

Design of a living as a service platform including shared mobility

Strategic Product Design

Master Thesis

By Xueyao Li

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Executive Summary

This graduation project starts with the goal of making a mobility hub as part of living services.

The project follows an improved double-diamond method.

First, I analyzed the different types and components of mobility hubs. Based on the goal and focus of this project, I determined that the scope of the mobility hub in this project is the community, and the service targets are the residents of the community.

The concept of living services in the project is defined as the living service package which includes the rental service and a series of additional shared services, such as shared space, regular cleaning and maintenance.

In the user research phase, I conducted online surveys and qualitative interviews. The purpose is to understand how different types of users participate in shared mobility and shared living services, and their needs and expectations for community-scaled shared services.

The results show that tenants living in shared living communities (Figure 1) have higher demand and expectations for shared services, thus can be seen as the target users of this project. What's more, it is found that there is strong association between people's community life and their participation in shared services. The aim for tenants to participate in shared services is to enjoy a better community life. Therefore, in addition to the physical shared facilities and space, tenants expect value-added services to help them use shared services without concerns and better manage their community life.

Based on the results of user research and discussions with Advier, I took DUWO community as the example for further design and came up with the following design intention:

I want to design a living service concept including mobility, for a community that takes DUWO apartments as an example, to support tenants' community life.

Figure 1. An example of shared living community



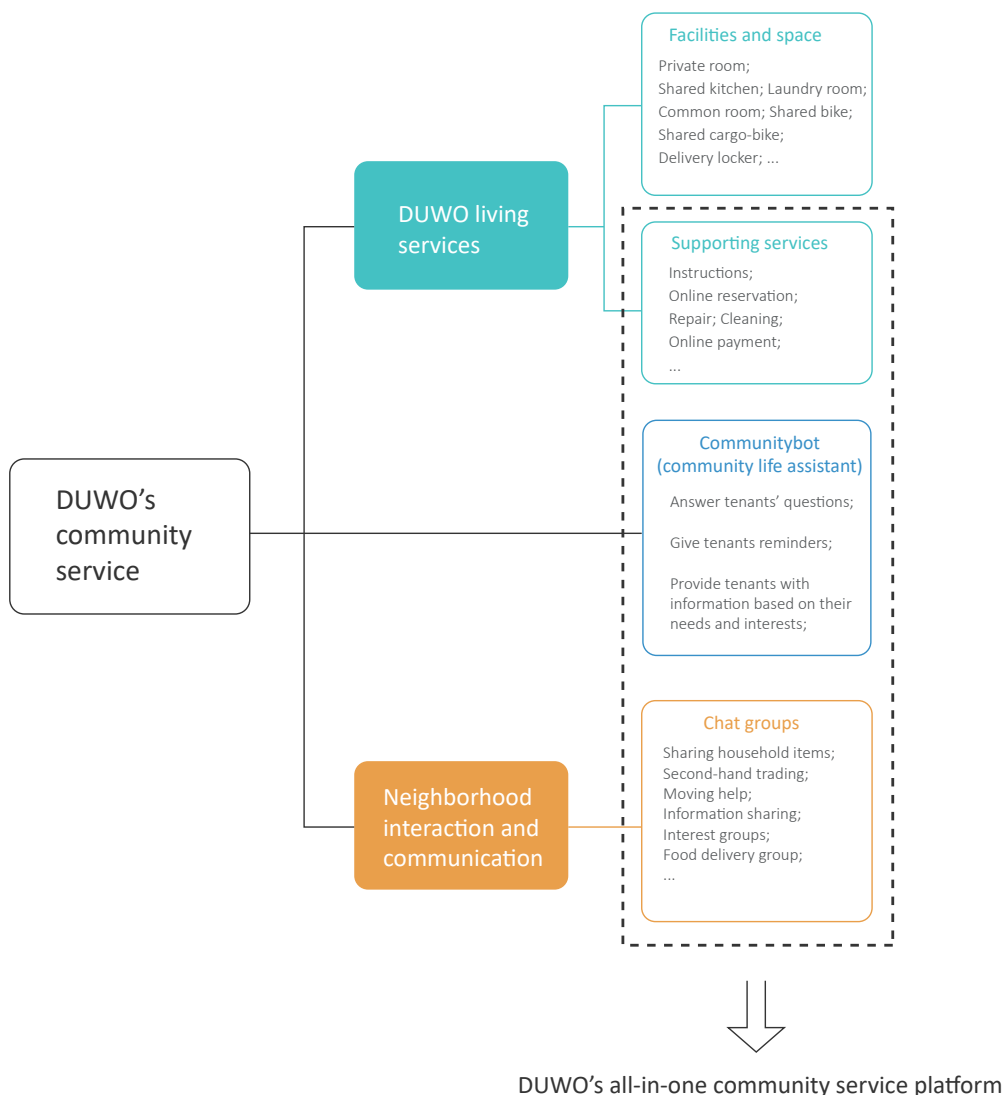
After investigating DUWO's current living service system and conducting online sessions with DUWO tenants, I designed the improved DUWO community service system (Figure 2). Except the physical facilities, all the other community services (in the dashed frame) are integrated into an all-in-one community service platform. The concept was prototyped and tested with target users and iterated based on users' feedback.

The final design, DUWO community service platform, integrates all DUWO's living services including shared mobility, and also provides tenants with neighborhood interaction and communication services. The communitybot

acts as a community service assistant, answers users' questions and provides users with suggestions and information based on their living conditions.

The final design was evaluated with DUWO experts, and it is considered to be a user-friendly solution to help DUWO tenants enjoy their community life. It is not limited to the functional combination of shared mobility and shared living services, but also makes up for the deficiencies of DUWO's shared services in supporting services and neighborhood interaction.

Figure 2. An overview of the improved DUWO's community service structure



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CHAPTER 1 INTRODUCTION



Figure 3. A Mobipunt concept made by Advier

Why integrate mobility hub into living services?

The concept of "ownership" has changed dramatically in recent years, especially when millennials choose affordable, practical products and services. Not only mobility as a service, the concept of living as a service (LaaS) is also developing.

The core idea of LaaS is that ownership is not all (Verveen,2019). Regardless of the product or service, shared ownership has become a viable option. This means that users can subscribe to living services when renting a house. They pay for rent and service fees to enjoy various services around the house, such as house cleaning, gym, laundry, and of course mobility services. A typical example of LaaS is co-living (also called shared living) as shown in Figure 3, which enables people to share spaces and facilities with like-minded people (Timalsina, 2020).

In this project, a mobility hub is going to be a part of living services. The commonality between the mobility hubs and LaaS is replacing ownership with the right to use. By providing

shared products and facilities, they enable people to enjoy convenient and flexible lives at an affordable cost.

Mobility hubs offer diversified sustainable travel options, including shared cars, shared bicycles, public transportation, etc., thus people are encouraged to reduce their use and purchase of private cars. When a mobility hub comes to a community, fewer cars will lead to more space for other facilities that benefit the residents, such as parks and squares. For the tenants and house owners living in the community, the mobility hub becomes part of the rental add-on services, enabling the service users to have access to multiple travel modes without having their own cars.



Figure 5. An example of co-living concept

Problem definition

The specific facilities and services included in the mobility hub depend on its location and functional positioning. For example, the mobility hub that serves as a transit point in the city and the mobility hub located in the suburbs have different sizes and functions. It's a new idea to put a mobility hub in the context of a community and make it a part of living services. For a community-scale mobility hub, it is necessary to study which services and facilities it needs to provide. Therefore, it leads to the essential problem to be solved in this project:

When mobility hub becomes part of living services, what characteristics should it have?

What facilities and services should the mobility hub provide?

The purpose of the mobility hub is to facilitate residents' travel and daily life, and its functions and services should meet the needs of residents in the community. However, a community is made up of different types of residents, such as tenants and home owners. The difference in their identities may result in the different attitudes and acceptance of shared services. Their demand for living services and mobility-related services are also different. Therefore, before determining the functions and characteristics of the mobility hub, the following questions must be clarified:

What are the living-related and mobility-related needs and pain points of different types of residents?

What factors do people care about when they participate in shared living and shared mobility services?

1.2 Design Labs, Advier & SHARE-North

The project was completed with the help and guidance of Delft Design Lab Cities of Things Lab and Advier.

Delft Design Labs (DDL) is an initiative of the TU Delft Faculty of Industrial Design Engineering (Delft Design Labs, 2020). Cities of Things Lab is part of Delft Design Labs, and is aimed at shaping the future of our cities with intelligent things (Cities of Thing Lab, 2020).

Advier is the initiator of the rollout of mobipoints in the Netherlands (Advier, 2020). Advier is also the Dutch partner in the European project SHARE-North. The SHARE-North project

includes the development, implementation, promotion and evaluation of car sharing, bicycle sharing, ride sharing and other forms of shared mobility activities in urban and rural areas and employment clusters (SHARE-North, 2020).

Advier is committed to sharing and promoting the knowledge and experience of mobility hubs. They are currently involved in the realization of mobility hubs network in the north of Netherlands, and are promoting mobility hubs in various new projects. The idea of making a mobility hub as part of living services is proposed by Advier.

Figure 6. Logos of Cities of Things Lab, Advier and SHARE-North



1.3 Project approach

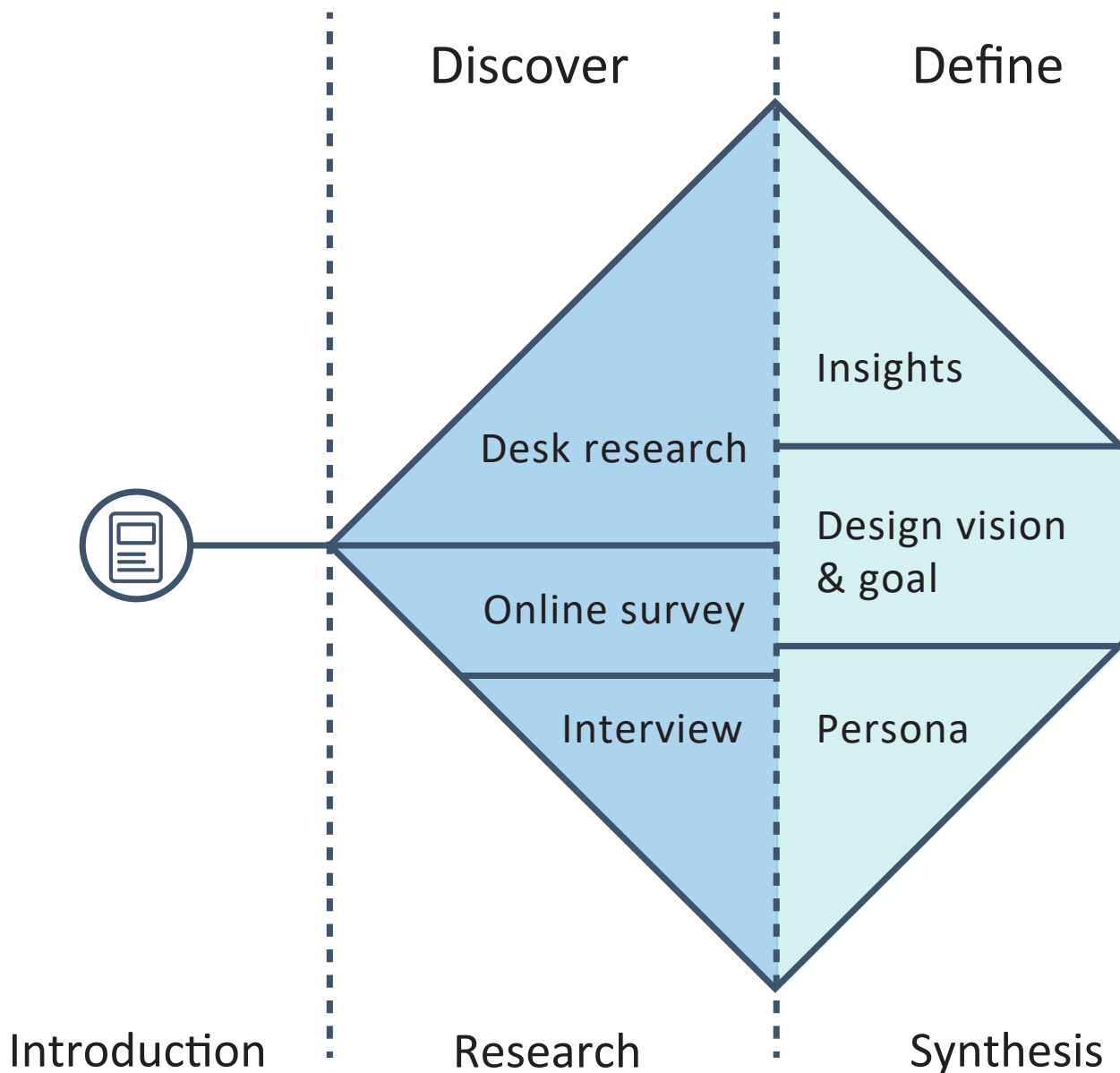
The entire project follows an improved double-diamond method (as shown in Figure 7), which has some complements based on the original double-diamond method (Design council, 2005).

The aim of this project is to design a service concept that makes a mobility hub as part of living services. During the research phase, desk research, online survey and interviews were conducted around shared mobility, living services and users' sharing behaviors.

In the synthesis phase, based on insights generated from the research phase, target users, design intention and goals were determined, which are the basis of design phase.

The design phase starts with ideation, followed by concepts and tests, and after that the iteration starts. The final concept is developed in the final design phase and evaluated with DUWO experts.

Finally, the last chapter provides reflections on



my learning experience and the results of this project.

Research and Design methods

In the research and design process, many specific methods were applied.

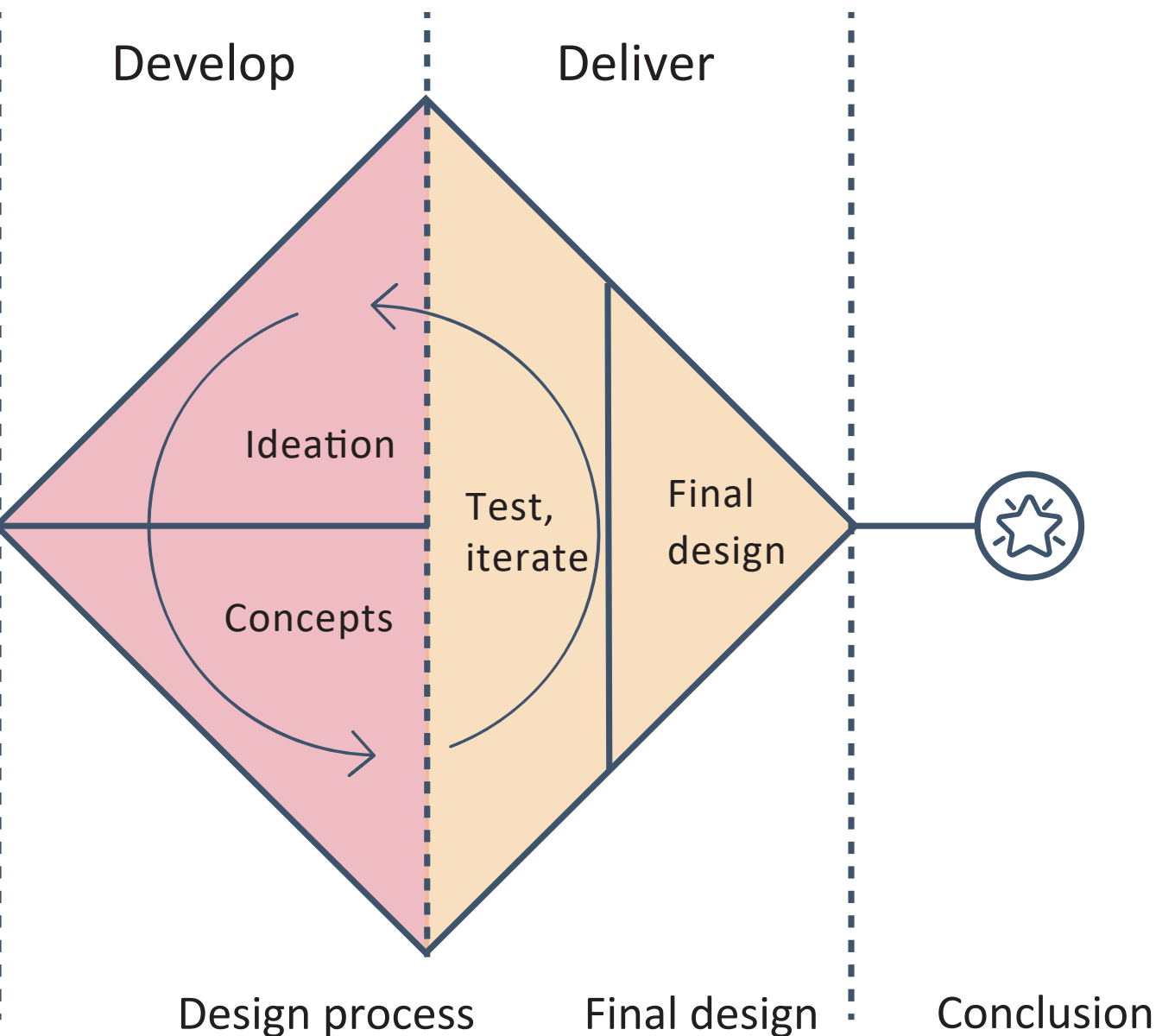
An online survey was conducted before the qualitative interviews, and its results provided a basis for the questions to be discovered in the qualitative interviews .

Grounded theory method (Glaser and Strauss, 1967) was used as a data analysis method in qualitative research, which is explained in detail in Chapter 2.

