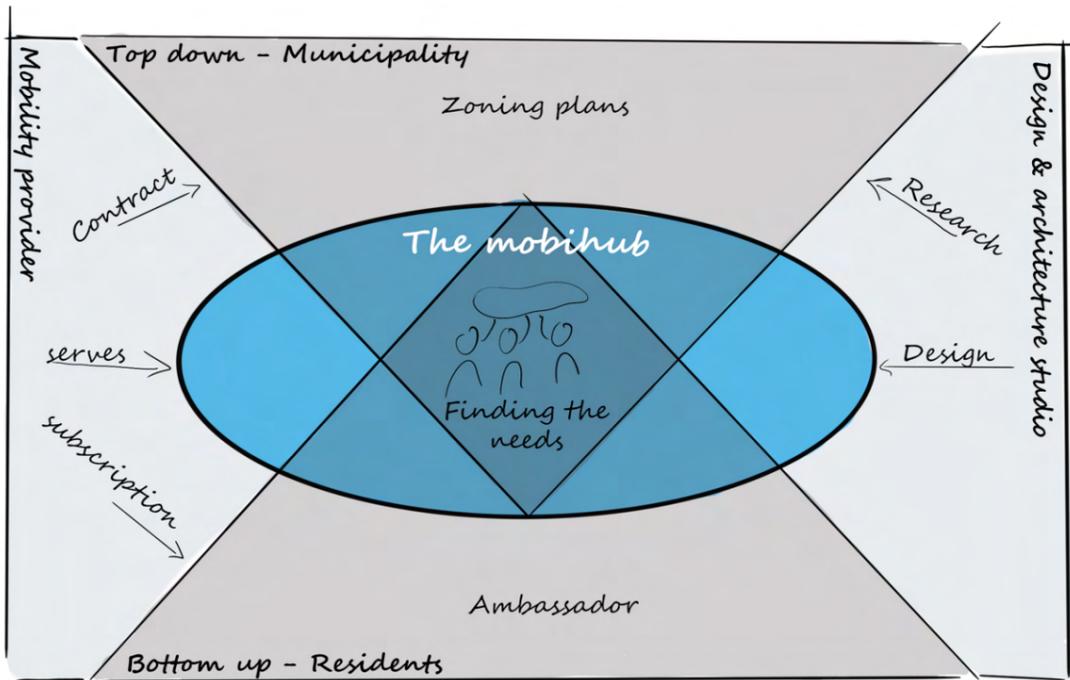


Figure 25 - Stakeholders

approach is definitely needed, but should play a facilitating and maybe triggering role. When forcing a street to start sharing many residents will dislike and counteract this idea, although when it would come from within the street changes of cooperation are higher. This can be seen in the difference outcome between projects where the municipality dropped a view shared cars but are never used, and projects where residents themselves started with sharing (Wijman, 2019)

For the municipality the added value of mobihubs is that they contribute to more sustainable forms of transportation and save space that can be used for other purposes.

Users

An important factor for a well-functioning mobihub is that the user feels connected to the mobihub and its facilities. Sharing vehicles will only work with a feeling of responsibility and shared ownership. There are numerous sharing projects that failed due to careless use. Or in other words; 'Don't be gentle it's a rental'.

This feeling of responsibility differs a lot per form of sharing, and depends highly on who started the initiative. If the users themselves have initiated the sharing, the feeling of shared ownership is way stronger than when it is imposed by the municipality or government.

In the Zandhofsestraat, the initiative for vehicle sharing is taken by the users. One of the residents is working on setting up community based car sharing (see appendix 2). An added advantage of this approach is that community based sharing is

one of the cheapest forms of car sharing. Working with ambassadors from the street seems to be a good approach to implement this in cities. At the moment this process still requires a lot of additional research; it would therefore be great to facilitate this process better either with help from business initiatives or the municipalities. This is the bottom up approach.

The added value of mobihubs for users is that they allow for more space for other activities in the street, lower costs for owning a car, and more interaction with the neighbourhood.

Of course, aside from the governments and the users, there are many others involved in the transition. Think about people without cars, inhabitants of the street, visitors, and public services. However, the two groups mentioned above are most relevant for this research project.

Providers

For each form of sharing different things need to be facilitated by the provider. For example with free floating the platform, vehicle, charging and maintenance and managing the fleet has to be done. These many tasks make this form rather expensive. In the case of community based sharing, the platform to share with is the most important. Organisations like Onzeauto.nl and wijzijndeel.nl facilitate community based car sharing. This form is the cheapest, and no need of a fully connected network. Therefore this form is the best to start with and later

Plan for transition

Change always meet with friction. Changing the complete street overnight, therefore, wouldn't be a great approach. Most residents would, for example, be angry about their parking spot being taken away. How should we go about the transition phase?

Previous projects like the mobility challenge (described in chapter mobihub), brought it as a test, to make people less afraid to join. It turned out that people did not have the time to join when they had the advantages. This test recommended to do following project over a longer term or permanent.

Following up this advice, first a small part of the street is permanently transformed. This gives people a chance to get accustomed to the sight and benefits of vehicle sharing and reduction of parking space. Hopefully this will ensure more support for implementing the full transformation.

The new layout

The layout is based on the first iteration, meaning cars and facilities for package lockers at the crossings - green and playing area in the middle.

Time-line

The Zandhofsestraat can be divided into 5 segments by applying the following steps (see figure 26 & 27)

Step 1: In consultation with the residents one segment of the street is chosen as starting point. This part will be redesigned with more greenery and space exclusively for shared cars. The car owning residents of that segment who still want to use their own car are allowed to park it somewhere else in the street.

Step 2: By seeing the improvements, and hopefully hearing good stories about the carsharing more residents get enthusiastic. Over time more people will switch to the shared cars, take into account that this can take quite some time since decisions are mostly made when having to switch from car anyway, which is not something that happens every week. But eventually less privately owned cars are in the street and there is space to choose a next segment to redesign.

Step 3: Next segment is redesigned just like the first

Step 4: the segment on the left facing the main street will facilitate the largest mobihub



Figure 26 - Step 1:



Figure 27 - Step 4

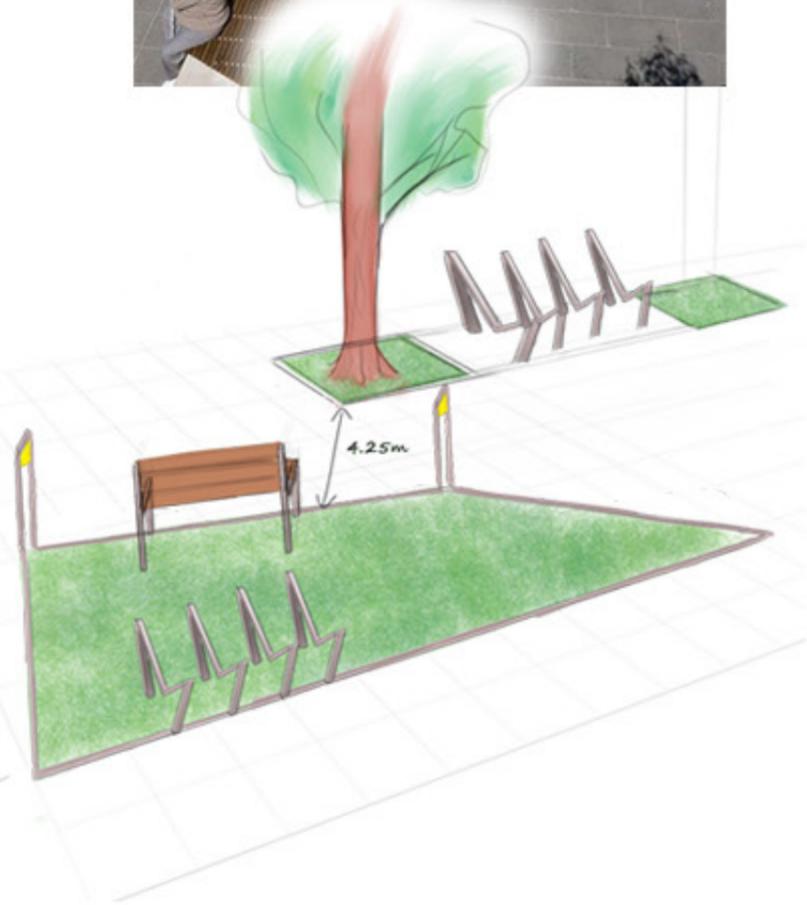
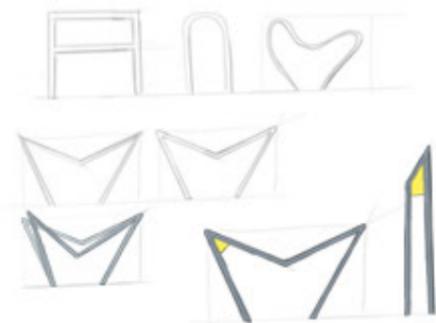
Design of the street Furniture

On this page some of the sketches and ideation is presented, the next spread gives an overview of all these sketches placed in one segment of the Zandhofsestraat (figure 29).