During the ideation process, two collaboration sessions were performed with the target users, in which a creative facilitation method was used to inspire the participants to generate ideas quickly and freely.

User testing was conducted during the design process, both to test the usability of the prototype and collect participants' feedback and suggestions for improving the concept.

Figure 7. The general approach of this project



CHAPTER 2

RESEARCH



THREE KISSES.
WHAT ARE YOU UP TO?
LISTEN. DRINKS?
NICE TO MEET YOU.
HANDSHAKE. HUG ME.

2.1.2 Types of mobility hubs

The classification of mobility hubs is essential for understanding the concept of a mobility hub from multiple perspectives, and can help us learn how to build a mobility hub in a way that is suitable for the local transportation environment.

The existing literature proposes several different ways to classify mobility hubs (Aono, 2018). For example, the Los Angeles Urban Design Studio (2016) divides mobility hubs into 3 types including neighborhood hubs, central hubs, and regional hubs.

CoMoUK divides mobility hubs into six more

specific types based on the surrounding urban environment and target users (CoMoUK, 2019):

1. Large interchanges / City hubs
2. Smaller interchanges / Linking hubs
3. Suburbs/ Mini hubs
4. Small market town, village hubs
5. Business hubs
6. Tourism hubs

The main characteristics of each type are summarized in Figure 9:

In his master thesis, Jelmer Koedood made a simplified typology of mobility hubs, which divided all types of mobility hubs into three types: neighborhood hub, business hub and transit hub (Koedood, 2020).

Figure 9. Characteristics of CoMoUK's six types of mobility hubs

Large interchanges / City hubs

- Large number of passengers
- Transferring between modes

Smaller interchanges / Linking hubs

- Link local residents to core network services
- First and last stop of a trip

Suburbs / Mini hubs

- Lower density of people with higher private car ownership
- Address local issues

Small market town, village hubs

- Link local residents to core network services
- First and last stop of a trip

Business hubs

- High density of users
- Offer commuting links and back to base solutions

Tourism hubs

- Focus on tourists
- Integrate with other travel services

2.1.3 Community-scaled mobility hub

In this graduation project, the goal is to design a mobility hub as part of living services. The scope of the mobility hub is limited to the scale of a community, and the target users are the residents of the community.

Therefore, from a functional point of view, a community-scaled mobility hub is more in line with CoMoUK's definition of a linking hub, which focuses on linking local residents to the public transportation network and serves as the first and last stop for people to travel.

Goals of a community-scaled mobility hub :

1. Connect communities and public transportation, and facilitate residents' travel and community life.
2. Reduce individual car ownership and provide access to various private car alternative travel modes.

Recommended elements in a community-scaled mobility hub:

Figure 10 shows the recommended components of a small interchanges or linking hub by CoMoUK, some of which are suitable for community-scaled mobility hubs.

- a. **Near bus stops:** Allow users to switch from other transportation modes to public transportation.



Figure 10. The recommended components of a small interchanges or linking hub by CoMoUK

Community-scaled mobility hub	A1-Mobility components: public transport	A2-Mobility components: Non-public transport	B-Mobility related components	C-Non-mobility & Urban realm improvement
<p>Focus on services which link residents in surrounding areas to core network services.</p> <p>An opportunity to offer greater choice to people for first and last trips.</p>	<ul style="list-style-type: none"> - Regional rail or tram - Local bus - DRT feeder service - Taxi 	<ul style="list-style-type: none"> - Back to base car club bay with choice of van/estate car - Bike share (electric & conventional) - E-cargo bike share / trailers 	<ul style="list-style-type: none"> - Secure cycle parking for connecting travellers - Digital pillar (transport info, ticketing, way finding, walk distances, local services) - Freight logistics hub - EV charging bays 	<ul style="list-style-type: none"> - Covered waiting area - Safer crossing & street repairs - Package delivery locker - Wi-Fi / phone charging - Play equipment - Kiosk for refreshments

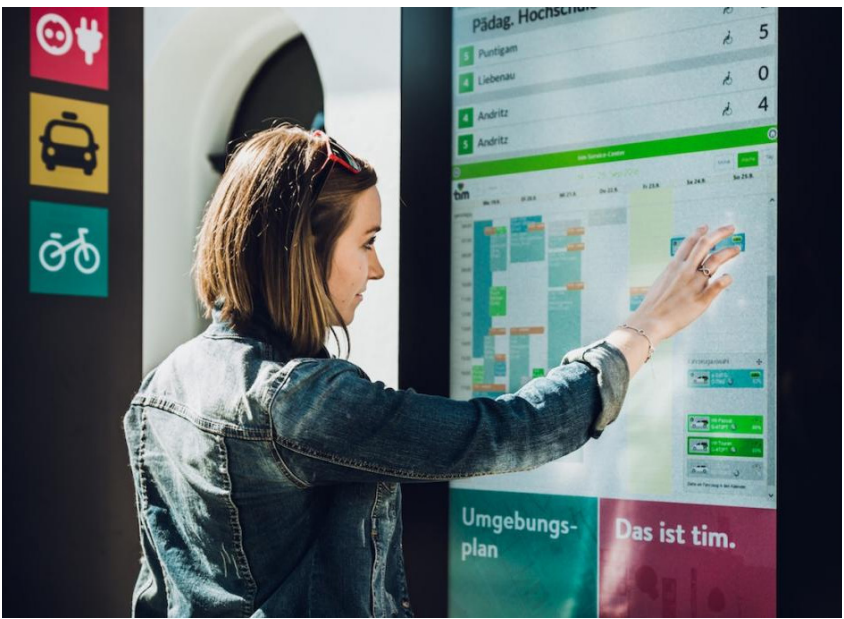
b. Shared bikes:



c. Shared cargo-bikes:



d. Travel information and way finding signs:



e. Smart lockers:



2.2 Understanding Living as a Service

Types of living as a service

After researching and comparing various cases of living as a service, I divided it into 2 types, one is called living service package and the other one is called subscription to living.

Living service package means that in addition to the rental service, a series of services such as regular cleaning, maintenance and repair, internet access, gym, etc. are provided to customers.

In many articles and cases, the living mode with living service package is called co-living, shared living or shared housing. This kind of living mode has become a popular phenomenon in many countries and regions, including the UK, USA, Northern Europe, Australia and New Zealand (Clark et al., 2018).

This type of living service mainly targets young professionals in the city, they can live with like-minded people and share service cost together. An important reason for young professionals to choose this living mode is to alleviate their economic pressure. In many big international cities, the shared housing market is one of the few viable options for finding affordable housing (Carlsson & Eriksson, 2015).

Many of these living services are composed of private areas (such as personal bedrooms) and tenants' shared areas (such as kitchens and living rooms).

The rooms are provided and managed by a housing corporation. DUWO student apartments and Ziroom apartments are typical examples.



Features of Living service package:



Affordable



Sustainable



Interaction in the community



Convenience

In the [subscription to living](#), the rooms are usually provided by the landlord and the platform serves as an intermediary. This type of living service is different from ordinary hotels in that it is mainly aimed at millennial travelers, business travelers, etc., and is committed to providing a better and unique housing experience.

People choose this kind of living service because they can enjoy the feeling of being at home, interact with the local host, get travel tips and experience the local culture (Cui et al., 2018). Therefore, not only are they paying for the room, they are subscribing to a lifestyle.

Examples of this type of living service include Airbnb, Homelike and HomeAway.



In this graduation project, living as a service refers to the first type, namely the living service package. The mobility hub will be part of this package, and bring convenience to users together with other living services.

Case study: Ziroom

In the case study, a desk research on Ziroom's living services was conducted to understand

what services Ziroom is providing, and two tenants of Ziroom were interviewed by phone to understand their experiences and opinions on shared living services.

Ziroom is a Chinese technology company that provides residential products and services. Compared with traditional house agencies, Ziroom eliminates all the redundant links in the traditional rental model, reconstructs the rental market structure through the O2O model, and aims to provide young people with a cost-effective and good quality rental life. Currently, it has properties in 9 Chinese cities including Beijing and Shanghai.

In 2012, Ziroom launched Ziroom apartments, which are high-quality urban apartments, and is committed to creating a smart community linking life and dreams for Chinese youths (Ziroom, 2020). In Ziroom apartments, all the rooms are owned and provided by Ziroom, and the residents are all Ziroom's tenants.

In addition to fully furnished private rooms, Ziroom provides tenants with a series of shared space and living services, including gym, audio-visual area, book bar, DIY restaurant bar, delivery service, room cleaning, maintenance and so on.

In addition to the above living services, Ziroom created community services sections (Z-space and Z-lovi) for tenants, where tenants can find online and offline activities and events, thus enhancing tenants' sense of belonging to the Ziroom's community. Ziroom also has its own APP, where customers can find all the services and information about Ziroom.

Through the interviews with two Ziroom's tenants, I learned that the main reasons for choosing Ziroom are convenience and affordability.

The living services of Ziroom are based on shared economy. The cost is shared by all the tenants, so it is a more economical option for many people, especially for young people who

just started work. The pressure of purchasing houses in big cities makes renting houses a rigid demand for the young generation. For these young tenants, economic factors are the main reasons they choose shared living services, while social interaction is an added value that makes Ziroom apartments more attractive than other rental services.

Figure 11. The shared space and facilities in Ziroom apartments



2.3 Shared services

In this part, the scope of shared services will be defined and the main motivations and barriers for consumers to participate in shared services will be discussed and summarized.

2.3.1 Access-based consumption & Collaborative consumption

With the rise of sharing economy, consumers, especially the younger generation, have undergone great changes in their perception of ownership. They value experience more than owning the products (Morgan, 2019). And the shift in consumers ownership perception has led them to increasingly accept temporary access to products (Hamari et al., 2016).

As a result, other than ownership-based consumption, alternative modes of consumption have emerged, which include access-based consumption and collaborative consumption.

Access-based consumption is market-mediated transactions in which no transfer of ownership takes place (Bardhi and Eckhardt, 2012), and consumers access products by paying rent or membership fees. Collaborative consumption is defined by Botsman and Rogers (2010) as the consumption of goods and services through sharing, renting, swapping or transaction activities. Belk (2014) thinks that collaborative consumption is that people coordinate and allocate resources to obtain money or other forms of compensation.

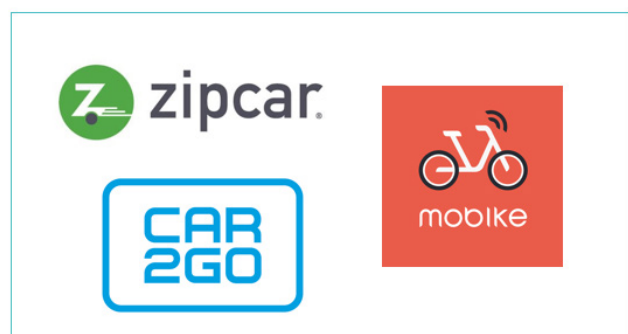
There are different views on the relationship between these two consumption modes. For example, Bardhi and Eckhardt (2012) combined collaborative consumption and sharing in the concept of "access-based consumption", and described collaborative consumption as a subset of the concept of access-based consumption, and named it market-mediated access. In other articles, they are regarded as two different

consumption modes (Edbring et al., 2016).

At present, examples such as car sharing services and Airbnb are classified as access-based consumption in some articles, while other articles regard them as collaborative consumption. After comparing various examples, I conclude that the biggest difference between access-based consumption and collaborative consumption is the original ownership of the shared product.

For access-based consumption, the ownership of the product belongs to the company or platform. Typical examples are Zipcar, Car2go and Mobike, the shared cars are provided by the company.

While for collaborative consumption, it is peer-to-peer and usually mediated by a platform, so the ownership of the product belongs to the customer who provides it. Platforms are responsible for establishing transaction and communication channels between service users and providers, and plays a role of supervision



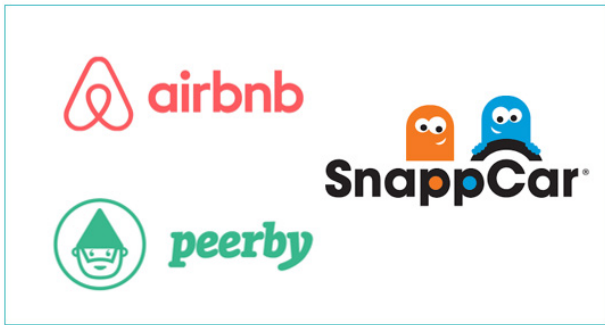
and management. In typical examples such as Snappcar, Airbnb, Peerby and other peer-to-peer platforms, people can choose to become the service providers or service users.

Many scholars believe that collaborative consumption is synonymous with sharing economy. Some people, for example Belk (2014),

thinks that access-based consumption (such as Zipcar) is more like short-term rental activity than sharing.

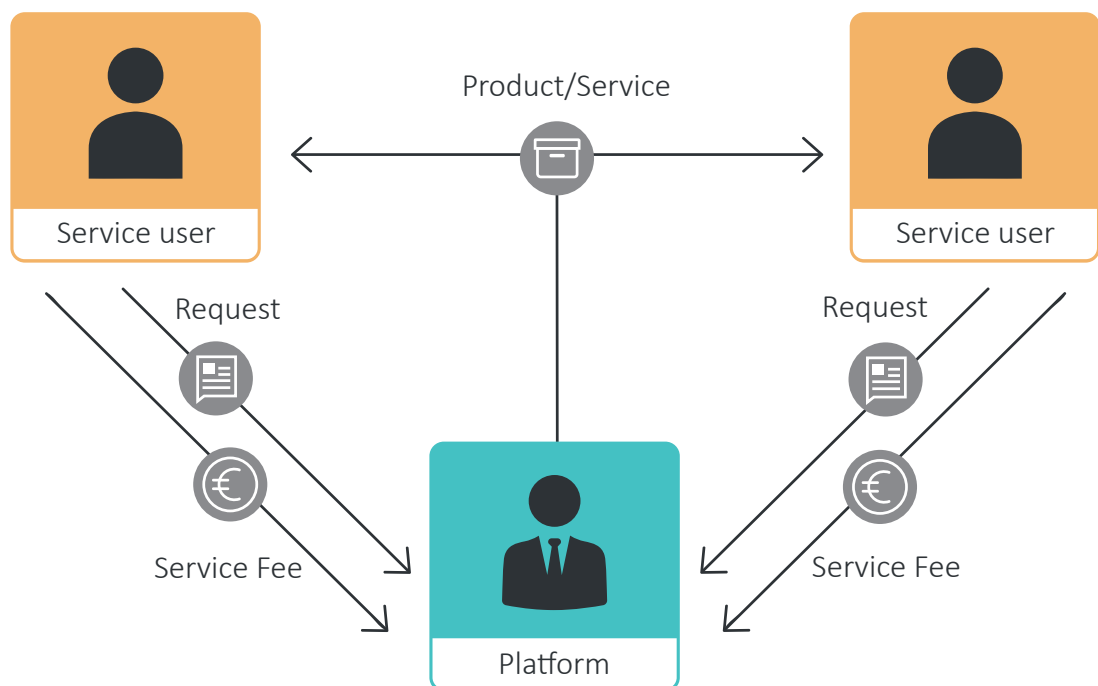
According to my observation, no matter what kind of consumption mode, the common thing is that the product is used by multiple users, and the right to use the product isn't limited to its owner. From a broad perspective, I think the products are shared. Therefore, in my graduation project, I will collectively refer to the services under these two consumption modes as shared services.

Consumer attitudes vary according to consumption patterns and depend on the type of products (Edbring et al., 2016; Baumeister,



Shared services

Access-based consumption



2014). In the case of collaborative consumption or sharing the use of products with others, people have a higher acceptance of sharing products that are rarely used than products that are frequently used (Edbring et al., 2016).

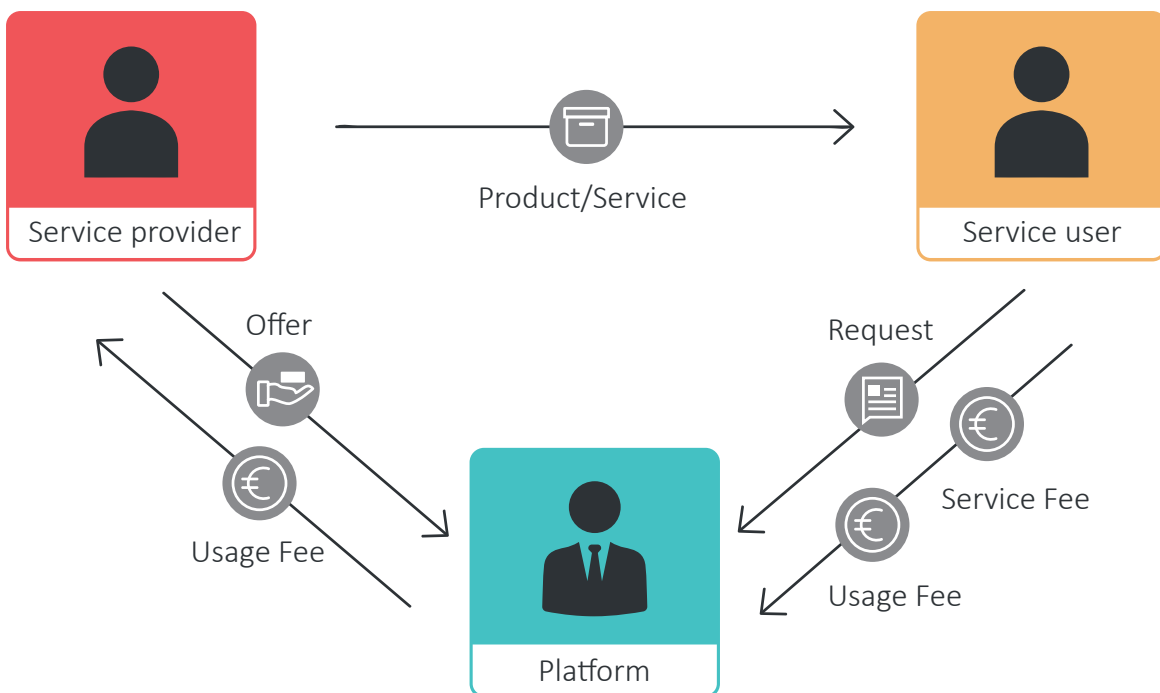
2.3.2 Motivations for people to participate in shared services

There are various motivations for people to participate in shared services, and these motivations can be summarized into two categories.

1. Personal utilitarian values:

Personal utilitarian values are the main motivation for people to use shared services, of which economic reasons are the representative. The researchers found that economic reasons are a major reason why people choose shared services, whether in access-based consumption or collaborative consumption models (Edbring et al., 2016). Especially for products that are used less frequently, it is not worthwhile to purchase these products for temporary use. Thus renting rather than buying is a more cost-effective option.

Collaborative consumption



Apart from economic reasons, personal utilitarian values also includes the convenience and flexibility of shared services (Edbring et al., 2016). For the access-based services, people use the product whenever they need. When they are not using the product, they don't need to worry about maintenance, cleaning, etc.

In the case of car sharing, convenience of the service is even more important than economic reasons, while sustainability considerations will not affect people's choice of shared car (Bardhi and Eckhardt, 2012).

2. Sustainability concerns:

One main benefit of the shared services is to reduce waste of resources and promote sustainability. Research shows that perceived sustainability has a significant impact on attitudes, but has smaller effect on behavioral intentions (Hamari et al., 2016). Similar to other sharing activities, an attitude-behavior gap also exist in the context of collaborative consumption (Hamari et al., 2016). In terms of motivation, people are more realistic and value their personal interests. They understand that shared services is beneficial to environment, but this motivation comes after personal interests.

2.3.3 Barriers for people to participate in shared services

Consumers will also encounter various barriers about taking certain risks when using shared services. I summarize these barriers and risks into the following types.

1. Less feeling of ownership:

Research has shown that there is a strong relationship between perception of ownership and perceived risk such as unavailability of services (Billows and McNeill, 2018). Belk (2010) proposes that consumers will experience a sense of perceived ownership over shared products, even though no transfer of ownership is involved.

However, Bardhi and Eckhardt (2012) found that in the case of car sharing, the situation is

different. Sharing the car with others reinforces the sense of "It is not mine" and reduces the obligation to take care of the car. Less sense of ownership leads some users to seek their own interests at the expense of the interests of other users, resulting in many irresponsible behaviors, such as throwing cigarette butts in the car.

2. Lack of trust in other users:

Another obstacle to using shared services is the lack of trust in other users. As mentioned above, some irresponsible people will sacrifice the interests of others for their own benefit. In terms of collaborative consumption, many people are reluctant to share products with unfamiliar people. But if the product has less personal value, people are more willing to share it with strangers (Edbring et al., 2016). In the sharing economy, the establishment of a clear responsibility allocation mechanism will help eliminate the obstacles caused by lack of trust.

3. Worry about special circumstances:

People's concern about the unavailability of shared products in certain situations is also an important reason that prevent them from using shared services. The resources of shared services are limited. People cannot ensure that the shared products are available in any situation.

Billows and McNeill (2018) compared consumers' willingness to use an access-based parking lot with a traditional non-shared parking lot and found that perceived risk is a major barrier to using shared services. Because of concerns about insufficient parking spaces during peak hours, even if the access-based parking lot is more cost-effective, people still prefer to use the traditional parking lot. Therefore, many people will still choose the safest and most secure purchase mode when their economic conditions allow.

2.4 Online survey

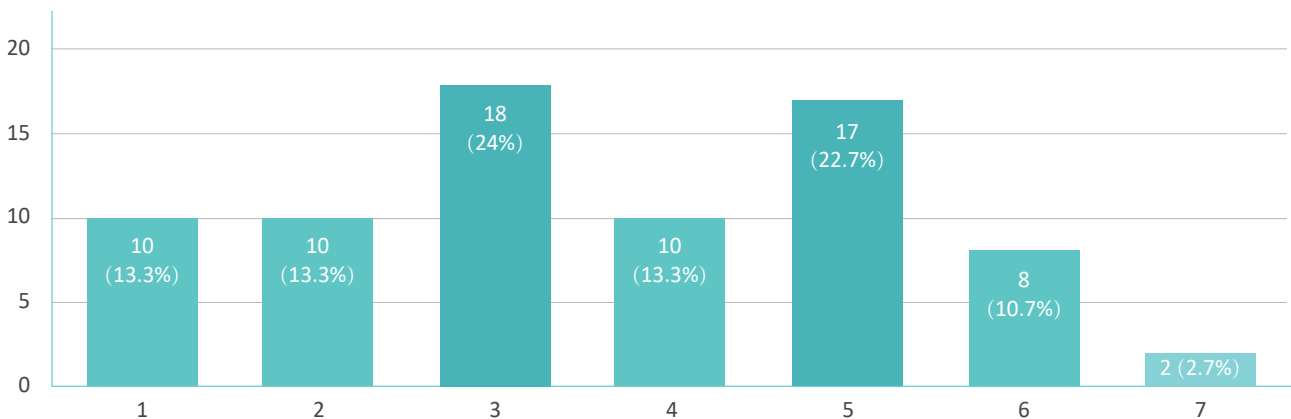
In order to further explore the barriers and motivations of consumers to participate in shared services in the field of shared mobility and living services, I conducted an online survey. A total of 75 responses were received from 16 homeowners and 59 tenants.

Insights from the online survey

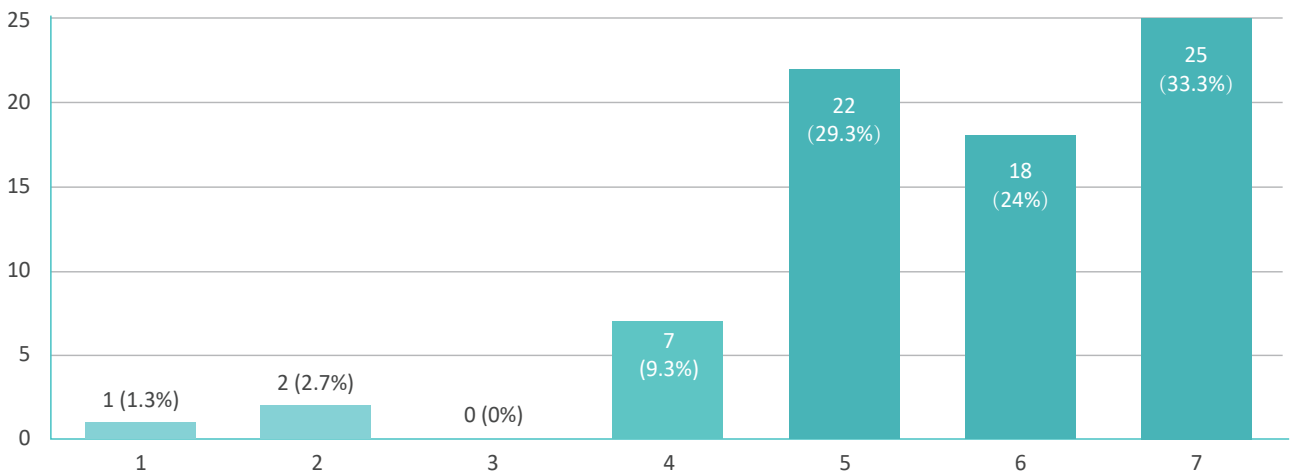
1. Compared with selling the vehicles that are rarely or no longer used, people have a less positive attitude towards sharing their own vehicles with others.

According to the data in the below chart, the average willingness to share the vehicles is 3.617, while the willingness to sell the idle vehicles is 5.675.

People's willingness to share their own vehicles with others living in their community.



People's willingness to sell their idle vehicles to their community for other residents to use.



2. People's willingness to share vehicles with others is influenced by the type of vehicles. Bicycles (referring to city bikes instead of hobby bikes) are the type of vehicles that respondents most want to share in the community.

3. The main motivation for people to use shared living services is economic benefits, including enjoying more space and facilities with affordable rent (73.6%), and saving expense on household items (56.9%). Another main motivation is the sustainability concern (63.9%). In contrast, interacting with other users and establishing social relationships are less important factors that motivate people to use shared living services.

4. There are some obvious differences in sharing habits and motivations between tenants and homeowners. The tenants share the most are the laundry room and household tools. For house owners, 33.3% of people currently do not use any shared housing facilities, most of the rest share household tools, and a few share public working place.

The main motivations for homeowners to use shared living services are the same as tenants, which are enjoying more space and facilities with affordable rent and sustainability concern. However, the proportion of homeowners who choose saving money on household items is lower than that of tenants, and the proportion of social interaction reasons is much lower than that of tenants.

5. The most anticipated services provided by the mobility hub in the community are shared bicycles (82.7%) and the connection to bus or tram stops (88%). Therefore, these two services are residents' basic needs of a mobility hub in the community.

46% of the respondents want to have shared cars and parking space, while 43% of respondents want to have shared cargo bikes and scooters. So these services are icing on the cake and can be added according to the size of

the community and the opinions of residents. In qualitative interviews, I will further ask people about their specific needs of these services.

6. The survey results show that people most trust the local government to manage the mobility hub, followed by housing companies. This result is not exactly what I expected. Considering that the mobility hub is built in the community and is a part of the living service, it seems more reasonable to be managed by the housing corporation. But the survey did not suggest respondents that the mobility hub is part of the living service.

In addition, the proportion of homeowners associations is the lowest, which is 20.8%. However, the proportion of homeowners who selected homeowners' association reached 33.3%, which is much higher than the overall proportion. This shows that, compared with tenants, homeowners are more willing to let homeowners associations participate in the management of mobility hub.

So in the qualitative interviews, I will explore more about the reasons why respondents choose their trusted association.

2.5 Interviews

I conducted 9 qualitative interviews in order to further explore the attitudes, experience and needs of homeowners and tenants towards shared living services and shared mobility. A total of 4 homeowners and 5 tenants were interviewed. The interview guide is attached in Appendix B.

Main goals of the qualitative interviews

1. Discover and compare different user groups' (homeowners and tenants) motivations and obstacles to using shared services.
2. Explore user perceptions of vehicle ownership and attitudes toward sharing their own vehicles.
3. Discover the needs and expectations of different user groups (homeowners and tenants) for the mobility hub in the community.

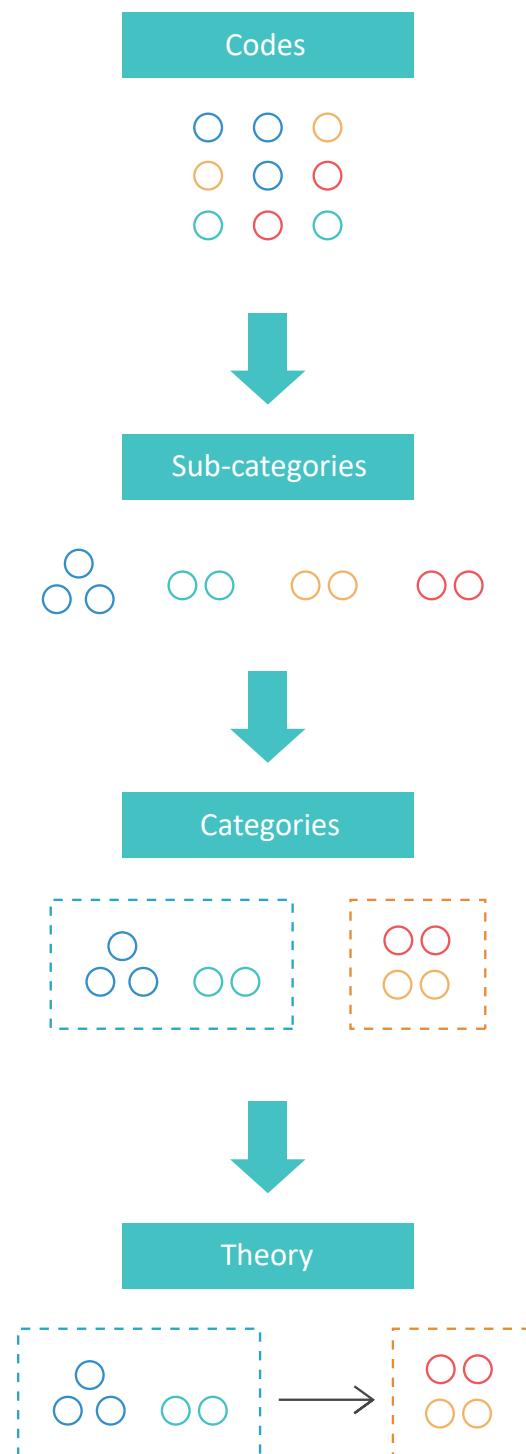
Data analysis approach

The interviews were audio-recorded and transcribed. In the process of data analysis, I followed the grounded theory method (GTM) and coded and classified the interview content in ATLAS.ti. An overview of the codes is made and attached in Appendix C.

Grounded theory method is developed by Glaser and Strauss (1967) and widely used in qualitative research. The goal of this method is to build up a theory (a set of relationships among concepts) which is based on the data itself.

The core process of GTM is coding, which transforms the concrete statements in the interviews into analytic interpretation. Then the similar codes with same subject or feature are organized and grouped into sub-categories, and then the similar sub-categories are emerged into bigger categories. The final step is detecting the relationships between the categories and visually map these relationships.

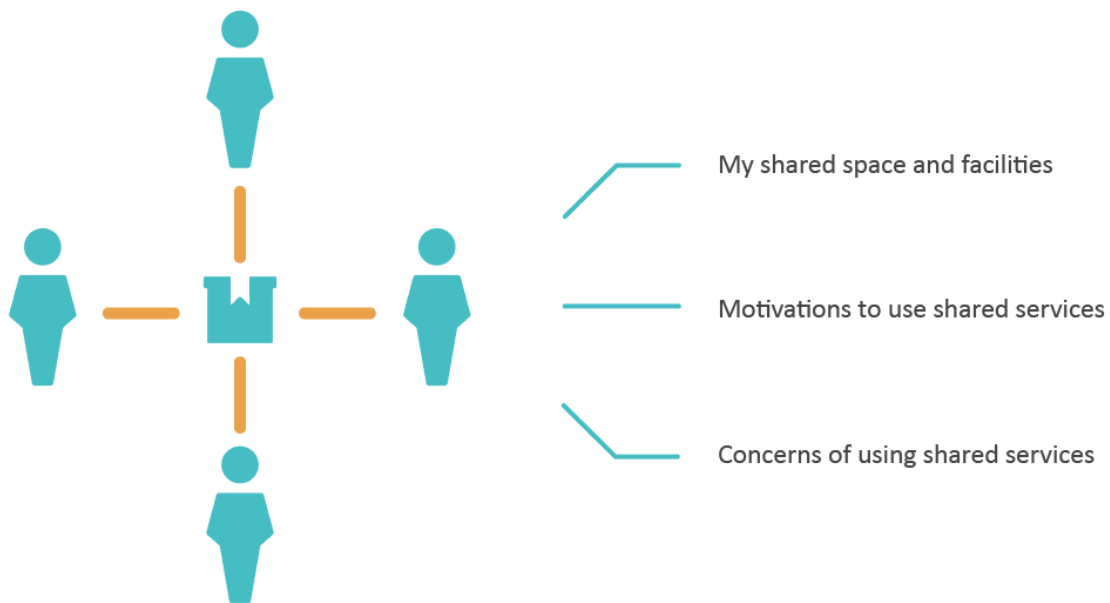
The steps of grounded theory method



Explain of the categories

A total of 50 initial codes were obtained from the interviews. An overview of all the initial codes can be found in Appendix C. These initial codes were classified into 14 sub-categories, which were finally grouped into 6 larger categories.

Category: Participation in shared services

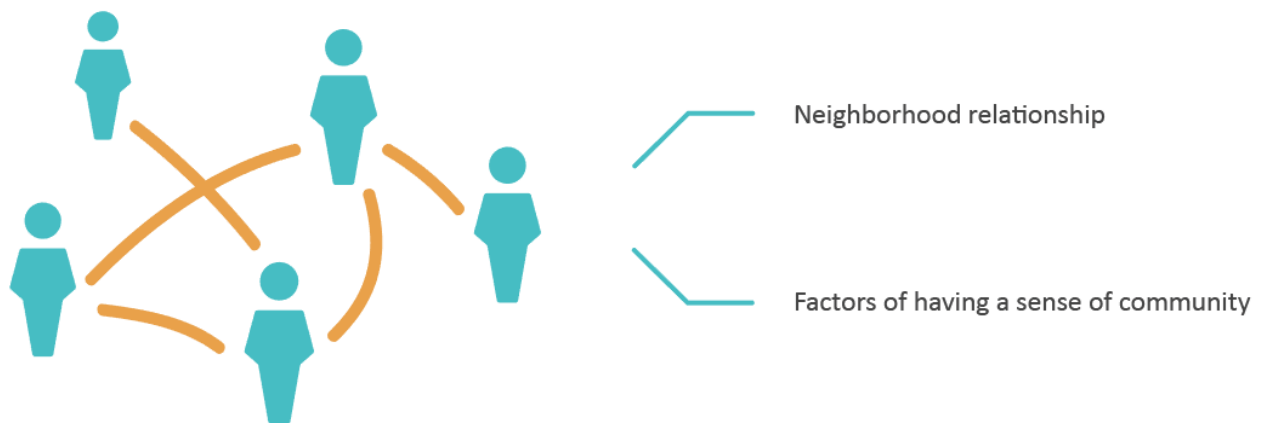


Compared with homeowners, tenants have more experience of using shared spaces and facilities, and also have more motivations and concerns to participate in shared services. The main space shared by the owners is the garden, parking space, etc., while the tenants share the kitchen, lounge, washing machines, bathroom, etc.