For the design of the furniture, attention was paid to a number of elements. First of all, the furniture must be able to fit in at different locations and change according to the needs of the residents. That is why it is made up of separate objects that can be placed in the street.

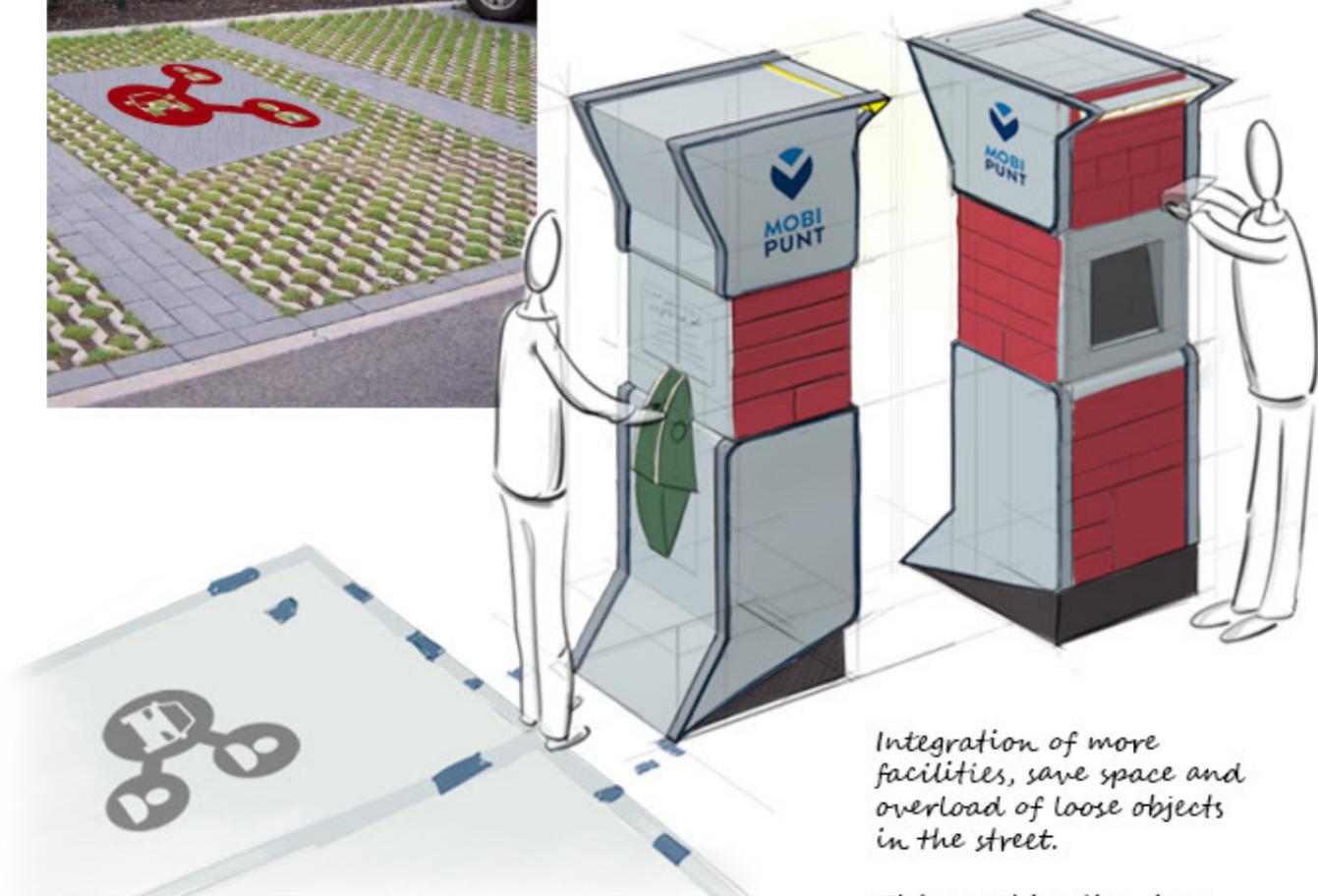
In order to create more unity, there is looked for possibilities to combine functions. For example, is the package locker on the right page. Which has a car charging spot integrated and is used to indicate the place is a mobihub.

Inspiration image, colour used to tie loose objects together.



Grass tiles for green parkingspaces combined with logo tile.

- Well connected with more green in the neighbourhood
- Clear indication of shared parking spot



Integration of more facilities, save space and overload of loose objects in the street.

Covered bicycle shed, partly sunken because that way the view from the street is less disturbed. It would be better to avoid objects higher than a cars. This because they would block the view even more compared to the old situation with cars.

This combination is a package locker, electric car charging pole and pillar for mobihub branding.

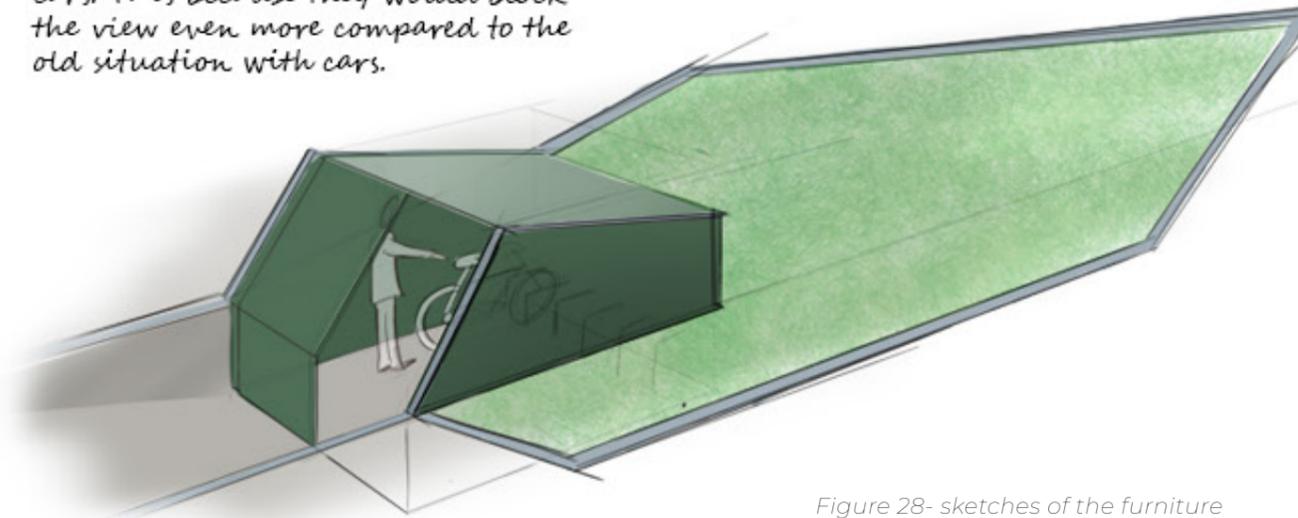


Figure 28- sketches of the furniture

The new street

The street is arranged in such a way that the facilities that need to be connected to the road, such as the parcel locker and parking spaces for shared cars, are placed at intersections. Becoming a transition area to the rest of the street, in which living is prioritized over transport. After you passed the mobility related facilities there is more space dedicated to social, recreational facilities and greenery.

The street itself has actually become a large pavement -filled with a lot of green- where pedestrians are prioritized. In an exceptional case cars can still drive into the street and it is wide enough to allow emergency services to pass through when necessary. This street is indicated with the blue tiles that smoothly fades into the rest, indicating that it is shared space.

As this is the first part of the street to be redesigned, it also demonstrates to other residents how things can be done differently. That is why it is extra important to make it clear that mobihubs are the enablers of this change.

Feedback

This design explorations and the sketches that came out of it where used in communication with residents and people from the municipality.

Residents

I came in contact with Michiel, he is a resident of the zandhofsestraat and is working getting people into community based car sharing. At the time we met they had a group of around 10 people who were ready to start sharing (all from segment 1 of the zandhofsestraat). He told me it was pretty easy to convince his neighbours since it was all without profit. His expectations were that when this request had come from the municipality or a company the reactions would have been different

Our thoughts about why carsharing would be an upgrade for the street where in line. Although Michiel had the feeling that when he would stop convincing people, the other parts of streets would not make the switch to shared mobility. When I showed him the my version of the redesigned street, and explained how this visually would convey the pro's of the mobihub he was enthusiastic and mentioned that is had to be done slightly larger scale than he had in mind first.

Municipality

In an email conversation with Remco van der Panne, project leader sustainable mobility at the municipality of Utrecht, we talked about the feasibility of this project. The reaction was positive and immediately dove into detail about this particular street. This shows the municipality's enthusiasm for change in this direction. a translation of this email is included in the appendix 3.

Insights

These two conversations supported the thoughts behind the implementation, especially the mix of bottom up and top down approach.

Many interesting leads came forward in this iteration, of which some could serve as the start of a completely new project. One of these could be, for example, finding a good way to guide interested residents in the process of setting up car sharing. Read more about this in chapter recommendations.

Other insights contributed to the requirements of the furniture. The design of the objects, play with colour and a mixed function in the street.



Figure 29 - Redesign of the street

Redesign street

Design Principles

1. Function

Show the rest of the street/neighbourhood the advantages, so they will be convinced

House community based shared cars as main function.

2. Ingredients

Nothing is added during this chapter.

3. Implementation

Concluding from the stakeholder analysis it became clear that mobihubs should be supported by the residents and the municipality in order for a smooth implementation. A mix of a bottom-up and top-down approach is necessary.

Start with something permanent, this gives residents the time to get enthusiastic and trade their car into a shared one.

5. Design style

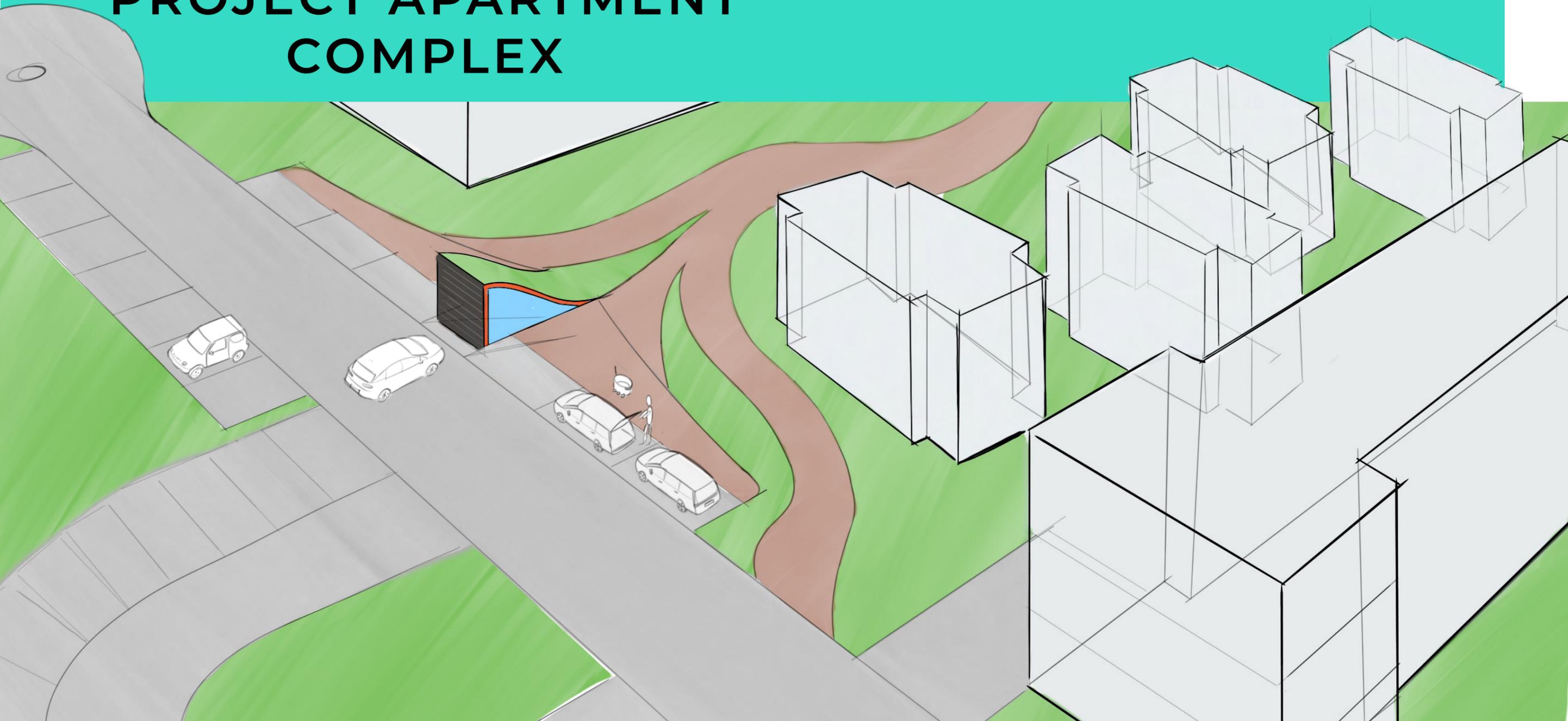
Providing different options and formats, for example in conversation with the municipality I found that in Zandhofsestraat there was already a store handling the package delivery. This means a package locker would not work, the charging pole now integrated with package locker should also exist stand alone.

Play with colour on the ground can connect loose objects and is recognizable. Next to that also easy to install.

There is not much space, this due to the fact that the streets need to be reachable by emergency.

Integrate different functions into one piece of furniture. This saves space and makes the hub less chaotic

DESIGN EXPLORATION OF A DEVELOPMENT PROJECT APARTMENT COMPLEX



In the previous design exploration an existing street was examined. Redesigning a pre-existing space comes with certain restrictions; for example, the fixed amount of space and the habituation of people to the current layout. To look at the mobihub from a different perspective, in this iteration a location is studied which is currently still in the project planning phase. This gives the design more freedom and allows for new explorations and approaches. The location for this case is the apartment complex in the centre of Heerhugowaard, special about this location is that project owner is already planning to facilitate this with shared cars.

Introduction

The 150 x 75 meter location will house 204 households, the construction is planned to start around 2022. De Nijs, the project owner, wants to make this a sustainable neighbourhood. De Nijs asked Advier advise them about the role mobility could play in the development.

Figure 30 shows a side plan of the current layout. This version has only 70 parking spots, this means many people will have to share the space.

Advier advised De Nijs to make the VVE (Dutch abbreviation for owners association) responsible for the way mobility is arranged. When providing the VVE with a limited amount of parking spaces they have a few options: changing the green areas into car parking, which spark resistance from residents who bought the place knowing their would be a lot of greenery, or make smart use of the available parking spots by facilitating shared cars.

Apartments are advertised referring to this story about new mobility. This means the new residents will likely be in favour of sharing. Moreover, moving is the best time to change behaviour. KIM research shows that 40% of people change their travel behaviour after moving houses. This is therefore the perfect moment to respond to behavioural changes. Instead of facilitating 'old' behaviour, 'desired' behaviour is encouraged during the relocation (berverling, 2017)

Research question and approach

This iteration centres around the following research question:

- How do you build a mobihub in a yet to be built residential area like Heerhugowaard?

This question is answered by looking into a few sub-questions, namely:

- Is the traditional street with parking spots on the side something we still need when sharing vehicles gain more ground? What are the motivations for the current design?
- What different situations could arise when you share vehicles with a large group (as opposed to smaller community sharing)?

To get acquainted with this new location and gain input right from the beginning, a co-creation session was held at the start of this iteration. The co-creations was held with fellow students who played the role of the VVE. They were asked to advise about the layout of the public space. When you give people the opportunity to arrange the location and amount of parking spaces, it was interesting to see that they grabbed the chance to place greenery in front of their door and the parking places far away. Although it was not the most representative group of people, an interesting conversation had been going on during the session. Details of these sessions can be found in the appendix.

Figure 30 - current design by de Nijs



Figure 31 - inefficient and efficient parking

Remarks on the current design

If you take a look at the current layout of the site plan, an interesting detail is the low amount of parking spots. There are only 70 parking spots reserved for 204 households, which is 75% lower compared to an average neighbourhood in Heerhugowaard (parkeernorm nota, 2016). This huge decrease in the number of car parking spots is not clearly translated into the design. Because there is a traditional street right in the middle of the residential area. This does not give the feeling that much space is gained by sharing of the vehicles. It might even make people think the location hold as many parking spots as a 'normal' area would. Concluding on insights of the previous iterations, we know that the visibility of the benefits is an important success factor of facilitating a transition in mobility.

How can we make the saved space more visible, and therefore more appreciated?

Advantages of a large community

In this study the group of people who share cars is way bigger compared to the group in Utrecht. This opens up new possibilities. The advantages of a large sharing community will be explored below.

From the analysis of the current design for Heerhugowaard, the request for a different of layout with more emphasis on saved space came forward. The most effective way would be to place another function instead of car parking at the centre of the apartment complex. But if you do this were would you park these 70 shared cars?

To gain inspiration parking innovations like self parking vehicles and automated parking systems



Figure 32 - Automated parking systems

are studied. While analysing these, an interesting fact was found. Namely that most of these innovations do not reach their full potential when they have to function in a space where humans interact as well. The function of for example self-parking cars doesn't add much value when parked in a garage which is designed for humans (Dariani et al., 2019). As a normal car park must leave enough space open for people to get out of the car and top of that software can park more tightly than humans do. Take a look at figure 31 where inefficient parking is compared with efficient parking.

The system that is currently used the most for efficient parking are the automatic parking systems, with a sort of lift that places the cars on a shelf, see figure 32. This type of parking is expensive.

What if the 204 households would act as one buyer? All the cars could be equipped with the same features. A garage specially design for cars that are all equipped with the same type of parking assistance would lift this feature to its full potentials. See figure 34 on the next page.

Aside from the parking, the charging can also be done much more efficient without human involvement. Normally, you need a charging pole for almost every electric vehicle, as hardly anyone will immediately remove their car once they are fully charged. However, in a self-parking space, it would be possible to rotate the cars between charging poles, automatically disconnect them when full.