In terms of motivations for using shared services, the most frequently mentioned are economic reasons, such as enjoy more space with affordable expense and save money on household items. All the tenants expressed various concerns about using shared services, the main concerns are the uncertainty about availability, irresponsible behavior of other users, and concerns about hygiene and damage of shared items.

In addition, people's preferences for the shared consumption model of different products are different. For the cars, bikes, cargo bikes, etc., interviewees prefer to use access-based consumption, which means that vehicles are provided by a service platform, and people in the community have the right to use them. The reasons will be explained further in the fourth category (Share my own vehicles with others). For some household items such as cleaning tools and repairing tools, the interviewees are willing to choose collaborative consumption and share their own items with others.

Category: Community life



The community life category is composed of two sub-categories, neighborhood relationship and factors of having a sense of community. I found many new and unexpected insights about community life from the interviews. First of all, although the living conditions of the homeowners and tenants are different, there is a great similarity in their understanding of the neighborhood relationship. The neighborhood relationship is between friends and strangers, and most of the respondents are satisfied with the current neighborhood relationship.

"I just say hi to neighbors when we meet. But roommates are more like friends."

"Neighbors are not equal to friends."

"This is the ideal relationship, I want to keep it simple."

However, in terms of community awareness, tenants have a significantly stronger sense of community than homeowners. On the one hand, the community where the tenants are living is managed by a organization and provides multiple shared services, thereby promoting the interaction of tenants in the community. On the other hand, the similarity of tenant identities (for example the student apartments) allows them to have more common topics with each other.

Category: What car ownership means to me



This category includes two sub-categories, benefits of owning a car and factors determining whether to own a car. Homeowners and tenants have relatively similar attitudes toward car ownership.

The main reason people can't give up owning a car is the sense of security and freedom brought by the car. Owning a car ensures that it is always available when needed, especially in emergency situations when you can not find a shared car. The interviews also found that boys care more about the driving experience brought by the car and choosing the brand of a car, which cannot

be achieved with shared cars.

Family and economic factors have a great influence on people's decision whether to buy a car. For some people, car is not only a transportation tool but also a storage space. Although as students, some interviewees do not currently rely on private cars to travel, they said it would be more convenient to have a car after having a family. On the other hand, high parking fees and shortage of parking spaces are a big concern for people to buy cars.

Category: Share my own vehicles with others



People have a preference for the sharing model of different products. Unlike the active use of shared vehicles provided by companies, people do not tend to share their own vehicles with others.

Consistent with the findings in the online survey, people are more willing to sell idle vehicles than to share with others, unless the economic benefits or other forms of return from sharing the vehicles are attractive enough. Because when selling the idle vehicle, people no longer need to be responsible for it, and don't have to worry about the hygiene and safety issues that arise when sharing it with others.

Many interviewees expressed their desire to decide whether to share and with whom to share. If a familiar person temporarily borrows their car, they are willing to share, and do not even need to be rewarded, but only if this does not affect their own right to use.

Category: Living situation



The fifth category is the living situation, including the interviewees' living environment and travelling modes.

Different living environments lead to different community life, among which the student group has the highest awareness of the community.

The living environment of the interviewees is affected by their economic conditions and life phase. All students live in apartments with shared space, single people who already have jobs live in rented houses alone, and those who have become married live in their own houses with their family.

The travelling modes vary according to interviewees' personal needs and are also affected by the traffic condition of the city where they are located. For example, their shared travel modes depends on the shared travel service provided by the city.

Category: Expectations for shared living and mobility services



The interviews found that homeowners and tenants have very different expectations for living and mobility services.

The most mentioned services include shared bicycles, delivery locker, shared cargo bikes, connecting public transportation, etc. Based on their experience in participating in shared living services, tenants also put forward suggestions to ensure and inform the availability of shared

Tenants obviously have more demand for shared living and mobility services than homeowners.

living and mobility services. Students also proposed services for the trading and recycling of second-hand household items and bicycles when moving out.

Since homeowners already have their own house, cars and bicycles, they have much lower demand for shared living and mobility services. Their most expected service is the delivery locker, while other facilities are not their basic needs.

For the management of the services, homeowners said that the services should be managed by the homeowners association, while tenants all agreed that the housing company should manage them. When the tenants understand that the service scope of the mobility hub is their community, they all said that the government is not the suitable management organization, because it is more suitable for managing larger-scale public facilities.

Relationships among categories

Figure 12 shows the relationships among the six categories.

Sharing own vehicles is a form of participation in shared services, and is influenced by people's attitudes toward car ownership. People's attitude towards sharing their own cars can be attributed to the meanings of car ownership for them.

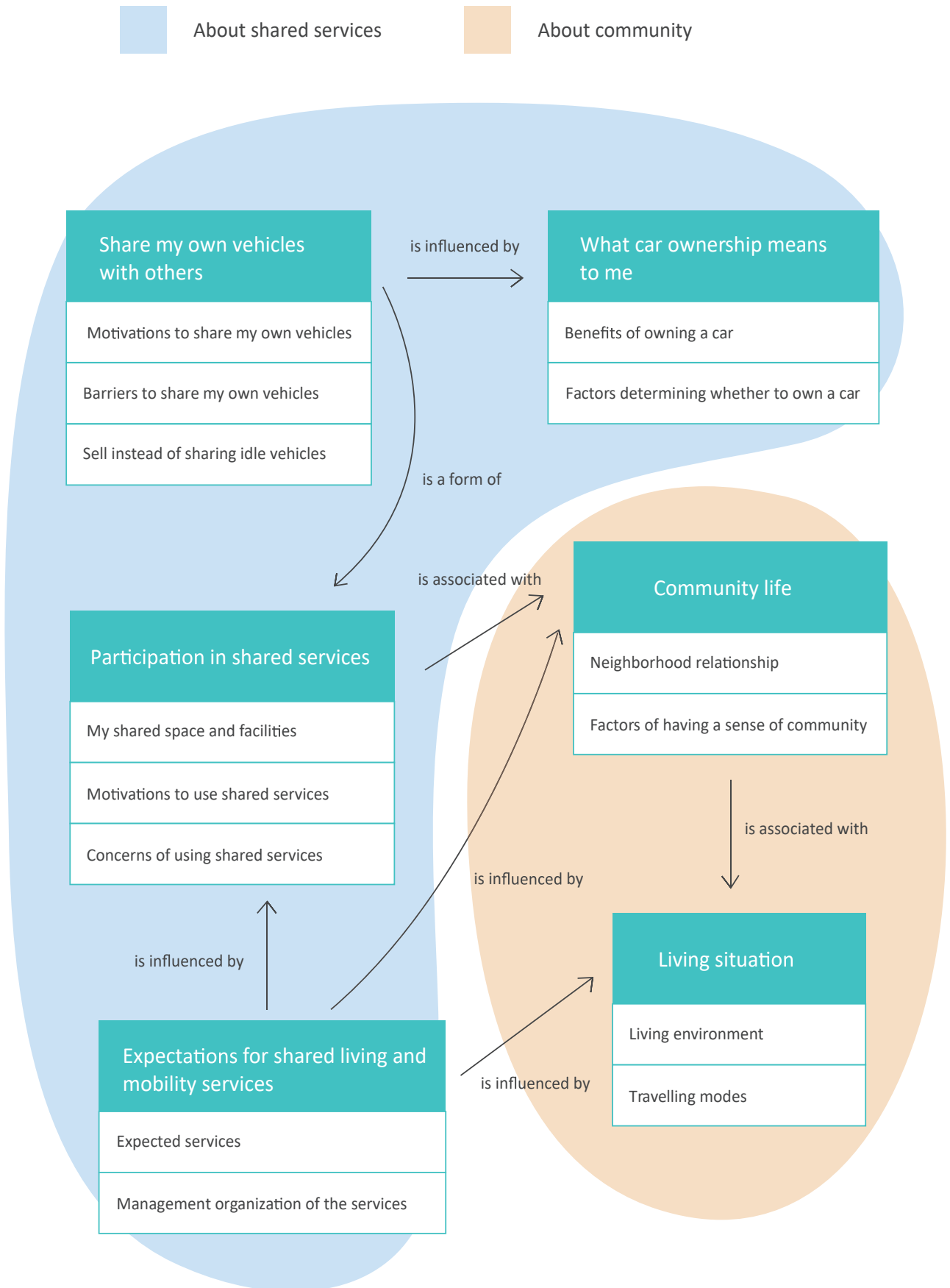
More importantly, people's expectations for shared living and mobility services are influenced by three aspects: their participation in shared services, their community life, and their living situation.

Additionally, the above three categories are associated with each other. People's participation in shared services and their experience and feeling of community life are

closely related to their own living situation.

The relationships between these categories explain why tenants have more needs and expectations of the shared living and mobility services than homeowners.

Figure 12. The relationship map between categories



CHAPTER 3

SYNTHESIS

An aerial, isometric view of a modern architectural complex. The scene features several interconnected buildings with flat roofs and large windows. The buildings are primarily light blue and grey. A central courtyard contains a swimming pool with a tree in the middle. Other courtyards have green roofs and various outdoor furniture like benches and tables. People are scattered throughout the scene, engaged in various activities like walking, talking, and playing. The overall aesthetic is clean, geometric, and functional.

3.1 Persona and target users

Personas

Based on the insights from the interviews, the interviewees can be divided into two typical types according to their participation in shared services. I created personas (Figure 13 and Figure 14) for two types respectively. One is the family-needs-driven homeowner, while the other one is the economic-condition-driven student.

The family-needs-driven homeowner has children and is living with family. He owns a car and a bicycle, except for public transportation, he doesn't use shared mobility services much. Except for the public garden and garage, he is not sharing other spaces or facilities with neighbors.

For this type of homeowner, his financial condition supports him to own a private car and other household items, thus whether to use shared services depends on the needs of the family. In the community where he lives, most of his neighbors are also homeowners, many of whom own private cars and have little demand of shared mobility and living services.

In general, for the family-needs-driven homeowners, shared mobility and living services are not their daily needs. Their expectations for the mobility hub in the community are far less than the following economic-condition-driven student.

The economic-condition-driven student is living with roommates, and they shares a kitchen together. Her neighbors in the community are also student tenants, they share the laundry room, common room and other facilities provided by the house corporation.

For this type of people, using shared services is the norm in life. She does not only use the house corporation provided shared services,

but also share other items with her roommates or neighbors, trades second-hand items, and so on. In the current economic condition, using shared services allows her to enjoy more space and facilities at an affordable price.

This group of people has more expectations and needs for the community-scaled mobility hub. They expect the mobility hub to fill the gap in the current shared living services provided in their community, and they trust the house corporation to manage and maintain the mobility hub.

Target users: tenants living in shared living communities

Comparing the two personas, we can find that tenants in shared living communities participate in more shared services and have a stronger sense of community. They do not rely on private cars, and have higher demand and more expectations of shared services than homeowners.

Therefore, they can be regarded as the target users of the mobility hub in shared living services.

Figure 13. Persona of the family-needs-driven homeowner

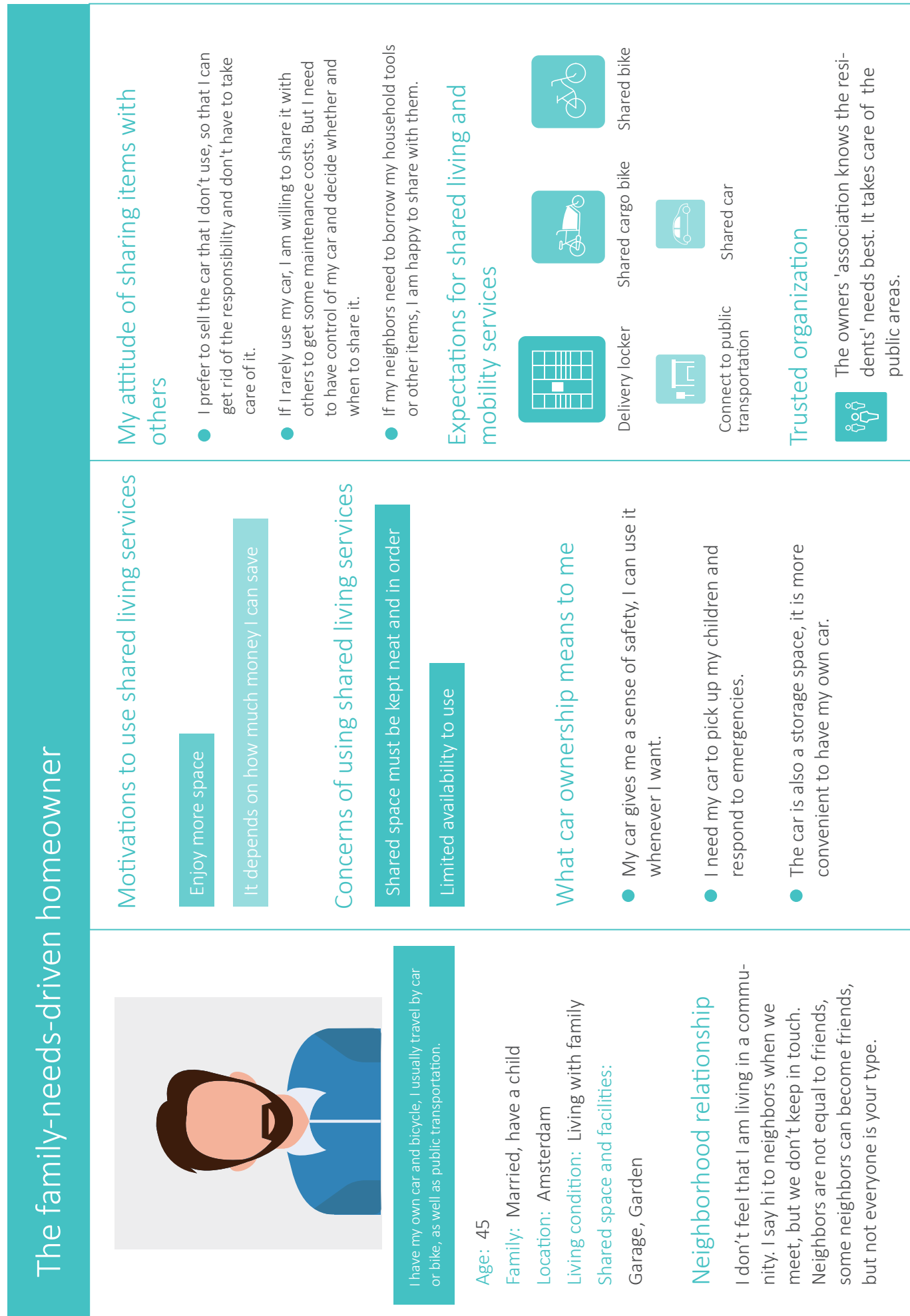


Figure 14. Persona of the economic-condition-driven student



3.2 Best practice of the mobility hub as part of living services

Best practice of the mobility hub as part of living services

First of all, a sense of community is a prerequisite of making mobility hub as part of the living service. People's participation in shared services and their community life will directly affect their expectations for the mobility hub. Their participation in shared services is closely associated with the type of the community. In a living environment with a stronger sense of community, people usually have a lot of experience in sharing spaces and facilities, and have a greater demand for shared services.

The key factors of having a sense of community

1. There are shared spaces and facilities for people living in the same area to use, for example public lounge, shared kitchens, public parking space, etc.

2. Similar identities of residents will increase the sense of community, for example interviewees living in student apartments are more community-aware than interviewees living in ordinary apartments.

3. The community is managed by an organization (e.g. a housing corporation), responsible for cleaning up and maintaining shared spaces and facilities.

Secondly, additional to the physical facilities, people are expecting value-added services, among which the instant information of availability of shared services is most needed. When people are unsure about availability before using shared services, they will feel insecure and switch to conventional but safe alternatives in emergency situations.

Other value-added services such as reservation, facility maintenance and cleaning will also promote people to use shared services including mobility.

Thirdly, the components of the mobility hub should depend on the needs of the residents living in the community. Recommended facilities and services include shared bikes, delivery lockers, shared cargo-bikes, connection to bus/tram stations, etc.

Last but not least, the mobility hub should be integrated with the existing living service system in the community to avoid the burden of accessibility to users, and help residents enjoy a better community life.

DUWO's student apartment as an example

After discussing with Advier's client, we decided to use the DUWO student apartment on Prof. Schermerhornstraat as an example to design a service concept that integrates the mobility hub into DUWO's living services.

Why DUWO?

DUWO's student apartment, especially the one located on Prof. Schermerhornstraat, fully meets the conditions listed to bring a sense of community.

First all, DUWO provides various shared living services for tenants, such as shared kitchen, common room, delivery lockers, etc. Participating in shared services is part of the daily life of DUWO tenants. They share kitchen, common room, laundry room, delivery lockers, etc. with their neighbors in the same community. In addition to the facilities and space provided by DUWO, tenants also share other items including daily necessities.

Secondly, tenants living in DUWO community

on Prof. Schermerhornstraat are all college students. Similar identities make them have more common topics and have a stronger sense of community.

Thirdly, DUWO manages all the living services in the community and is suitable for the maintenance and cleaning of the mobility services.

Shared mobility services for DUWO tenants

Duwo tenants' common travel methods are cycling and public transportation. Now there are bus and tram stations near DUWO Prof. community.