Taking into account the shift towards renewable energy it is becoming more important to use energy when available (source). In other words use the energy gained by solar panels when the sun shines. This is hard to manage with a single car, since when you connect it at the charging pole you want it to be fully loaded the fastest possible. A whole fleet that is being monitored has more resilience. For example only half of the fleet would be charged if the conditions are not favourable. When the sun starts shining the fleet is completely charged. An extra detention is added when the car batteries are also used as storage, this can be done with bi-directional charging (GreenFlux, 2021).

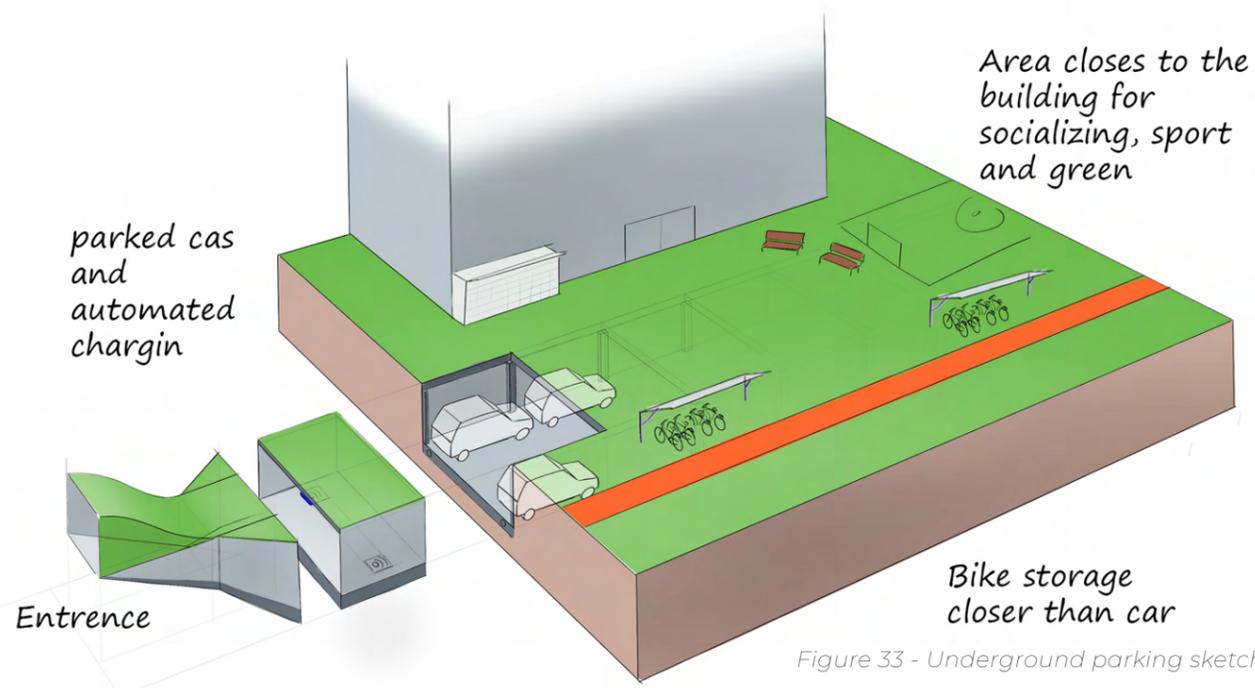


Figure 33 - Underground parking sketch

Design: Cars parked underground

Underground is obviously a great space to minimize human involvement. On top of that it would take the cars completely out of sight, immediately saving more space aboveground.

This low underground parking garage could be placed anywhere on the location. In this example it is placed below the original street (figure 33).

Sketching a concept like this forces one to think about all the possible interactions and scenarios (figure 35). The first thing to figure out is how to drop your car.

Automated valet parking: as indicated in the sketch there are a few parking spot where people can park and step out. From there the car drives itself to the entrance of the garage. In the garage when needed couples itself to the charging infrastructure.

Luggage issue: In the current design with a street in the middle, most front doors are closer to the place where you park your car. by placing the entrance of the garage further away a problem occurs when you have to transport a lot of luggage. Some kind of boulder car, that helps you transport it from car to door would be nice. This concept is explored in more detail on the next page.

In this sketch the focus is on parking. As you can see, the space previously occupied by cars is now a cycle/pedestrian and social area.

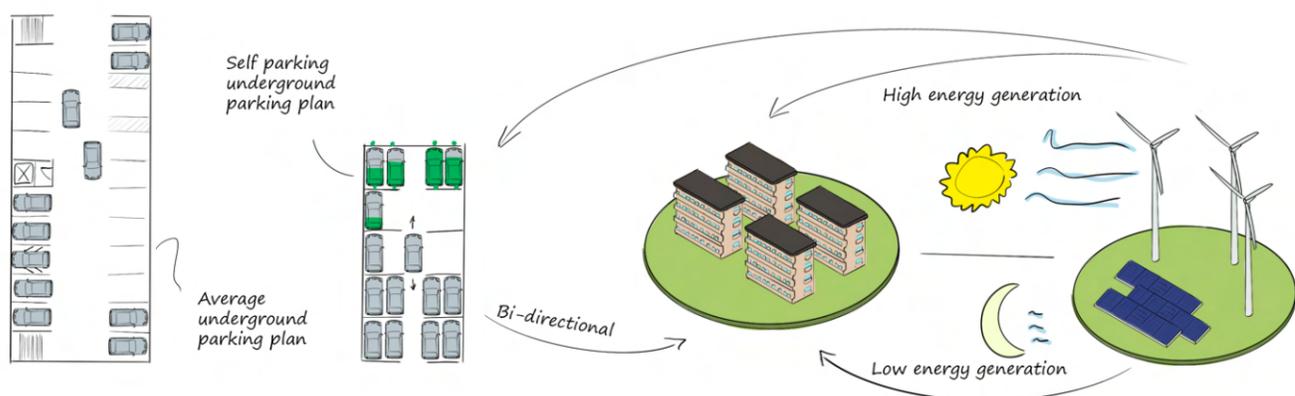


Figure 34 - Sharing and parking a large fleet

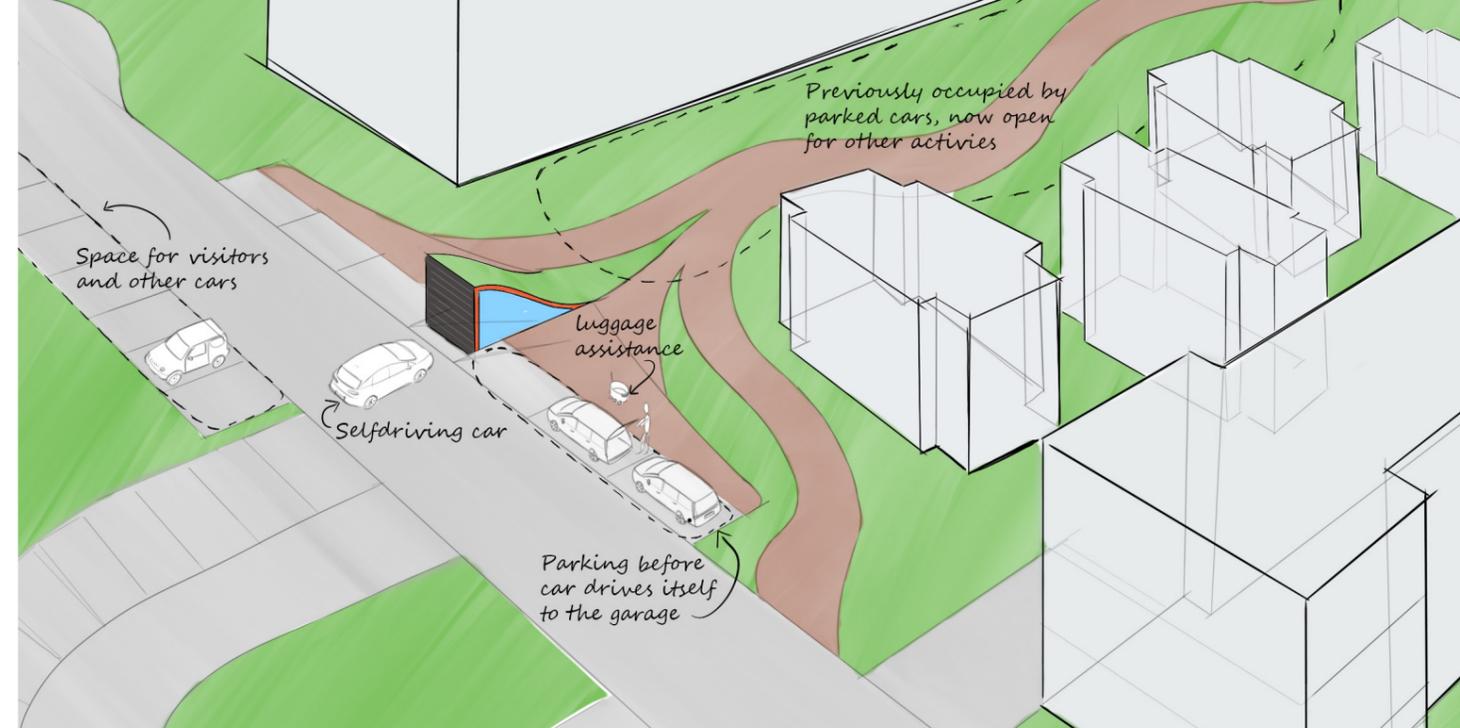


Figure 35 - overview of scenarios

Half underground & integrated with facilities of the mobipoint

Unfortunately underground construction is expensive: an average underground parking spot costs 40.000. Although this is calculated for the space a car needs when parked inefficient by humans, it is still costly even with parked more efficient.

The project budget for Heerhugowaard is not limitless. Therefore, this second concept is exploring ways to combine the enclosed space without going fully underground. And looking for more connection to the other facilities of a mobihub.

This design shown in figure 36 consist out of blocks that can be configured as a parking garage. The other facilities of the mobihub can be attached to the outside of these blocks.

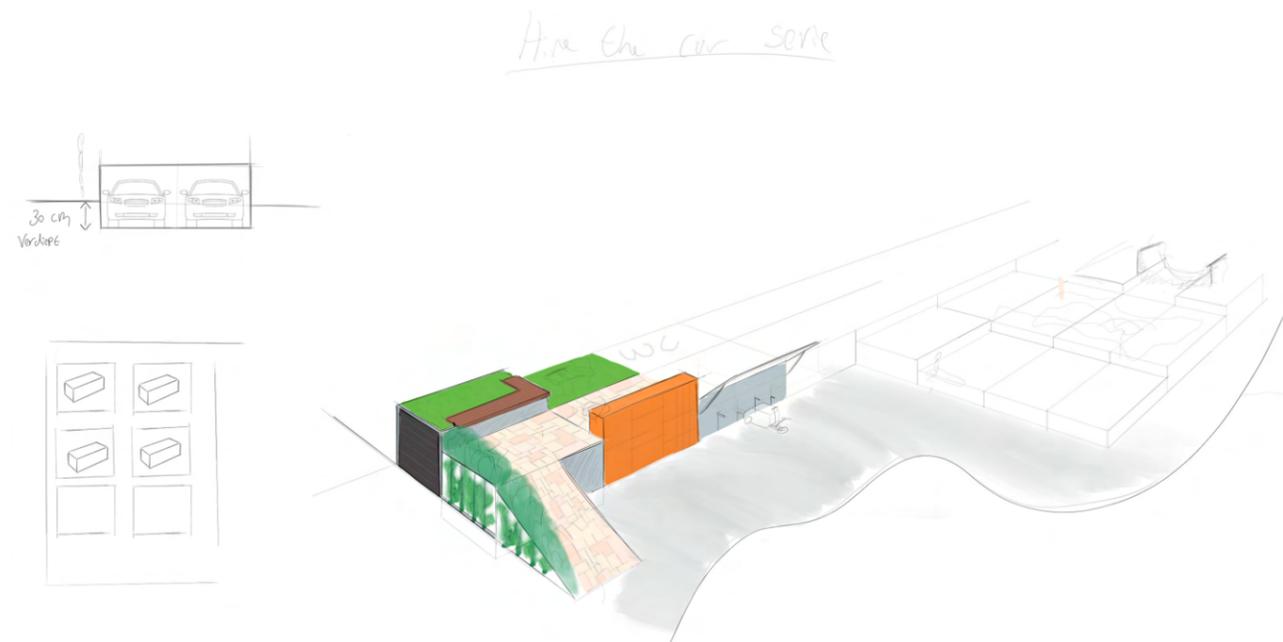


Figure 36 - Impression of garage with mobihub facilities attached

From car to Front door

The self parking service can be compared to valet parking at a luxurious hotel. Although there is one element missing - how do you get your luggage to you front door? This can be tricky when the new garage is further away than the usual parking spot.

To deal with this discomfort the analogy with the hotel is explored. At high end hotels after an employee parked your car, your luggage will be brought to your room. Can't we translate this luxurious treatment to the mobihub using technology instead of employees?

A quick search in the world of autonomous driving vehicles, showed projects with self driving cart. All experiments so far are done in a restricted area like a campus or business park. The apartment complex in Heerhugowaard is smaller than areas of these experiments, so based on this it would already be possible with the current technology to let small carts transport your luggage after a large groceries session (Edwards, 2020).

Of course a human operated 'normal shopping car' would work as well. But only for one way, bringing back the cart after arriving home is no one's favourite hobby. The autonomous cart could drive back to the entrance of the garage by itself.

This added an new facilitate to the list of ingredients for a mobihub.



Figure 36 - Starship delivery robots

Insights

Sharing vehicles with a large group, can change the way we park and build our parking spaces.

Fleet parking and charging can be done way more efficient than for a car on its own. Even things like bi-directional charging can be added, to make the building ready for transition to green energy

These changes are accountable for the fact that your car is not parked right in front of your door. Which brings a view pro's, namely that you can have green instead. And next to this, when the car is not the first thing you see, changes of taking another more sustainable mode of transportation becomes larger.

The only downside is that it becomes a hassle when you are bringing a lot of luggage, for this the solution of the self driving cart are proposed.

New apartment

Design Principles

1. Function

Integrated with the building, charging

Make the space right in front of you house more like a park instead of a garage.

2. Ingredients

From car to door service

Closed off parking space for self parking cars

Bi directional charging

3. Integration

The fact that you integrate all these innovations right from the start gives the advantage that it will be more appealing for people who think like minded about sharing vehicles.

4. Design style

An sheltered parking place where the roof is integrated with facilities of a mobihub.

DESIGN GUIDELINE & TOOLBOX



In the course of the project, it became clear that conveying information about the strengths and design principles was more useful than solely designing street furniture. To this end, the final result of the project is a guideline focusing on the why and how to design and implement a mobihub. The design principles coming forward from the research give structure to the document. The document is assisted with a toolbox, this toolbox facilitates a conversation about the possibilities for a specific location and can be used during the start of a process where residents and the municipality meet. The complete guideline is included in the appendix. Both the guideline document and the toolbox are a draft version, to make a first improvement a validation session was held with different expert. More about this session in this chapter.

What?

The guideline is a booklet explaining the key insights of this graduation.

The toolbox consists of an 100 cm by 60 cm board representing 32 m by 19 on the scale of 1:32. Onto this board the area that you want to design can be mapped out. Scale models of houses, cars, people and furniture for the mobipoint can be placed onto the map. On the next spread pictures of two setups for different areas are shown.

For who?

The guidelines is for policy makers and designers involved in the implementation and design of a mobihub. Because people in this position should understand why and how mobihubs can change the city before anything will happen.

The toolbox is there to engage with residents, involvement of the people who will use the mobihub is necessary for a well functioning design. The needs of every neighbourhood differ, so without getting to know this

Thereby the these guideline & toolbox support the philosophy of the necessary mix of top down and bottom up approach. Which is explained in depth in block 2.

Goal

The guideline serves as an inspirational document, starting with a plea about why we need mobihubs. This to make people aware of the need to change. Followed up by a set of guidelines for the design and implementation of a mobihub, illustrated through examples for different types of locations.

The toolbox has multiple goals, first of all it works as conversation starter between the residents. It becomes tangible because you can easily take a car away and put something else in return. Next the function as conversation starter, it helps to take the first step in ideation based on the design principles from the guideline. This process help people to see the design principles in the context of the street/area they want to redesign. It makes the concept tangible, and therefore the topic becomes easier to discuss.

Content and order of the guideline

The structure of the guideline is based on the classic identification of the problem and proposing a solution order. Shared mobility is start of the solutions and the mobihub will lead this into there right direction.

Intro:

To ensure everyone is on the same page, the definition of a mobihub is given in this chapter.

Awareness of the problem:

The guideline starts with demonstrating the problem with the current mobility system. Since this is overlooked, or at least not fully understood, by many. When systems function in a certain way for a long period, people tend to forget that there is a possibility to do it differently. Therefore the documents starts out with a chapter about the issues and how a shared mobility and the mobihub could help solving this

Sharing as a solution

Since the mobihub is a place that is facilitating shared mobility, understanding the opportunities of shared mobility should be understood before talking about the hub.

Function of the mobihub

Shared mobility without the guidance of a hub will not reach their full potentials. In this chapter the role of the mobihub is explained. Starting with the more basic know how and later diving into the possibilities of changing the complete layout of a neighbourhood.

Elaboration through examples

The guideline uses the two different sites studies to illustrate certain insights in more dept.

Toolbox

This chapter explains the toolbox. The same steps as on the next page are discussed.