Therefore the recommended basic shared mobility services are shared bikes and shared cargo-bikes. Shared bicycles can be provided by external partners. DUWO provides space for parking shared bicycles and provides tenants with access to this service. Cargo-bikes can be provided by DUWO itself due to the low demand and low frequency of use.



3.3 Design Intention

Design intention

After determining that the DUWO tenants are the target users and the DUWO community on Prof. Schermerhornstraat as an example to design a living service concept incorporating shared mobility services, I came up with the following design intention:

I want to design a living service concept including mobility, for a community that takes DUWO apartments as an example, to support tenants' community life.

The living service here not only refers to DUWO provided shared services, but also includes other value-added services that can help tenants enjoy a better life in DUWO community. Therefore, the goal is not only to integrate shared mobility services into DUWO's current living service system, but also to allow tenants to participate in these living services without concerns and worries.

What are the challenges?

1. The availability of shared services

According to the interviews, the biggest obstacle and concern for tenants in using shared services is uncertain availability of services. Limited shared facilities and a large number of users make it impossible to guarantee that the shared service will be available for use at all times.

For shared mobility services such as shared bikes, uncertain availability forces tenants to choose safer alternatives, in case they cannot find available bikes in an emergency.

Although we can not fully ensure the availability, we can inform users of the availability status to make them feel at ease and in control.

2. The quality of shared services

The main purpose of tenants using shared services is to seek high cost performance, enjoying high-quality services at affordable prices. However, due to the irresponsible behaviors of some users, the quality of shared services is difficult to control. A typical example is the problem of massive damage to shared bicycles (see Figure 15).

3. Competitiveness

It needs to be considered that how to let tenants choose DUWO provided shared mobility services instead of those provided by other external companies.

When the shared mobility services are not part of the living service system, tenants have to register and pay through new channels, which raises the threshold for using shared mobility services.

Take the Hely hub near Camelot community (a shared living community near TU Delft campus) as an example. For tenants in this community, except for its proximity, Hely hub has no other obvious advantages over other shared mobility service companies. Therefore, we should not just place the shared bicycles and cargo-bikes in the community, but also need to make shared travel services more accessible to tenants, enhancing the competitiveness of DUWO's shared services.

Figure 15. Damaged shared bikes



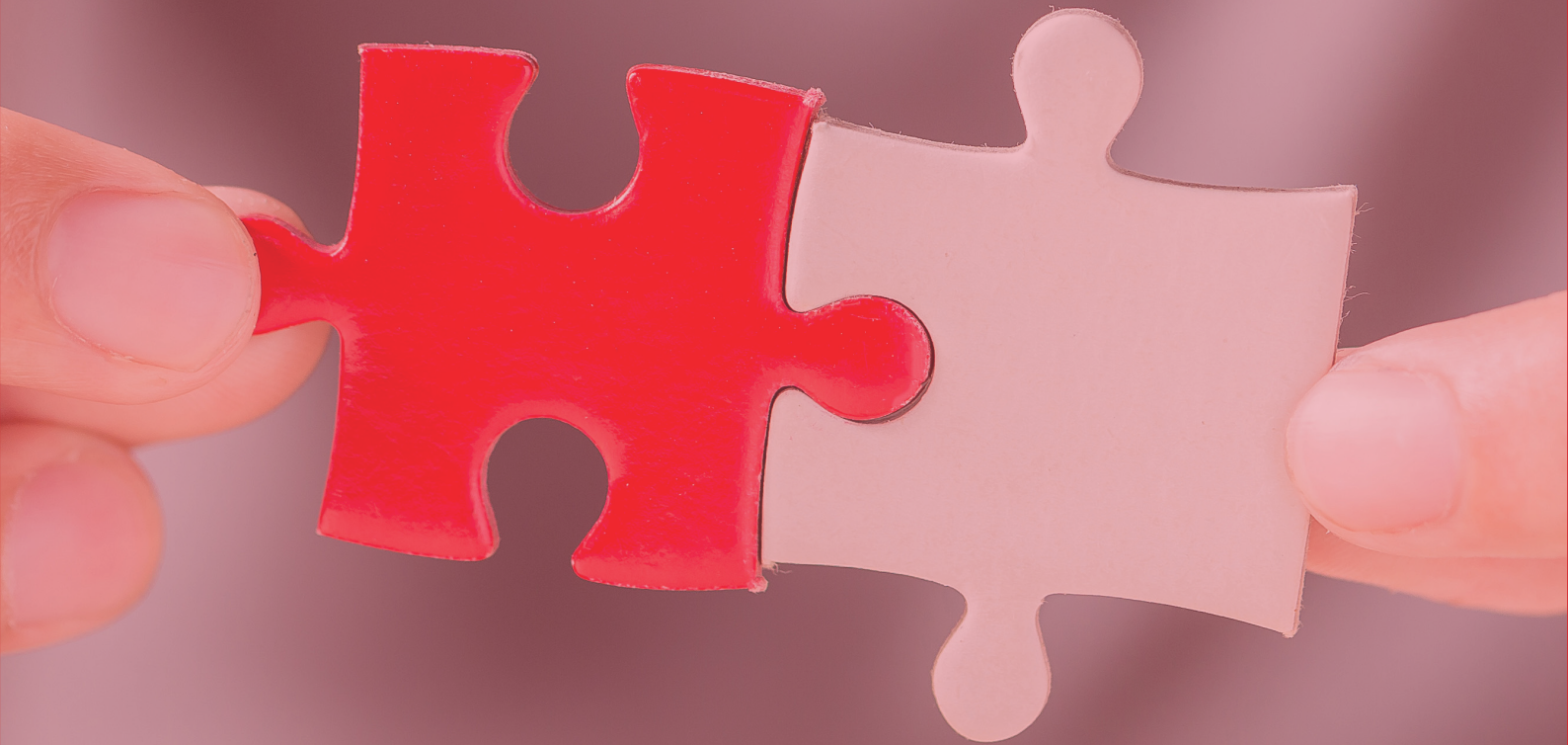
Figure 16. Hely hub near the Camelot community





CHAPTER 4

DESIGN PROCESS



4.1 DUWO community

Before the ideation stage, I went to DUWO's student apartment on Prof. schermerhornstraat (DUWO Prof. in short) to learn how DUWO's existing living service system works. During the visit, I also observed how DUWO's tenants use these living services and how they live with their neighbors.

How does DUWO's existing housing service system work?

DUWO's current living services are mainly composed of two parts, namely the physical facilities and spaces, and supporting services.

The physical facilities and spaces include tenants' private rooms, shared kitchens, shared laundry rooms, common room, delivery locker, bicycle parking place, etc.

As a supplement to physical facilities and space, supporting services include maintenance, regular room refurbishment, online booking of laundry service and common room, etc. Currently DUWO's supporting services are

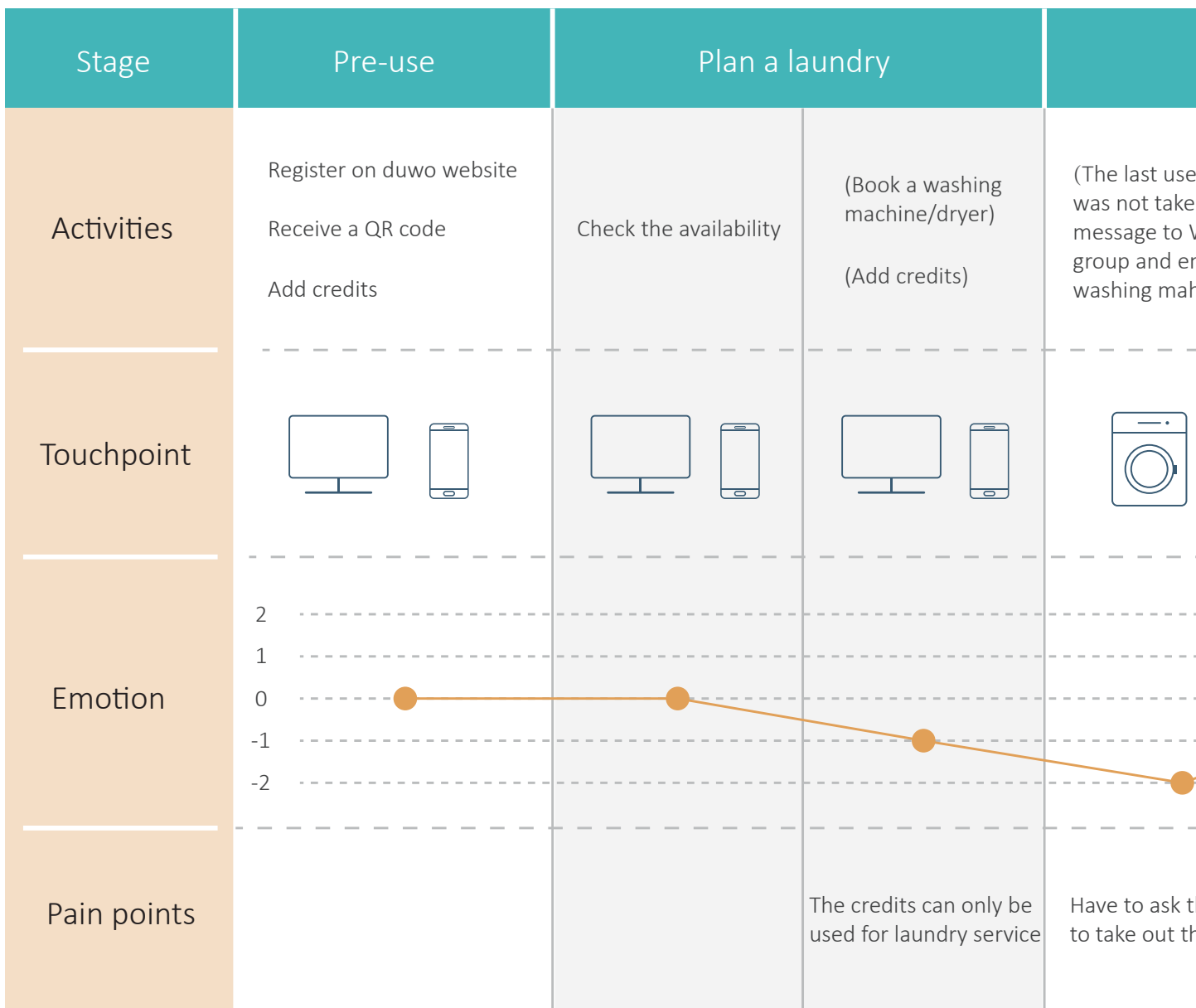
accessed through several different channels. Online repairs and laundry service reservation are completed through the DUWO website, internet repair request are done through the phone, important notices (such as room refurbishment) are notified to the tenants by email. There isn't an integrated channel for tenants to find all supporting services.

For many tenants, they do not know which living services are available and how to use them at the beginning, and usually need to ask other tenants who have used the services before. The lack of service instruction raises the threshold for using the services. For example, many DUWO tenants still do not know how to reserve a common room after living for a long time.

Figure 17. Private room, laundry room, common room and shared kitchen in DUWO community



Figure 18. The customer journey of using DUWO's laundry service



I observed and asked how DUWO tenants use the laundry service. The customer journey is shown in Figure 18.

For new users, if they go directly to the laundry room, they will only return in vain. They must first enter the DUWO website, then click on the link URL of the laundry service, register, add credits, check how many machines are currently available, and then decide whether to make a reservation based on the current situation. For experienced users, they still have to click on

the link to the laundry service webpage every time before using to check the balance and available machines.

Their balance of the laundry service cannot be used for other DUWO services, which makes many tenants feel inconvenient. Users will not receive a reminder when the laundry is done, resulting in users sometimes forgetting to take out their laundry in time. The lowest point of the user's emotions in the entire process occurs when the previous user

How DUWO tenants live together?

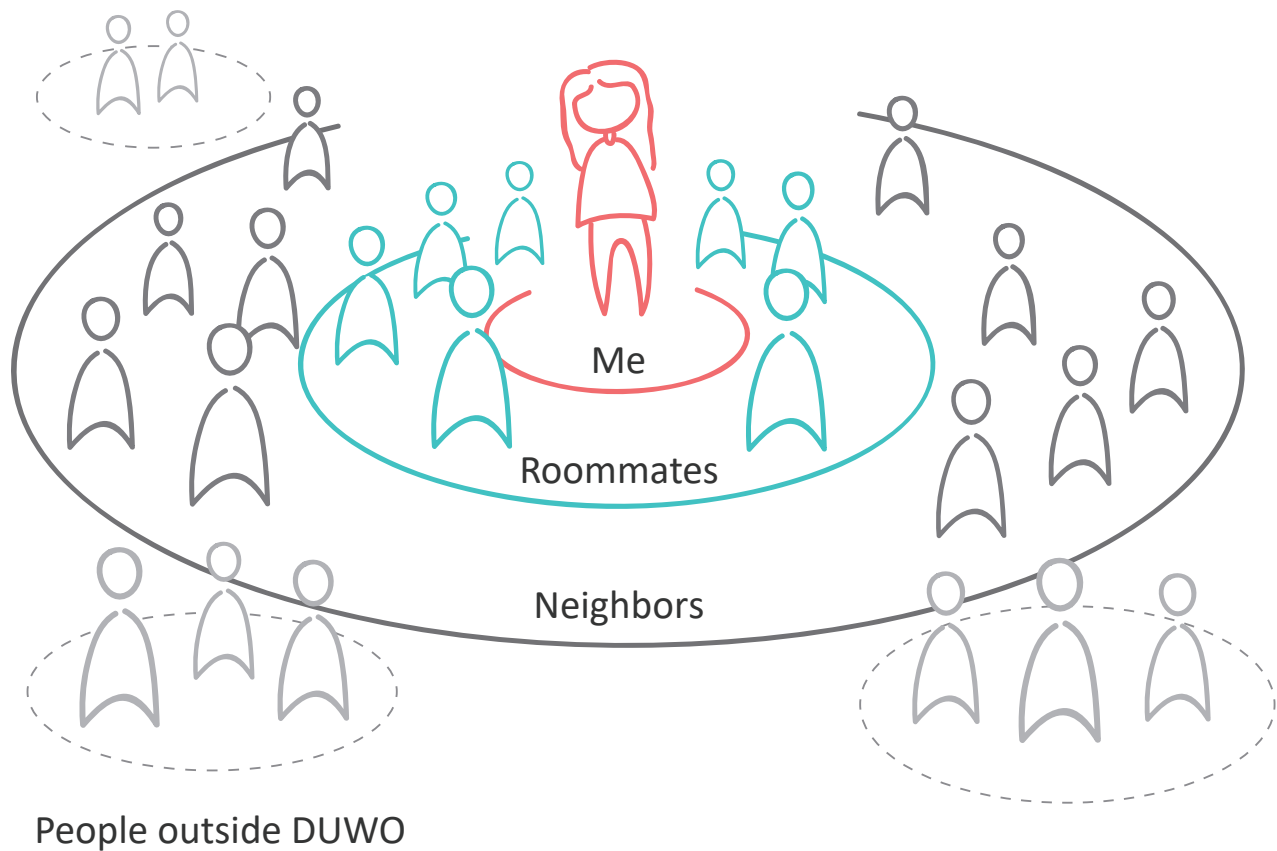
DUWO's tenants live in their private rooms. In DUWO Prof. community, 8 tenants who live on the same floor share a kitchen together and they call each other roommates. (In other DUWO communities, two tenants share a kitchen and a bathroom.)

Other tenants living in the same DUWO community use DUWO's shared living services together. The shared facilities and space include the laundry room, common room, delivery locker, bike parking space, etc. Shared mobility services such as shared bikes and shared cargo-bikes will be added to the existing living services.

Outside DUWO community, tenants have other interpersonal circles, such as fellow students, people from the same club or organization, family members, etc. The interpersonal circle outside the community is not completely separated from those in the community. Roommates and neighbors also include people who often contact outside the community.

Interpersonal circles outside the community also have an impact on tenants community life. When tenants' living or emotional needs cannot be well met in the community, they will tend to seek help from interpersonal circles outside the community, such as borrowing things, buying and selling second-hand items, participating in entertainment activities, etc.

Figure 19. DUWO tenant's interpersonal circles



Interpersonal relationships in and outside DUWO community

I share the kitchen with 7 other tenants living on this floor, we know each other and share the task of cleaning the kitchen.

For some roommates, we meet and chat very often. Sometimes we cook together.

"I made friends with some of my roommates."



Me



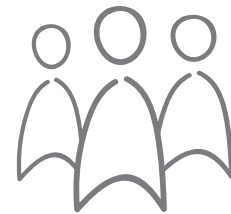
Roommates

I share the laundry room, common room and other public places and facilities with all tenants living in this DUWO apartment. For most neighbors, we don't know each other. I joined the WhatsApp group and WeChat group of the DUWO community I'm living in. Sometimes in the groups we discuss some information, such as network problems.

"I will say hi when I meet my neighbors, but we don't know each other."



Me



Neighbors

"Neighbors are not equal to friends."

"Compared to strangers outside the community, I trust neighbors in my DUWO community more."

Many of my friends and fellow students do not live in the same community as me. We always meet each other at school, have lectures and do group work together. My friends outside DUWO community are a very important part of my interpersonal relationships. But since we live in different communities, our contact outside school is usually online.

"Most of my contacts with people outside DUWO rely on online tools such as WhatsApp and WeChat. Sometimes I really hope that my friends live closer to me so that we can meet and interact more conveniently."



Me



People outside DUWO

4.2 Ideation

The ideation stage is composed of two parts. In the first part I did two collaborative sessions with DUWO's tenants, and in the second part I generated several concepts based on the insights and inspiration obtained from the sessions.