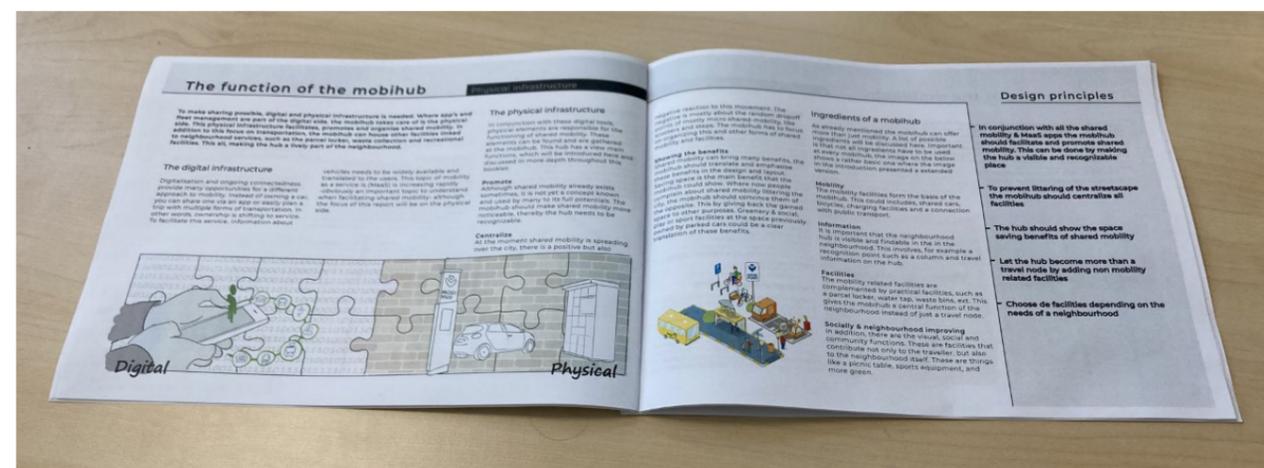


Figure 37 - Guideline book printed

How to use the toolbox

The goal of the toolbox is already explained, in what steps to approach a session is outlined here.

Step 0.

The residents are asked to write down their wishes about the neighbourhood in advance without any restrictions.

Step 1.

A briefing about shared mobility given to the resident, so that everyone is aware of what the possibilities are. This briefing should focus on the advantages for the individual and the neighbourhood.

Step 2. Indication of participants

After the briefing, a rough indication of the percentage of people who are willing to switch to sharing can be made. This together with the wishes written down before serves as guidance during the session.

Step 3. Street in the current situation

Setup the current situation on the model. (the only limitation is that it should fit within the 19 m by 32 m).

Step 4. Space saved

Based on the percentage of residents that are interested in sharing, a number of cars can be taken of the board. Now it is time for the discussion on how to fill in this space. For this, all the models can be used and everything can

be shifted freely. This process should be guided by the session leader who applies the principles from this guideline book.

Step 5. More idealistic version

In case there are many wishes about the neighbourhood unfulfilled a higher number of cars can be taken away, as an experiment

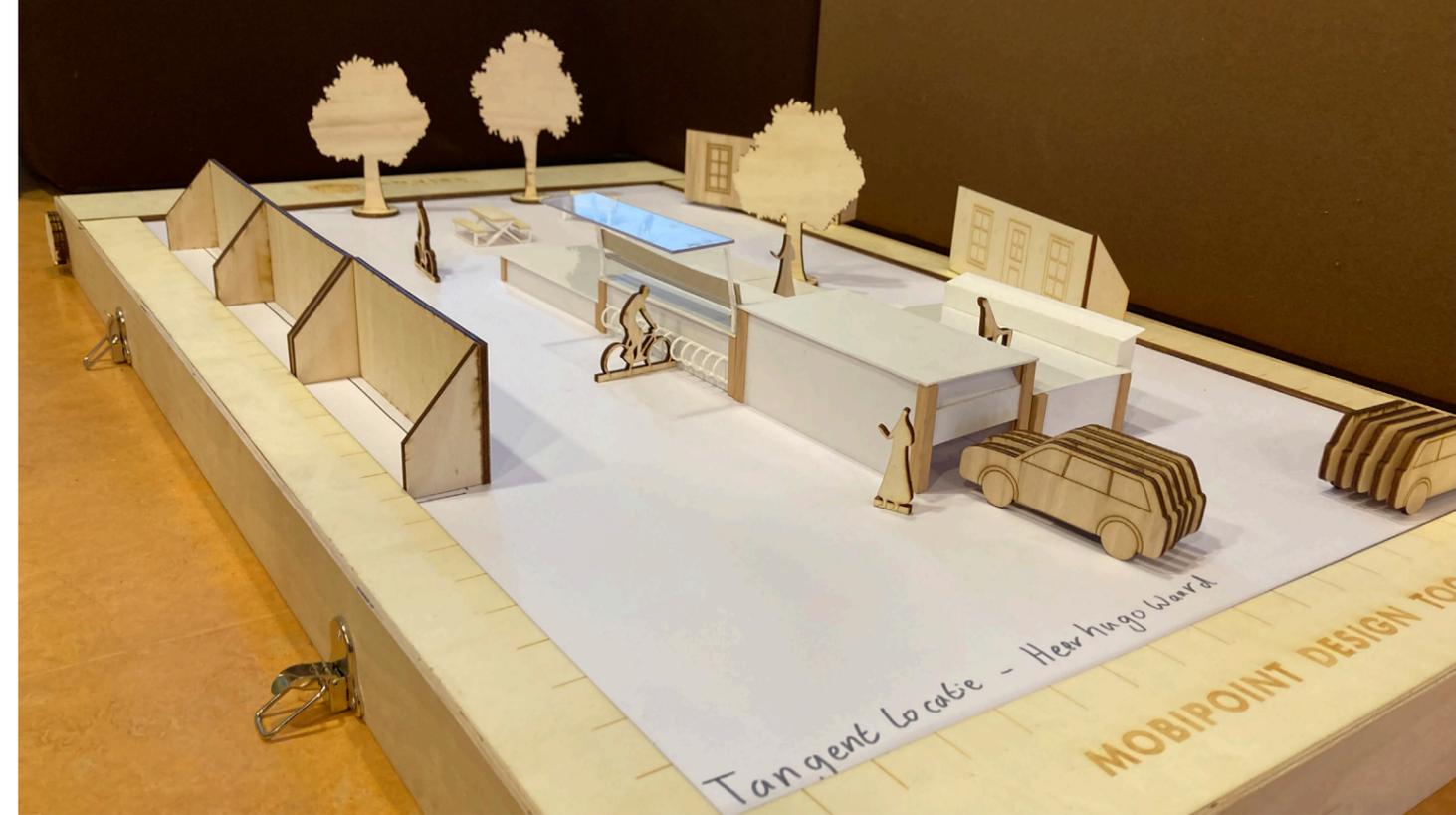
Location - Redesign of the street

For both location an design is made as an example

The principles of the guideline are applied by placing the mobility functions at the corner of the street. The part cars are on the crossing with around them bicycle storages & parcel locker. This eliminates the need for parking spaces further down the street.

Playing with facilities in this way quickly shows that space is not in short supply, it quickly becomes a game with many choices.

For a location such as Zandhofstestraat, the toolbox could work well to start a conversation with the residents. And to get inspiration for a first design.



Location - construction site

To designate the underground garage as a building block for the location of heerhugowaard, a design was made for the half underground half above-ground parking. To these modules, facilities of a mobihub can be attached. For example, one part of the parking is integrated with a parcel locker and another with a bicycle rack. These loose modules can set up in different ways.

Although this gives a first impression of how the design could be, the toolbox is less relevant for this type of location. Because when integrating the mobihub to such an extent as proposed in the guideline it is difficult to do it with standard modules. On top of that, in this stage of the project planning, there are no residents. Teams designing an apartment complex like have their tools to design.



Example of possible design



Quotes

Some quotes to give some insights in the conversation goin on;

'The toolbox quickly reveals who wants what and what kind of bottlenecks this creates' Friso

'Is the goal to make a mobihub, or to let people fill in the needs in the street, and is the mobipoint a possible tool for this? How to bring this story?' Nike

'Can't we set this up life-size, to redesign the street with the residents in a theatre-like setting. Drawing on the street how it could be different, to create attention' Riette

'Designing in a playful makes even a staid traffic engineer come out of his comfort zone' Jenny

'Use the design principles here as a kind of rules, let them come back during the design process' Nike

'It might be a good idea to have people write down their objectives before they start designing. Then there will be a little more structure in the session' Friso

'The toolbox quickly brings to light who wants what and what kind of bottlenecks this creates' Friso

Validation session

Both the guideline document and the toolbox are a draft version, so the purpose of this validation session is to improve.

Participants and preparation

Since improving was the main aim, I searched for a mix of participants from various disciplines related to the mobihub. Like, Urban planners, developers, experts in (shared-) mobility and urban logistics, marketing/communication, people involved in smart society and social inclusion.

An invitation was posed on Linked-in to reach a wide audience and make. In the end four employees from Advier joined, which still gave me the mix I wanted since two of them recently joined Advier and did not know much about my project jet.

Participants:

- Friso Metz - Shared mobility expert
- Jenni Hasenack - Junior mobihubs
- Riette Zonnenberg - Social design
- Nike Moedersheim - Marketing & communication

Session & feedback

First the presentation was given in the same structure of the guideline. A discussion started about different perspectives and especially target groups who had to receive this information. The

outcome was that several versions of the manual should be made for different target groups. In addition, it appeared that more focus on the most important guidelines would work better. Where there are many without a clear focus at the moment.

After the presentation the toolbox was explained, together with the context of the zandhofsestraat. Everybody was asked to act like a resident of the street. It was difficult to really start with making a design because the setting was a bit too abstract. Riette with much experience in participation projects was enthusiastic and liked the tangibility that the toolbox gave to the topic. Friso mentioned that it might not be suitable to easily get to a design, but worked perfect to get people their needs on the table.



CONCLUSION

The design guideline serves as an overall conclusion of the project, this chapter will supplement this with a recommendation and reflection

Recommendations

The project explored a lot of new directions, of which not every one has been worked out in further detail due to time restrictions. Therefore the following chapter offers some recommendations for further research and projects, in the form of new project briefings.

Reflection

This conclusive part of the report closes off with a reflection about the way I have approached this research and how this has impacted the project.

RECOMMENDATIONS

During this journey in the world of mobihubs, many tracks have been explored. Due to time restrictions not all of these tracks have been studied or designed up to the level they deserve. To provide the opportunity for this research to continue, tracks that can use some extra research have been written down as new project briefs.

1. Design of the furniture for the redesigning of an existing street

A small first step is made in this direction during the design exploration about the Zandhofsestraat. However, these are only a few first sketches.

Brief: Design a coherent set of modular pieces that contain all the basic ingredients of a mobihub. The manual provides design principles to which this furniture has to comply.

2. Make a design for the implementation during a construction project

A first step in this direction is done during the design exploration about the site in Heerhugowaard. It mentions a view elements like automated valet parking, and solutions towards from car to front door luggage transportation

Every site asks for its own solution, especially when it is as heavily integrated as proposed. This means a design could not easy be copied, still a further detailed design could serve as inspiration for other projects.

Brief: Design the integrated mobihub at a location like heerhugowaard. The manual provides design principles to which this hub has to comply.

3. Guideline for enthusiastic citizen

During the conversation with a resident from the Zandhofsestraat I learnt that it still is a rather complex process to start community based sharing and do this in collaboration with the municipality. Which is the bottom up approach that should be done by ambassadors as explained in more detail in block two.

Brief: Design a manual & platform for ambassadors that helps them in communication to municipality, providers and the other residents in the neighbourhood.

4. Mobihubs as a network

Where in this project the focus was on the influences on street around a mobihub. The way how different mobihubs have a relations, give the concept even more potential.

During my explorations mostly community based sharing was used. But when using free floating this network becomes extremely important

Brief: what should the link be between different mobihubs be? How can the form a strong network?

REFLECTION

This chapter reflects on the way the project was approached. What choices made this project strong and what -in hindsight- could have been done differently? Throughout the project the method was formed with regards to the changing perception of the most valuable outcome of the project. Starting with the original question of a 3D printable design of furniture of a mobihub, and changing towards a design guideline and toolbox of how to design a mobihub.

Structure

A total of 20 weeks I could fill with working on this project, the first question you have to answer is where to focus on.

Instead of the classical approach to a design project with an analyse ideation conceptualization and embodiment phase, the structure of the project was customized into four design blocks. This because the topic asked for an flexible approach since it is a the broad, new and complex topic. Splitting up the project was a good move, because this iterative way of designing made it possible to discuss outcomes with different stakeholders in an early stage. The regular discussions throughout the project strengthened the research, as I was able to incorporate all the feedback straight away.

Next to this it allowed for flexibility. For example, findings made in the first iteration could be explored into more detail in later location specific studies. Even the envisioned end result changed slightly due to findings during the project. We discovered more value could be gained by creating a design guideline discussing topics around mobihubs, instead of one fixed design for the street furniture.

Another advantage of this way of working is that it brings speed into the project, and prevents you from getting lost in endless amounts of information as at the end of every month you need to present results. Although this speed is a limitation as well, as you end up with many insights but less time for diving into details.

Since the four block together form a research the merging it to a story was an important step. Writing the report brought more structure in the project, it connected all the different iterations into one coherent story.

At the start the idea was to split the project into five block instead of four, all blocks of a month in total. Leaving no time for reporting, this has been a planning mistake and I had to skip one block due to that reason.

Missing a block

The block that has been skipped due to the planning mistake should have focused on the design of the furniture, work out the first ideation made during the design for both location. It probably would have strengthen the design principles but without this block the end result is still a coherent story.

Research by design approach

Using design as a tool to research the topic of mobihubs gave rise to unexpected results and directions. By starting to design something you stumble upon new topics that enrich the project. For example, during the design for Utrecht the implementation caught a lot of my attention and became an important factor for the design. Another example is the third iteration, where the need of a traditional street is questioned. While working on other versions of the street new possible facilities and other strengths of the mobihub came into the picture.

Summarizing in guideline document

The main end result of the project is a guideline and toolbox on how to design a mobihub and why they are needed. he focus is on conveying the information that has been gathered so others can build upon this knowledge. From my point of view this is a valuable outcome especially due to the state mobihubs are in right now. Probably a more valuable outcome than just a design of a package locker and charging pole in the same style.

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APPENDIX

1. Original brief
2. Conversation resident of Zandhofsestraat
3. Mail conversation project planner Utrecht
4. Co-creation session new apartment complex
5. Guideline

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Cities are cluttering full with cars, shared mobility could help in limiting the amounts of private owned cars. Even give the user more freedom in ways of transportation, because many different options are available. Until now the different options for shared mobility aren't working smoothly together, so switching from one to another or exploring options can be a hassle. On top of that the way most forms of shared mobility is organized, is cluttering the city as much as the cars.

The mobility point could be a solution for this. Mobi points are envisioned to be placed in the city as well as the rural area. For this project the scope will be within the city, due to my interests in saving space in the city.

The project setup can broadly be separated into two parts, in which the first has a broader scope. In this first part the development of and cities and shared mobility in the coming 10/15 years will be studied. The findings about cities development and shared mobility will serve as input to a vision of how the idealist future city will look and what role mobility points will have in them.

Where the second part is zooming in and will have a more defined scope. Here I will work towards a design that could be realized in the near future. To make this design more tangible Advier can provide me with a real case in which they want to develop a mobipoint. This concept will be based on the design guidelines that came forward from the vision, and will be the first step towards this idealist city.

ASSIGNMENT **

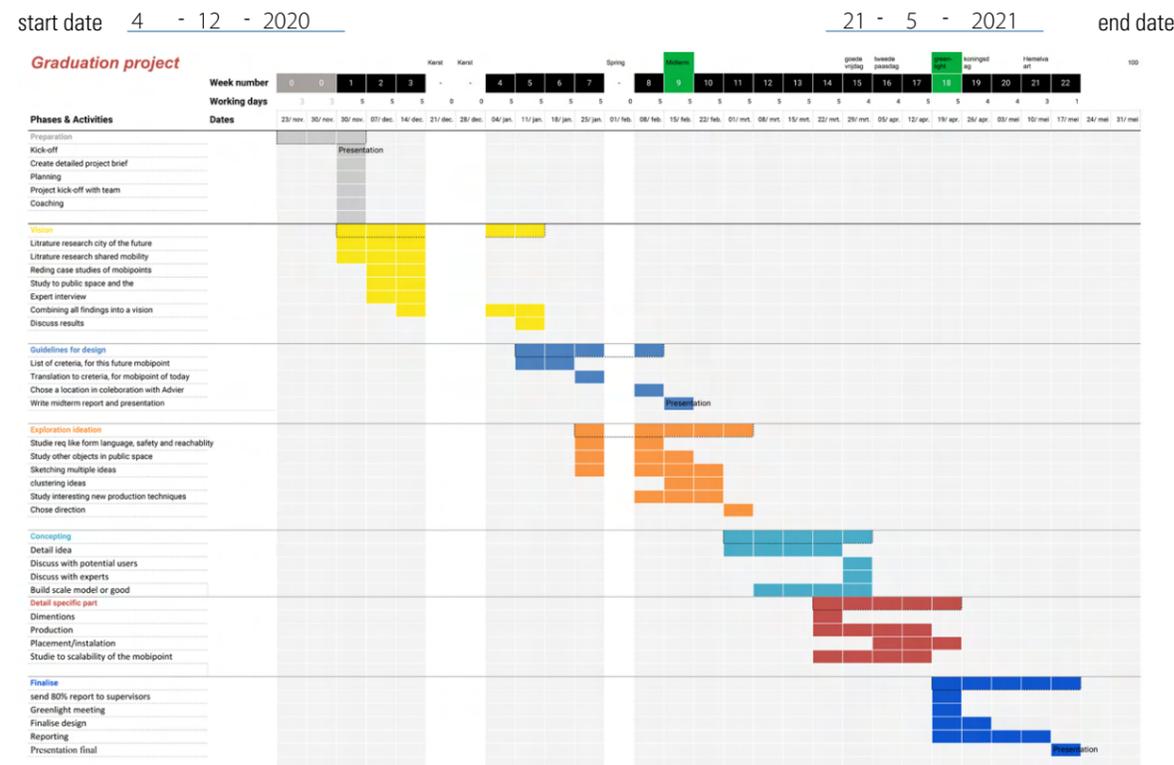
State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

A vision of a future city in which shared mobility is facilitated by mobility points will be made, based on literature research and interviews with experts. Based on this vision a mobipoint will be designed with a specific location in mind (this to make it more tangible). To take it a step closer to implementation, certain parts will be designed in more detail emphasizing the production technique.