4.2.1 Collaborative sessions

In order to figure out the living service issues that duwo tenants are most concerned about, and brainstorm possible solutions, the duwo tenants were invited to participate in two rounds of collaborative sessions.

Participants

A total of 10 participants participated in the two collaborative sessions, 6 in the first round and 4 in the second round. All participants are tenants of DUWO and have experience in using DUWO's living services.

Process

The sessions are conducted online using a website called mural. At the beginning of the session, it took 10 minutes to introduce the project context and design vision to the participants.

Step 1: After the introduction, participants were asked to write down their motivations and desires of using living services including mobility.

Step 2: Participants wrote down the problems, frustrations and worries they encountered when using living services including mobility. Then they were required to categorize the similar problems in clusters and name the clusters. After the categorization, participants voted to select the category of problems that they think need to be solved most. Each participant had two votes. The category of problems with the most votes

was transformed into a how-to question.

Step 3: The how-to question became the objective of the following brainstorming. During the brainstorming process, participants were asked to generate ideas in 15 minutes. They were encouraged to think out of box and write down as many ideas as possible. In the end, we discussed the creativity and feasibility of each idea, and classified it into the quadrant of the How-Now-Wow Matrix.

Method

In the last step of the session, participants were asked to freely brainstorm ideas to solve the how-to question. In this process the How-Now-Wow Matrix (Gray, 2011) was used to help participants evaluate their ideas on 2 parameters and generate creative ideas.

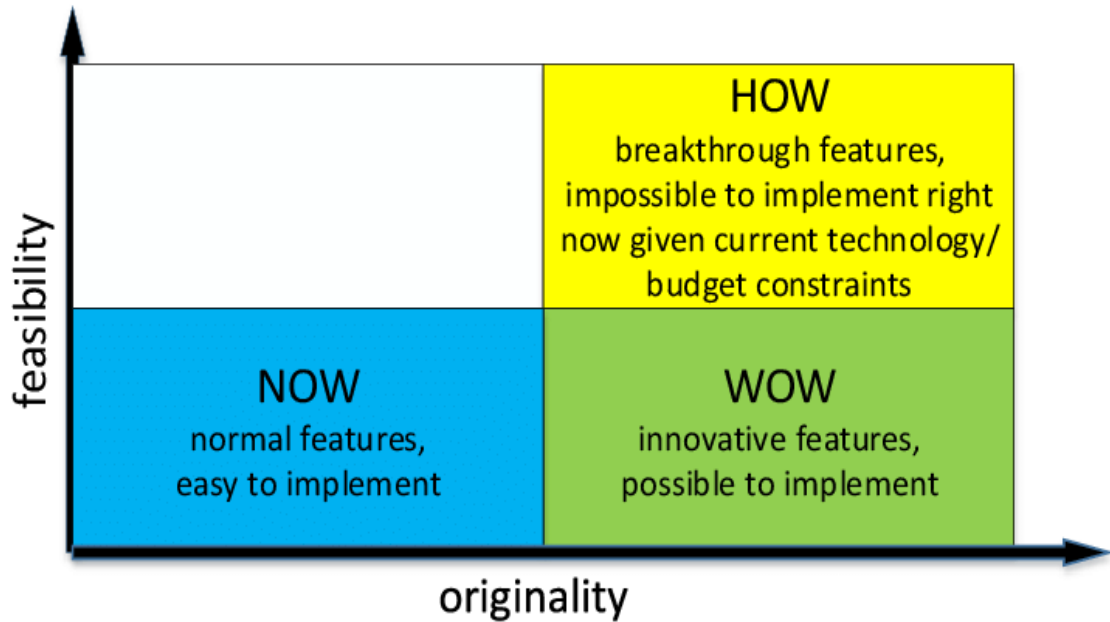
How-Now-Wow Matrix is a idea selection tool which is composed of 2-by-2 matrix. The X-axis represents the originality of the idea, and the Y-axis represents the ease of implementation (Gray, 2011). As shown in Figure 20, the quadrants are labeled as Now ideas, How ideas and Wow ideas.

Now ideas represents the normal and feasible ideas. These ideas are usually easy to implement and there are existing cases in reality, which can be used as a supplement to the current service.

How ideas are the breakthrough ideas that is innovative but difficult to implement due to current technical constraints.

Wow ideas represents innovative ideas, and can be achieved with current technology. Participants were encouraged to generate as many ideas in this category as possible.

Figure 20. How-Now-Wow Matrix (Gray, 2011)



Result

Participants in the two rounds of sessions have basically the same motivations and desires for using living services.

Duwo tenants' motivations and desires for using living services are consistent with those mentioned in the persona in Chapter 3, focusing on economic needs and convenience, supplemented by neighbourhood interaction. In addition, tenants expect to have one channel for all shared living services and be informed of the availability of services before using them, which are the lack of DUWO's existing living service system. (See Figure 21)

As shown in Figure 22, tenants' problems, frustrations and worries in using living services are concentrated on service availability, the lack of service instructions and other users bad



Figure 21. Duwo tenants' motivations and desires for using living services

behavior (for example, forgetting to take out the laundry from the washing machine after the laundry is done). In addition, for tenants who are not familiar with DUWO living services, the lack of instruction can cause confusion.

Brainstorming results

The problems of service availability and the impact of other tenants' behavior received the most votes in each two rounds of sessions, and were converted into how-to questions, as the objectives of the two rounds of brainstorming.

In the first round of brainstorming, participants produced a series of ideas (as shown in Figure 23) around how to improve the availability of living services (including mobility).

In the second round of brainstorming, the problems caused by the behaviors of other tenants were integrated into one goal, which was how to enable tenants in DUWO community to use living services more harmoniously. The ideas generated by participants are shown in Figure 24.

Figure 22. Duwo tenants' problems, frustrations and worries of using living services



Figure 23. Ideas of how to improve the availability of living services (including mobility)

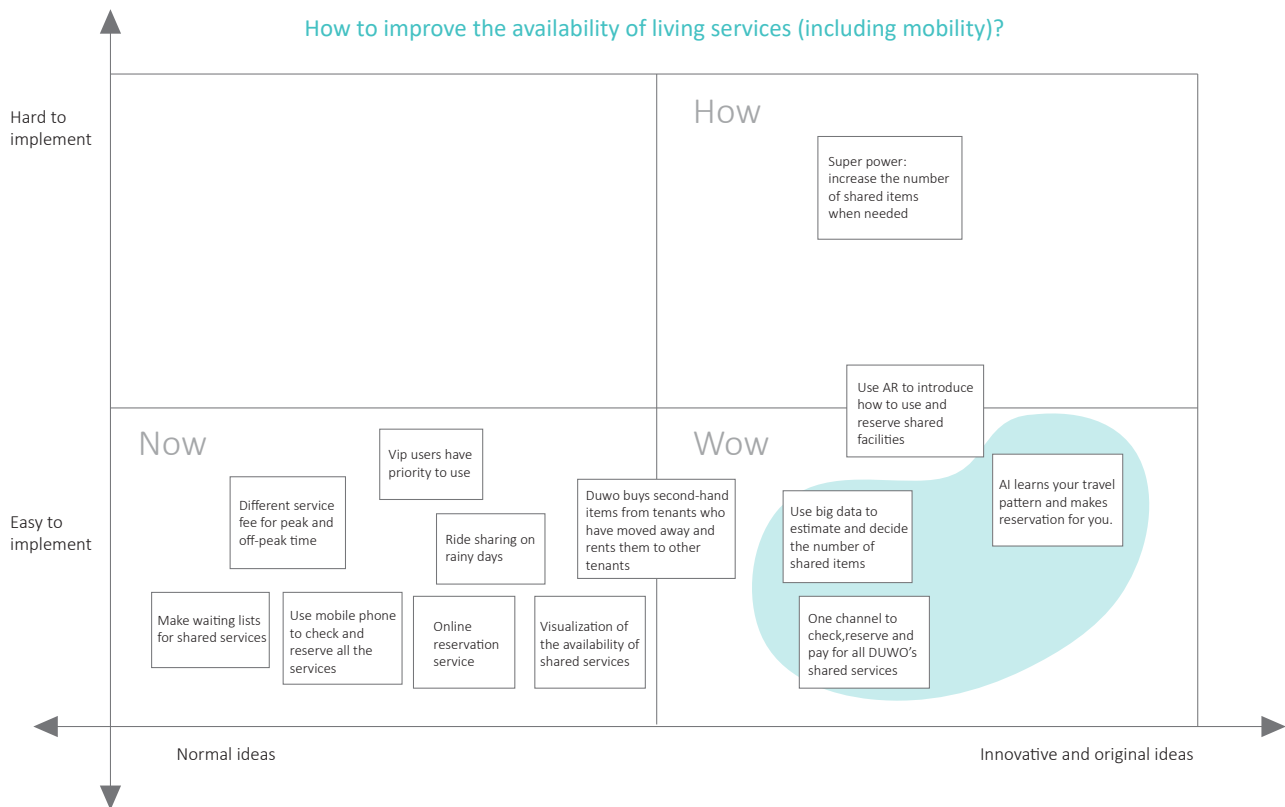
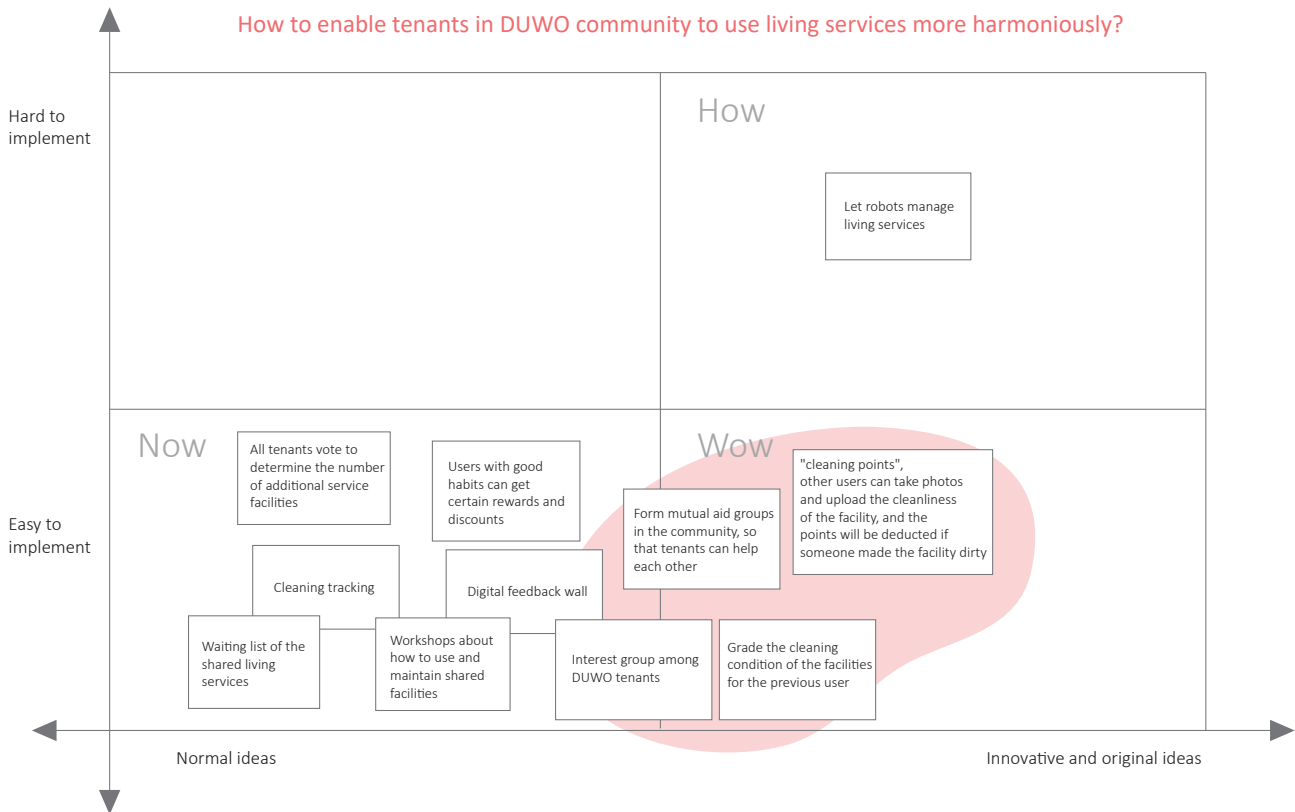


Figure 24. Ideas of how to improve the availability of living services (including mobility)



Insights and inspirations

At present, DUWO's living services have many shortcomings in terms of supporting services. Duwo tenants expect to be able to use living services more conveniently and harmoniously. This goal should be achieved by improving DUWO's supporting services on the one hand, and on the other hand, through the communication and cooperation of all tenants, to establish a harmonious community living atmosphere.

Ideas with potential

1. Inform tenants the availability of services, and provide online reservation service.
2. All-in-one service platform for tenants to find all the services they need on one channel.

3. Artificial intelligence helps tenants book services in advance.

4. Give tenants instructions of how to use the living services.

5. Promote communication between tenants, e.g. establish mutual aid groups.

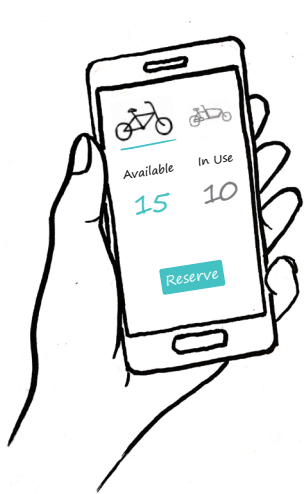
Some of the above ideas can be integrated into one concept.

4.2.2 Initial ideas: How to help DUWO tenants manage their community life?

Idea 01: Online reservation service

1. Check instant availability information

The instant availability status of shared services are shown on a platform. Before using the services, users check the availability and can choose to reserve a vehicle if they want. When informed of availability status, users will feel more secure and in control.



2. Make a reservation

If users want to ensure that they can use shared services at a certain time, they can reserve from the platform. As shown in the scenario below (Figure 25), users can reserve a shared bike on this platform.

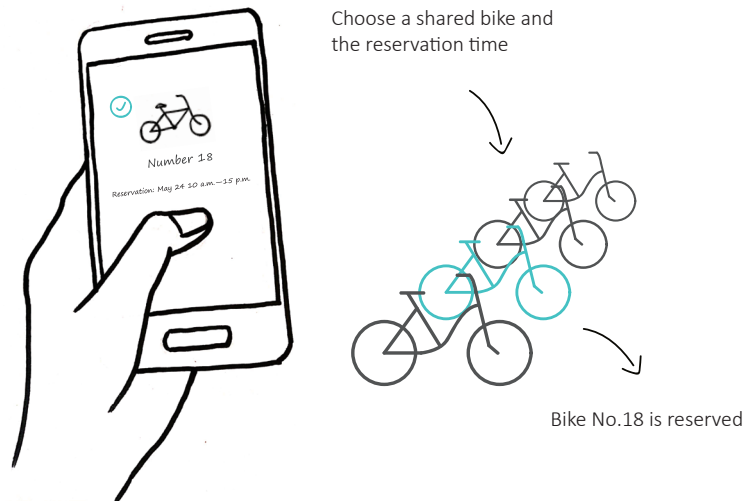


Figure 25. Scenario of idea 01: check the availability and make a reservation

3. AI predicts the peak hour and gives suggestions to users

Users can see the prediction of the percentage of shared facilities which will be used in different time period and the prediction of the usage percentage of the following days. (See Figure 26)

With the prediction of usage, users know in advance whether they need to make a reservation.

By importing the calendar to the platform, users will receive reminders from AI. (See Figure 27)

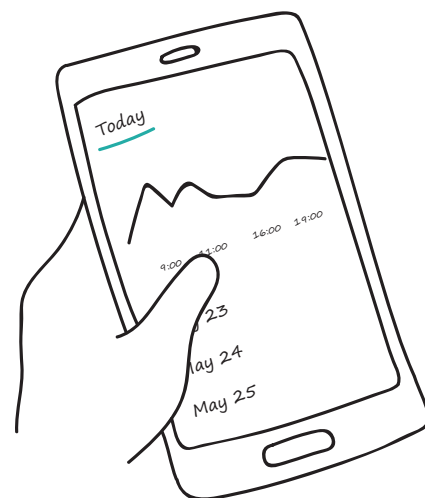


Figure 26. Scenario of idea 01: check the prediction of peak usage hour

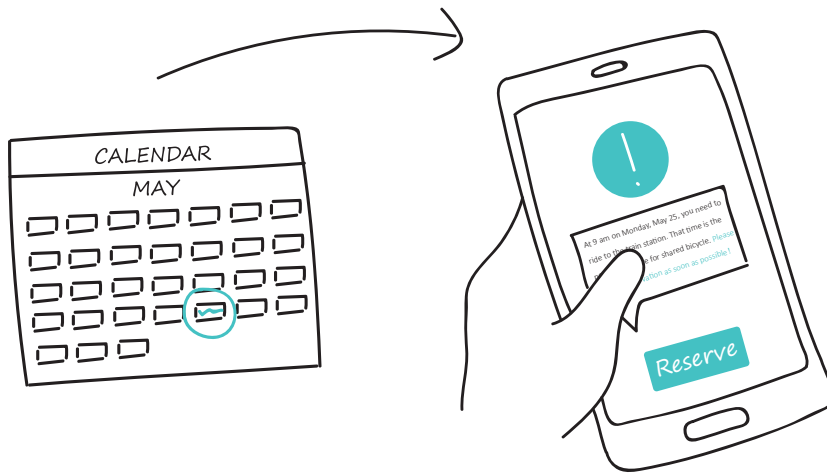


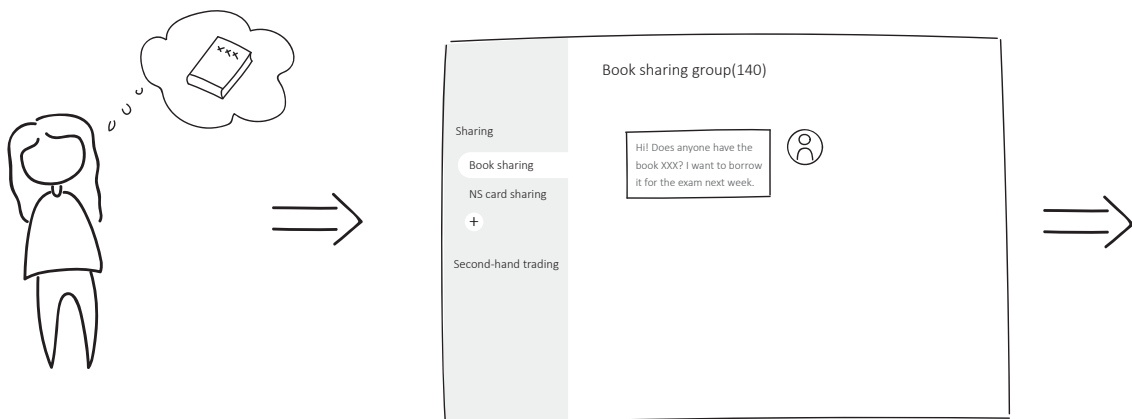
Figure 27. Scenario of idea 01: receive reminders from AI

Idea 02: Neighborhood communication service

1. A platform for DUWO tenants to freely create chat groups based on their needs and interests

The platform enables tenants to interact and share items with each, so that they can participate in services which they need in community life but cannot be provided by DUWO, such as item trading, interest groups, information sharing, etc.