The envisioned result of this project is a design of a mobility point, which will give stakeholders a clear image of what a mobility point could add and how it could look. To bring the design a step closer to implementation. a specific part is elaborated in more detail emphasizing the production method.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.



I will be working at the office of Advier four days a week and one day from home. No parallel activities are planned next to my graduation. This means all the weeks not spending five days, are weeks with holidays in them.

Weekly meetings will be planned with my chair, mentor and client.

The planning is divided into phases, each phase has it's own deliverable. These deliverables are made to define what the should be done in that specific part of the planning, by this provide more structure. The first set up of the deliverables can be found in the kick off presentation and will be complemented during the project.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, Stick to no more than five ambitions.

This project motivates me because I believe mobipoints can solve some issues I personally find important. To start with it could contribute to less cars in the city, due to the reason that you need less cars when you share and more substitutable modes come available. Since I was kid I did most of my travels by bike and I still do. I always wondered why the car conquered such a big space in the city. Recently I heard more and more people complaining about this and governments trying to get rid of all the cars in the city center. Next to this, the change towards electric cars is more easy when this option is provided by the carsharing companies. I hope to contribute to these trends by designing a useful mobility point.

Quite a while ago when I had to choose what I wanted to study, I had to choose between Industrial Design and Architecture. Although I think I made the right choice, I like the fact that this project has a bit of a crossover.

During this project, I want to give insights of what I think mobility points could have as added value and show how they could look. Since the topic integrates many fields, like architecture, human behavior, form giving, production and many more. I want to use the strength of an industrial designer to be able to understand and combine insights, limitations and opportunities from different fields.

Appendix 2 Conversation with Michiel

Context:

We got in touch through the municipality of Utrecht. This was a connection that Advier had with them.

Michiel, a resident of the street for which I was making a design, was trying to set up sharing cars with the street. He is talking to the municipality about this. With regard to parking permits

Summary conversation:

Michiel explained in dept how the whole process had gone till now. From the idea came about, to how he approached the rest of the street. Two years ago the idea arose with a neighbour to

whom she sometimes lent the car. they wanted to expand this to save costs and maybe free up some parking spaces to set up a table or something else.

Invitations had been sent to the rest of the street and a provider had been found. Michiel felt that there was a lot of enthusiasm because it was not being done from the municipality but from the street itself. He was afraid that if he would stop taking the initiative, the concept would not spread to the rest of the neighbourhood. He also mentioned that it was a lot of work to figure everything out. According to him, a manual or guide for this process would get more people to undertake something like this.

After this, we went through my ideas, which were a little more zoomed out than the process of Michiel. The issue of not taking the lead no more was solved by the attention the design would get.

4 Co creation

Hoi Jip,

Dit ziet er gaaf uit! Het lijkt me inderdaad slim om aan de voor- en achterkant van het blok ruimte te maken om enkele deelauto's te kunnen plaatsen en dat er behalve voor nooddiensten geen ruimte voor auto's in de straat is. Zo te zien zijn er geen gehandicaptenparkeerplaatsen in dit deel van de straat nodig waardoor dit een relatief eenvoudig uit te voeren plan is met een afsluiting voor en achter en shared space voor fietsen en voetgangers tussen huisnummer 3 en 53. Hopelijk kan het vervolgens als olievlek door de buurt/wijk/stad als inspirerend voorbeeld dienen.

Qua pakketkluisen voorzien we die momenteel niet in de openbare ruimte maar meer bij pick up points zoals je die ook bij de AH en de Jumbo hebt. Om het geheel minder kostbaar te maken en sneller door de besluitvorming te krijgen zou ik Michiel adviseren die als optioneel toe te voegen en uit het basisontwerp halen.

Qua verzonken fietsparkeren ziet dat er heel gaaf uit. In die omgeving is zo nu en dan wel wat wateroverlast. In hoeverre dat specifiek in deze straat speelt zou Michiel moeten kunnen toelichten. Meer info via [Waterproof Zeeheldenbuurt | Gemeente Utrecht](#).

Qua straatmeubilair is <https://www.utrecht.nl/fileadmin/uploads/documenten/ondernemen/bing-beheer-inrichting-gebruik/2020-04-atlas-meubilair-productbladen.pdf> misschien wel handig om zaken snel door de besluitvorming te krijgen. Deze heb ik eerder met Michiel gedeeld.

Hopelijk helpen jouw schetsen om Michiel een beetje snelheid te geven.

Hartelijke groet,
Remco van der Panne

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.



3 Co creation

Goal and set-up

To gain insights and get acquainted with the location of heerhugowaard a co-creation was held with fellow students.

To get into the topic the participant had to bring pictures of their current street and present what they would like to change.

The goal of the session was to have a discussion on how to divide space. The participants were provided with basic info about the location and the target groups who was envisioned as the residents. They could all chose one group which they had to represent.

The site plan for this area was printed with only the location of the houses and the infrastructure around the location. The rest was left open to the participants

Before starting to design, a short presentation on the possibilities of shared mobility was given.

Outcome

After the presentation, all participants were hyped about shared cars and started to fill in everything with green and pedestrian lanes. Of course, it was a bit of an overreaction because it felt like a game and non of them was really moving to this apartment complex. Nevertheless, it was interesting to see the enthusiasm about the space that would get available.

When everything was green someone posed the question he 'when I have to move how do I get my heavy furniture to my house?' After this the design was adapted to more accessible for cars, but systems came up to limit the frequency cars would use this infrastructure.

Overall it had been an inspiring afternoon with many discussions about the public space.



Doelgroep Jonge Digitalen

Wie zijn ze?

- Jonger dan 40 jaar
- Alleenstaand Geen kinderen
- Middelbaar opleidingsniveau
- Student met parttime baan of werkloos
- Bredemiddelbaar
- Sociale huurwoning (appartement)
- < 90 m²
- 1945 - 1969
- Geen auto

Jonge Digitalen doen een opleiding, werken parttime of zijn werkzoekend. In alle gevallen is deze groep veel op internet te vinden. Bijvoorbeeld voor het opzoeken van informatie, het bijhouden van social media en het inschrijven op datingsites.

Het opleidingsniveau onder jonge Digitalen is zeer gevarieerd, van een lagere opleiding tot een universitaire studie. Wat ze gemeen hebben is dat ze sterk in hun schoenen staan. Ze weten wat er te koop is in de wereld, ondanks hun beperkte budget. Omhoog is de jonge Digitalen verhuisd naar een appartement van maximaal negentig vierkante meter. Dit appartement staat in middelgrote steden als Groningen, Delft, Wageningen, Leiden of Nijmegen.

In tegenstelling tot wat de groepnaam doet vermoeden, onderhouden deze jongeren ook offline hun sociale contacten goed. Jonge Digitalen met een parttime baan werken vaak in de horeca. In hun vrije tijd is de kans groot dat je de jonge Digitalen tegenkomt op wintersport, in hotels ergens in Europa of op een popfestival. Ze zijn te herkennen aan een smartphone in de ene en een Red Bull of Corona in de andere hand. Thuis staat de televisie bijna niet meer aan. Alles gaat online. Heel soms wordt er nog naar MTV gekeken of staat de radio op SlamFM/gestemd.



Doelgroep Stedelijke Balanceerders

Wie zijn ze?

- Jonger dan 40 jaar Alleenstaand of samenwonend
- Geen of in sommige gevallen jonge kinderen
- Lage tot middelbare opleiding
- Werkloos of studentend Bredemiddelbaar
- Huurwoning
- < 90 m²
- 1900 - 1969
- Geen auto, wel een brommer of scooter

Stedelijke Balanceerders wonen in een huurappartement midden in de stad. Deze groep is meestal van Turkse, Marokkaanse, Antilliaanse of Surinaamse afkomst. Materieële zaken zijn niet het meest belangrijk voor deze doelgroep. De belangrijkste wensen zijn een gelukkig gezin en een iets grotere woning.

Stedelijke Balanceerders wonen alleen of eventueel samen met partner en jong kind in een multiculturele wijk in grote steden als Den Haag, Rotterdam, of Amsterdam. Hun appartement is klein en ligt vaak boven een bevelinkel of toko. Sommige Stedelijke Balanceerders wonen iets ruimer in een kleine tussenwoning.

In hun vrije tijd onderhoudt deze groep goede contacten met buren en familie. Respect, beleefdheid en gehoorzaamheid krijgen Stedelijke Balanceerders dan ook van jong af aan mee. Als ze geen bezoek hebben, kijken ze er online naar films of naar een commerciële zender op televisie. Ook zijn ze regelmatig in de stad te vinden bij winkels als Van Haren en de Media Markt. Ze hebben niet veel geld te besteden, dus boodschappen worden gedaan bij de goedkopere supermarkt. Als deze groep op vakantie gaat, is dat vaak om een bezoek te brengen aan familie in bijvoorbeeld Turkije of Marokko. Niet leven is niet altijd even makkelijk of spannend, maar deze groep is wel gelukkig.