These chat groups are freely created by tenants themselves. In the following scenario, a tenant wanted to borrow a book, so she sent a message in the book sharing group. She received a reply from a neighbor, and then went to her to get the book. (See Figure 28)



I want to borrow a book.

Send a message in the book sharing group, ask if someone can lend the book.
If I am not in the group, I can search the relevant group and join it.

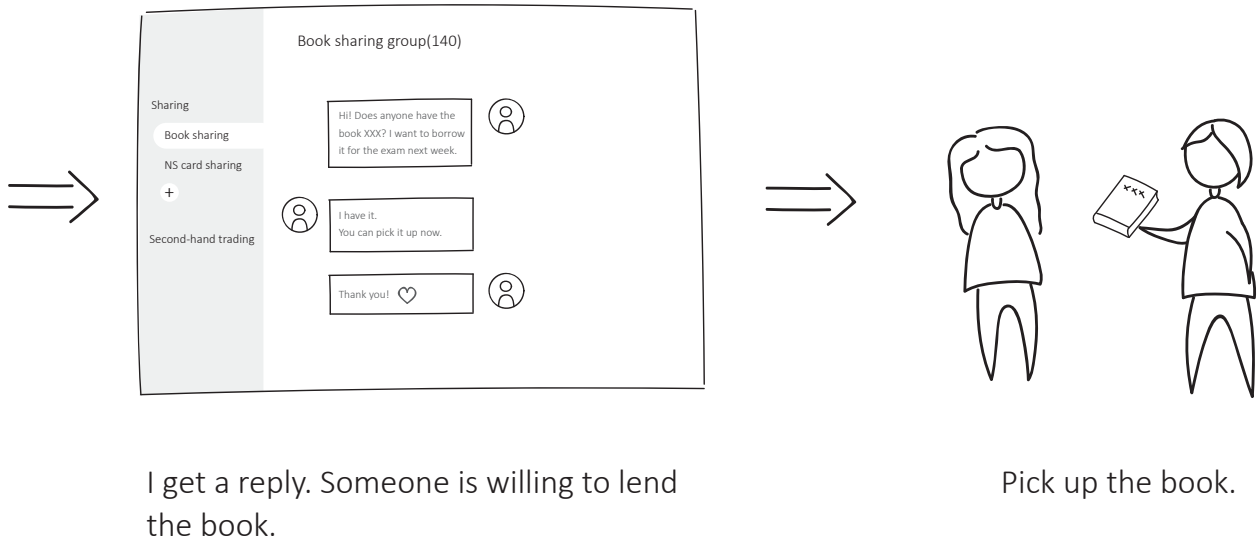


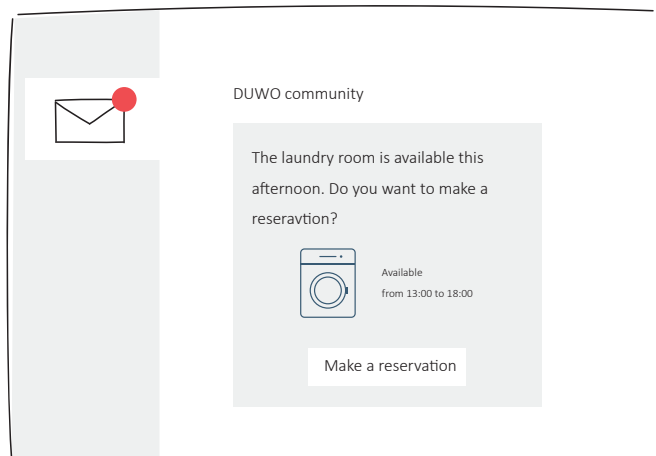
Figure 28. Scenario of idea 02: borrow a book from a neighbor

Idea 03: Platform provides information and suggestions to tenants

1. The platform proactively sends tenants information and suggestions they may need

The interaction between users and the platform is two-way. The platform assumes the role of a community life assistant and proactively provides information and suggestions that tenants may use. Users can choose to receive

these messages by email. For example, in the following scenario, the platform reminds the user of the available time of the washing machine and recommends the user to make a reservation. (See Figure 29)



Remind the tenant to reserve a washing machine.

Figure 29. Scenario of idea 03: receive a suggestion from the platform

4.3 The concept: DUWO community service platform

Concept introduction

After the three initial ideas were combined and iterated, the concept of DUWO community service platform was reached.

It improves DUWO's community service system by creating a service package consisting of two main parts (DUWO living services, neighborhood interaction and communication) and communitybot as the mediator between users and community services.

Service structure

Part one: DUWO living services

DUWO living services include a series of physical facilities and space. In addition to the current facilities and space provided by DUWO, shared bikes and shared cargo-bikes are recommended according to tenants' needs.

Duwo also provides tenants with supporting services such as online reservation and instructions, to help tenants better use these facilities and space. All supporting services are integrated in one platform.

Part two: Neighborhood interaction and communication

To help tenants build a harmonious neighborhood relationship, and enrich their community life, DUWO offers tenants a platform, where tenants can communicate and interact with neighbors based on their needs and interests. Tenants can freely create and join groups on the platform.

Communitybot

Last but not least, DUWO's communitybot acts as a community life assistant. It is like a bridge between users and the services on the platform. When new users enter this platform

for the first time, communitybot will greet them friendly. Communitybot also answers tenants' basic questions about community services, and actively provide them with reminders, suggestions and information based on their needs and interests.

Except the physical facilities and space in part one, all the other services (in the dashed frame of Figure 30) are integrated in a digital platform. I call it DUWO community service platform.

Features of the platform

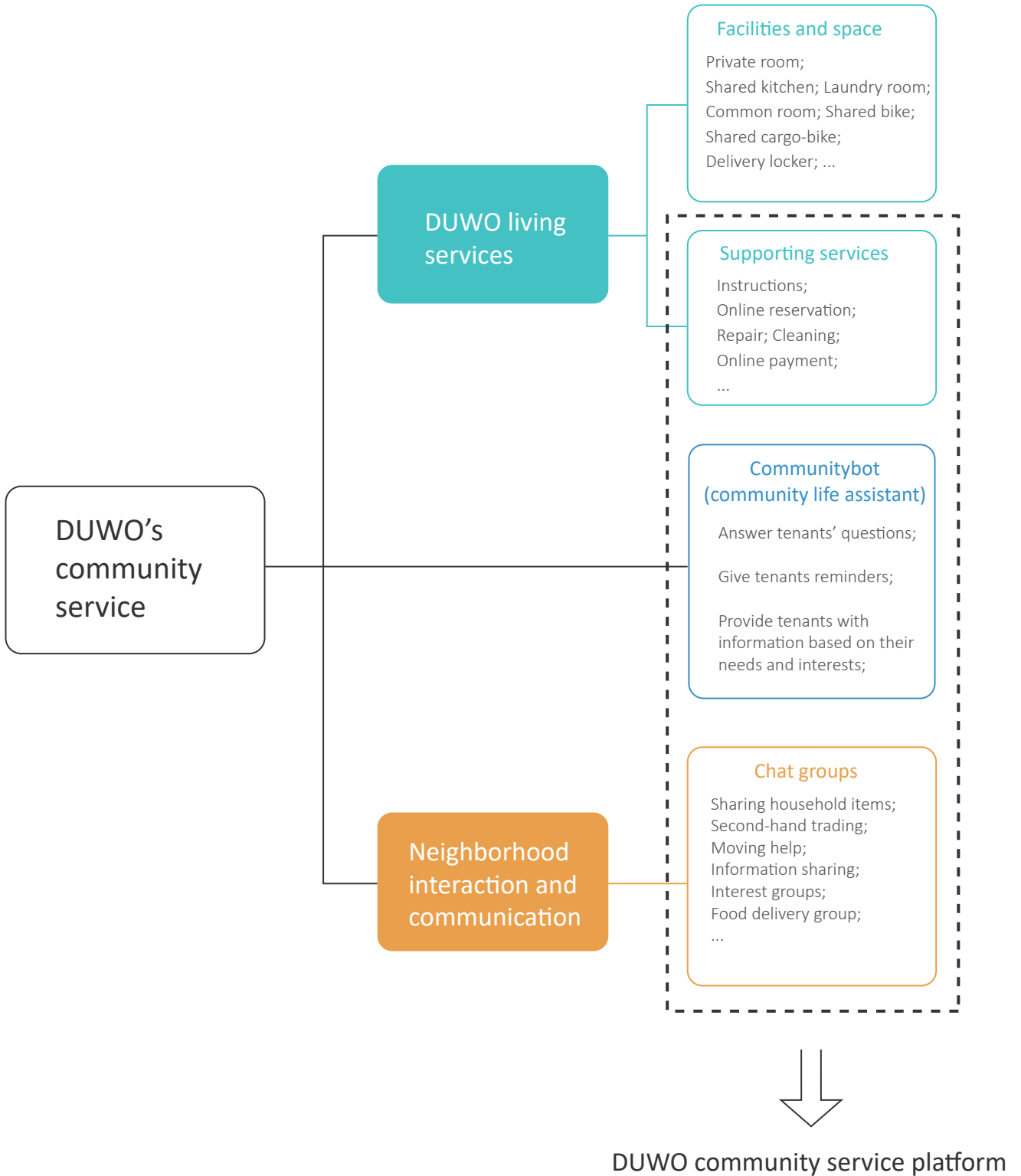
1. An all-in one platform where tenants can find all DUWO's living services, such as laundry service, online reservation, online recharge, repairs, shared bicycles, etc.
2. Tenants can send messages to neighbors without verification. The communication with neighbors becomes more direct and convenient.
3. The capabilities of the platform depend on the needs and interests of tenants. Tenants can join or leave the group at any time according to their needs at the current life stage.
4. The platform supports mutiple plugins, e.g. Google calendar, and external service providers.

Personality of the platform

Keyword: **helpful, enthusiastic, reliable, considerate**

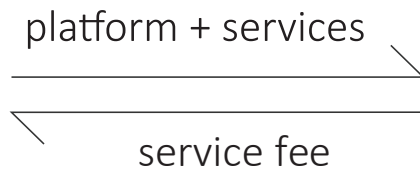
This platform acts like an enthusiastic senior you met when you first entered the university or a kind neighbor you met when you moved to a new home, helping you understand everything about the new environment. You can trust it and always ask it for help.

Figure 30. Service structure

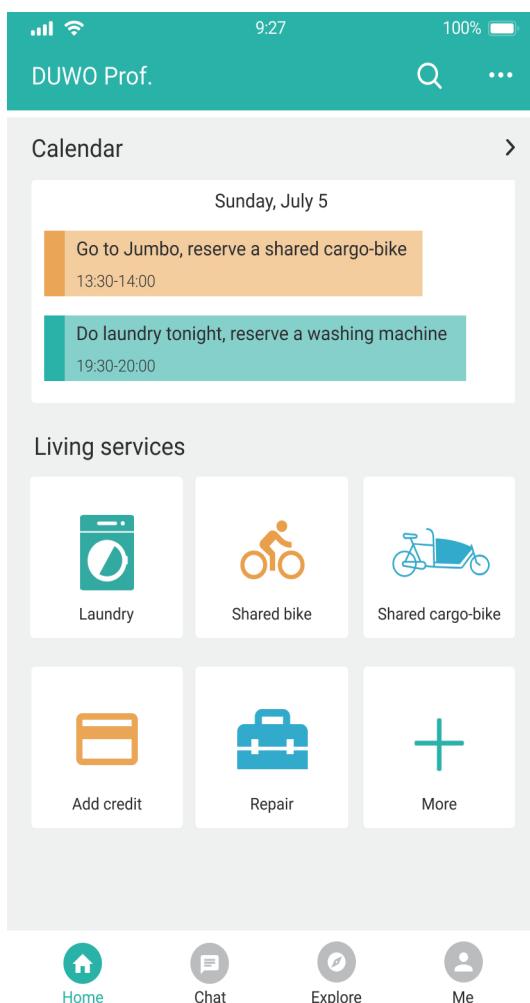


How does the community service platform work?

Part one: Supporting services

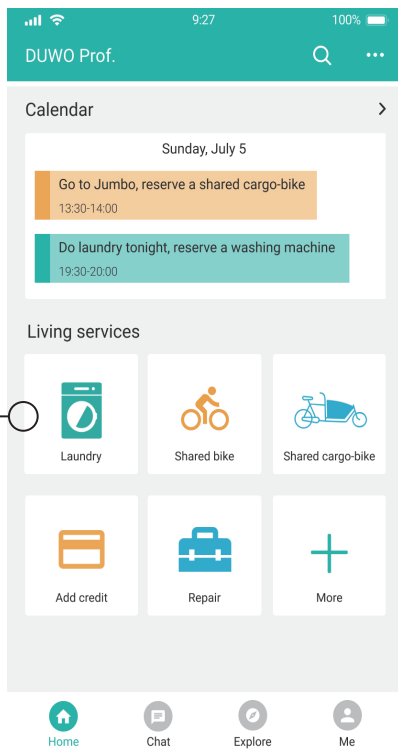


tenants



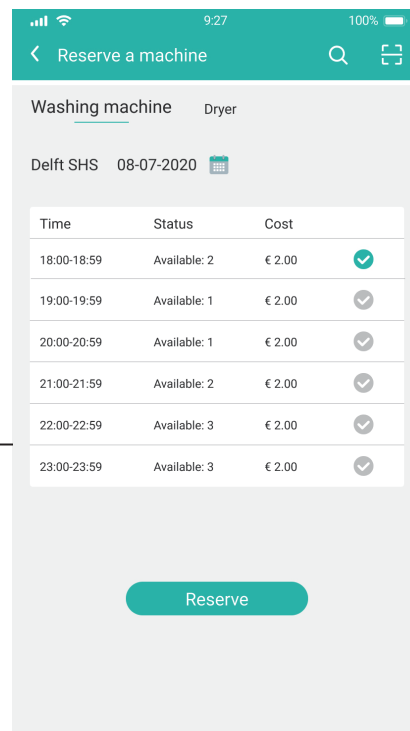
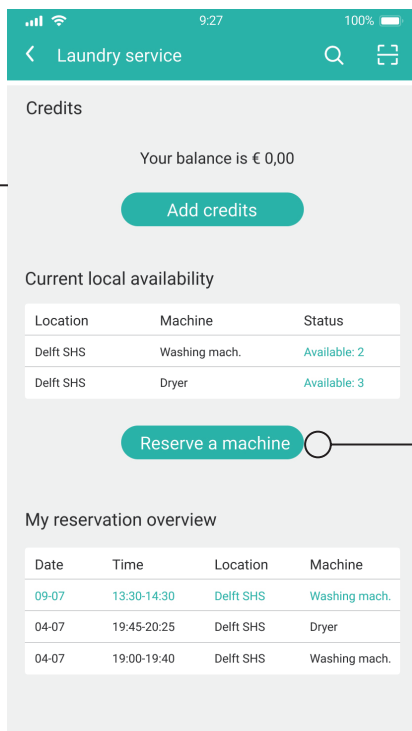
Users can import electronic calendars in this platform or write notes here by themselves. Communitybot will give users personalized reminders and information according to their schedule.

Users can find all DUWO's supporting services on this platform. They can put the frequently used services on the home page, such as laundry, shared bike, cargo-bike and so on. When clicking the 'More' button, users can see all other supporting services.

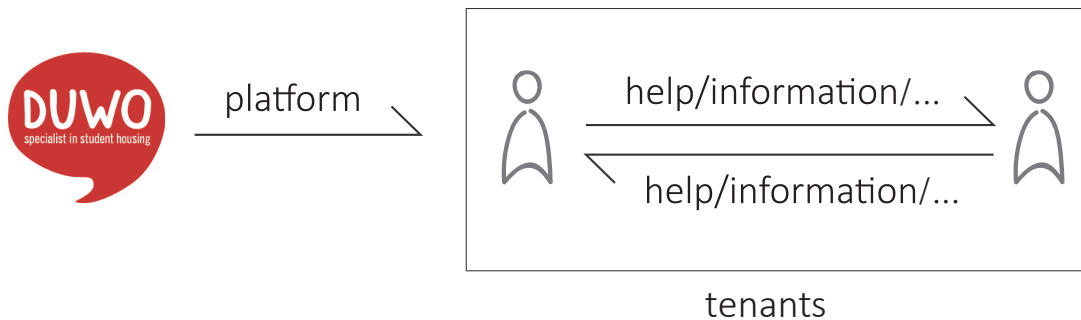


Take the laundry service as an example.

When the user clicks the "Laundry" button, the page jumps to the laundry service page, the user can see the balance, current availability of machines, his or her reservation record, and choose to make a reservation.



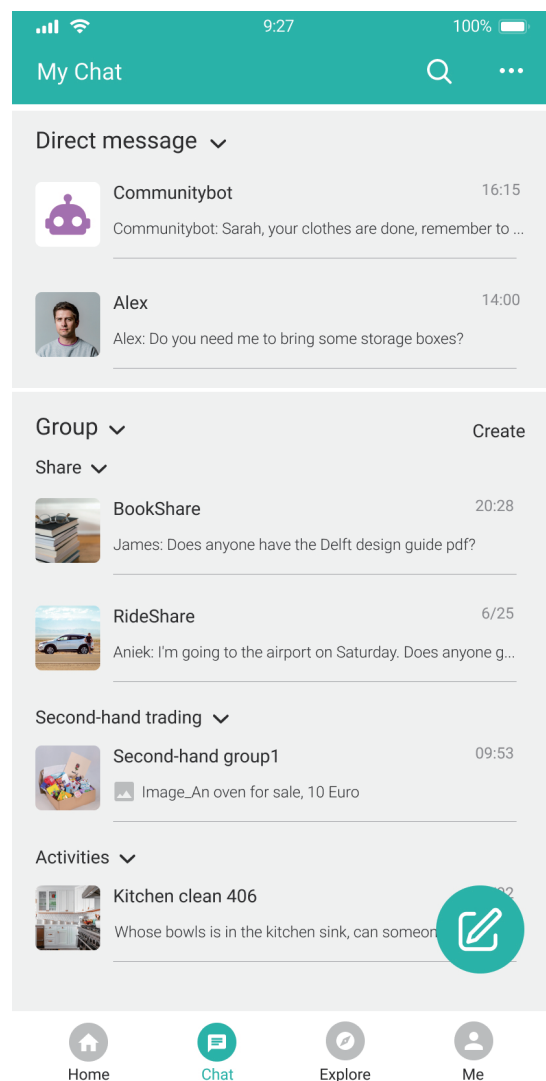
Part two: Neighborhood interaction and communication

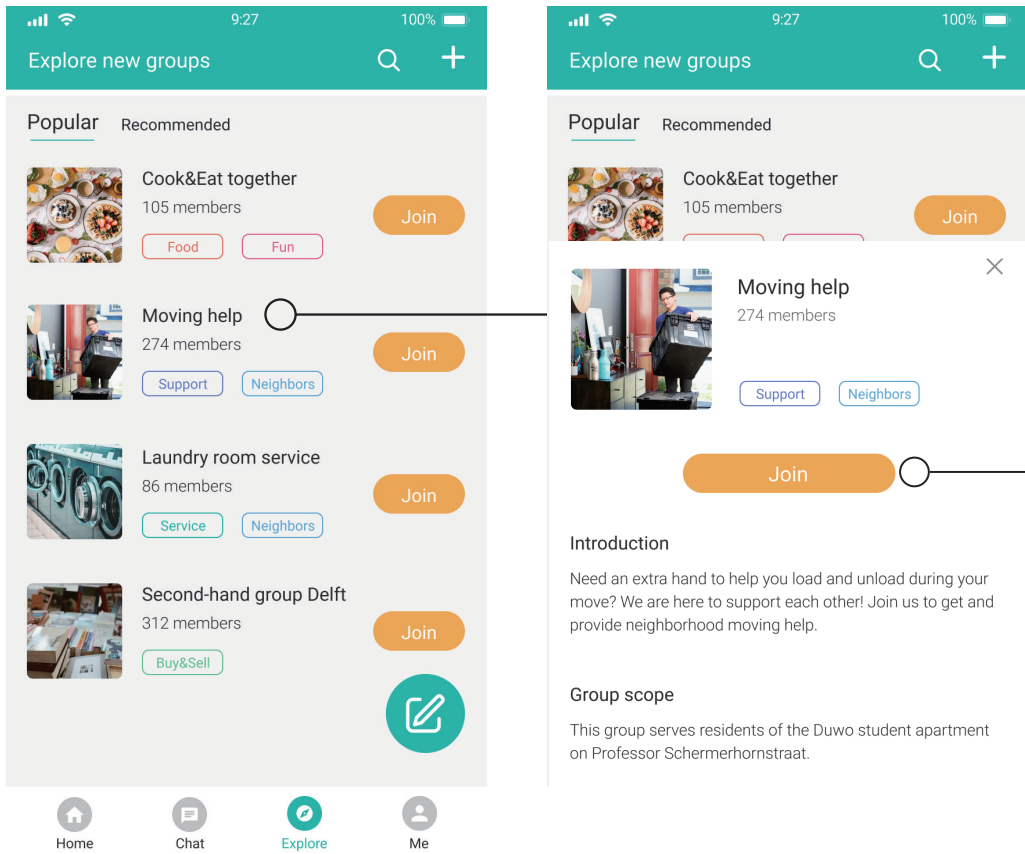


DUWO provides tenants with a platform for communication and interaction. In the joined chat groups, tenants share information, organize community activities, provide and seek help from neighbors, etc.

The user's chats in the joined community groups and individual chats with neighbors are displayed on this page. The chat dialog with communitybot exists by default and is placed at the top.

No verification is required to chat with your neighbor. For example, if you belong to the same group, you can send a message directly to him or her. But users are allowed to set themselves as not available to be disturbed by others.



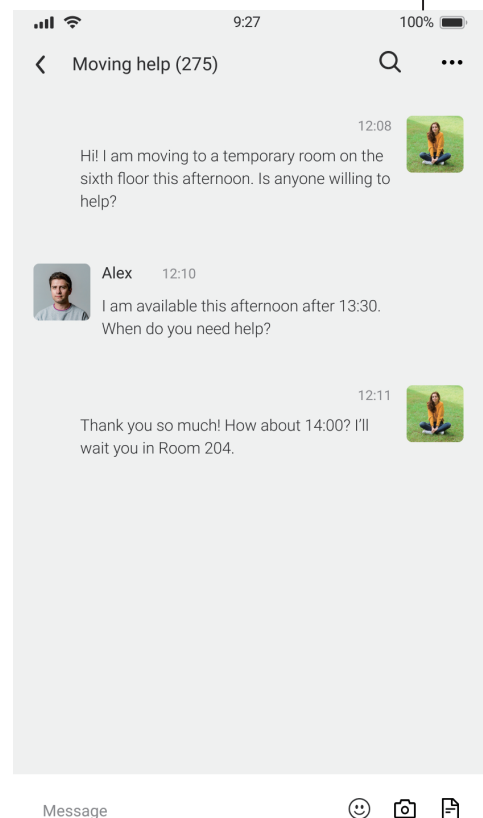


The platform helps users explore and join new groups.

Some community services are basic for tenants' community life, while some are optional. The platform will help tenants to explore their needs and interests for community life.

On the explore page, users can find the popular groups and the recommended groups based on their interests and habits. When the user clicks on a group he/she is interested in, the group's introduction and scope will pop up.

The tags of each group (e.g. food and fun) tell users what this group is for. The colors of the tags indicate the type of the group, for example warm and bright colors for interest groups and cool colors for functional groups.



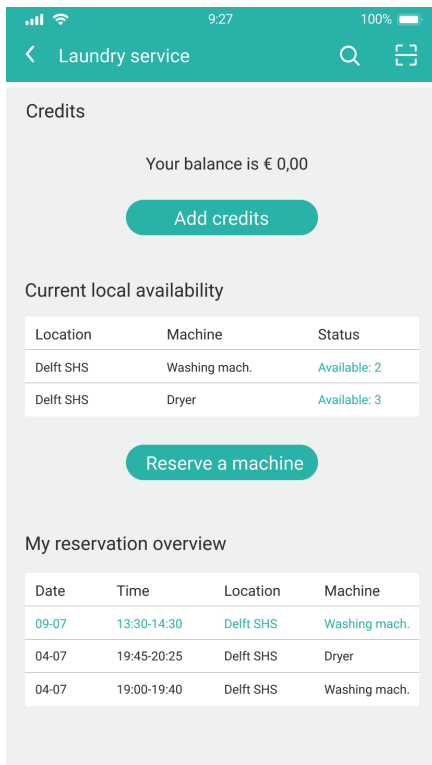
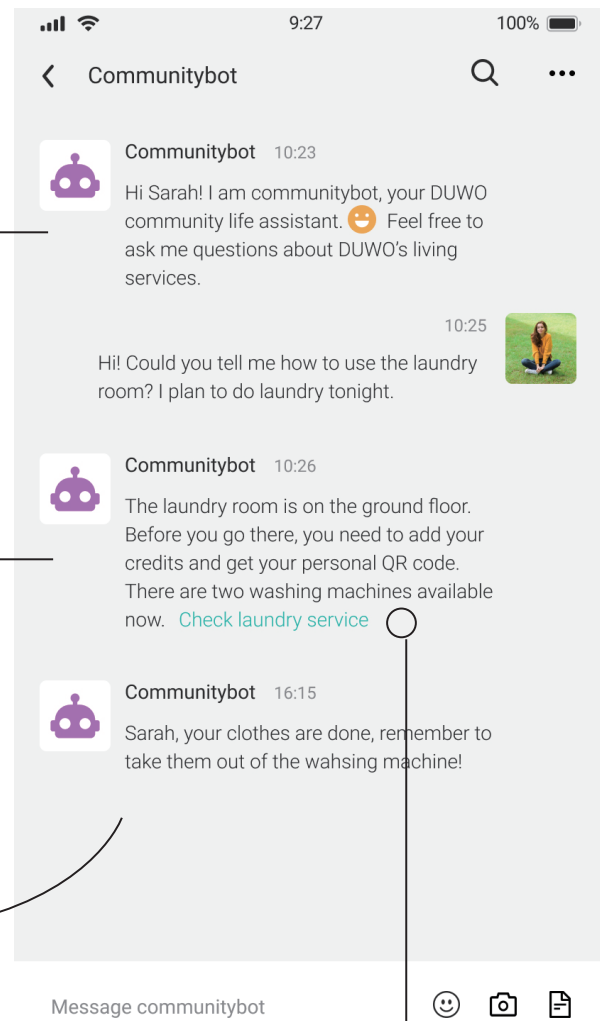
Communitybot

When the user use this platform for the first time, communitybot will send a welcome message and tell the user it will ask his/her questions about DUWO's living services.

When the user ask a question or wants to use a service, communitybot will answer and add a service link to its reply. When the user click the service link, it goes directly to the corresponding page.

Users can choose to receive communitybot's reminders by email. The link to the relevant service or chat group will be attached to the email as well.

Communitybot actively sends users reminders and suggestions.



Communitybot's communication principles

1. Communitybot would welcome and greet the new users with an enthusiastic "Hi!" and a smile (smiley face emoji).
2. When chatting with tenants, communitybot speaks with a friendly and positive attitude. It often uses cheerful emojis.
3. Communitybot responds to tenants' problems and questions with a can-do attitude. For example, it says things like, "Don't worry Sarah! Let's see what I can do to help resolve this."

Communitybot's behaviors and responsibilities

1. When communitybot provides suggestions and information to users (e.g. recommends a new group, notifies the user that the room will be refurbished), the message does not pop up. On the chat page, it shows that communitybot sent a new message, and the user needs to open the dialog to view it.
2. When communitybot gives reminders to users (e.g. reminds the user to take the laundry out), the message will pop up. Users can choose not to receive such reminders.
3. Communitybot could answer to users' basic questions related to community services, such as how to reserve the common room, which number should users call when the network is bad.
4. Communitybot also provides users with personalized information that matches their living situation. For example, when the tenant is going to end the contract and move out, communitybot will send him or her moving instructions.

4.4 User testing

The goal of this user testing is to get target users' insights of DUWO community service platform and test the usability of the digital prototype.

Research questions

1. What living services do users want to get from the community service platform?
2. What makes the users want to join the community/groups?
3. How do users interact with communitybot?
4. What role do users expect communitybot to play in their community life?

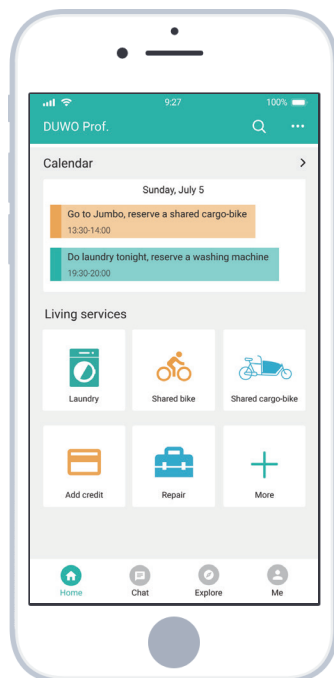
Participants

4 tenants living in DUWO's community participated in this test. The user testings were conducted in their living environment (shared

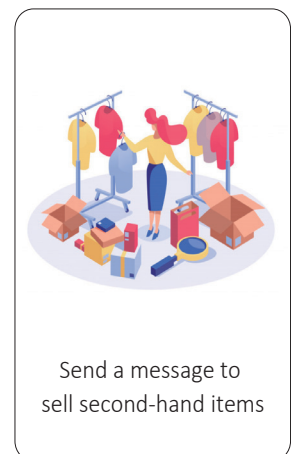
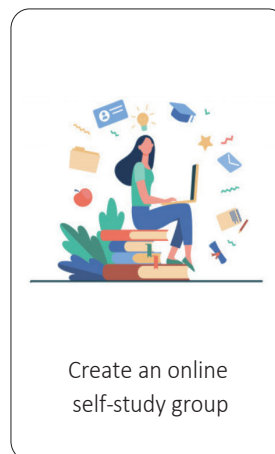
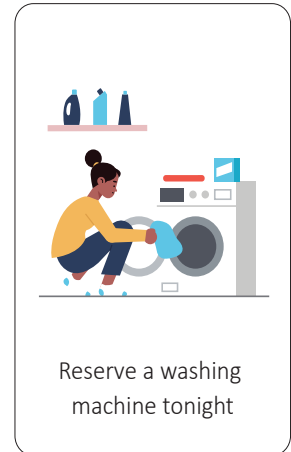
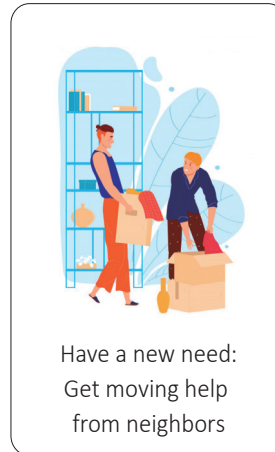
kitchen and private room).

Materials

1. Instruction of the concept
2. Task cards
3. Questions to be filled out before and after users perform tasks
4. Prototype App(displayed on participants mobile phones)



Task cards:



Process

Step 1: Introduce the context of this project and the structure of the DUWO's community service platform.

Step 2: Questions before tasks

Before the usability test, participants were asked to answer several questions. The first question was to ask them what services they expect and need from the community service platform, and whether these services should be provided by DUWO or created between tenants. For DUWO provided services and tenants-led services, an example was given respectively, and the rest were freely proposed by participants according to their needs and desire.

Next, participants described and wrote down the ideal role of the communitybot should play in their community life.

In the next step, participants were asked to perform 4 tasks on the prototype App.

Step 3: Tasks

Participants were asked to pick a task card

and perform it on the prototype App, and speak out each step of their operation. During this period, as a tester, I observed how they operated the prototype and did not give them any instructions or guidance. The post-test questions started after they completed all the tasks.

Step 4: Questions after tasks

Participants were asked to fill out the following questions.

1. Does this platform meet your desire and needs for community services? Why?
2. What makes you want to join the community/groups?
3. How do you feel the interaction with the communitybot? What makes you want to interact with it?
4. Other recommendations

After answering the above questions, participants were given time to freely express their opinions and suggestions on this community service platform.

Figure 31. User testing in the living environment of DUWO tenants



Results and discussion

DUWO tenants' expected services

The mostly expected DUWO provided services include laundry room, common room, gym, study room, etc.

For tenants-led services, tenants want second-hand trading service, information sharing, interest groups, takeaway food ordering groups, etc.

Factors which make tenants want to join the community/groups

First of all, the platform that integrates all community services is a major reason that attracts tenants to use it.

Besides, the groups are open to tenants in the DUWO community, which makes them feel safe. Tenants will join groups when they have relevant needs and they want to have a friendly group atmosphere.

Service structure

Overall, the structure of the current concept is clear. As a supplement and support to DUWO's existing living services, the community service platform fills up the gap in DUWO's supporting services and neighborhood interaction services. By integrating all community services into one platform, it is convenient for users to understand and find DUWO's community services.

Usability

In the test, participants completed a total of 4 tasks:

1. Reserve a DUWO service (washing machine)
2. Send a message in a joined group
3. Join a new group that they need
4. Create a new group

Except for the third task, all participants completed the other three tasks successfully without duplication or wrong operations. Although the third task was finally completed, it took longer than the other tasks.

According to the feedback from participants,

when users have new needs but cannot find the corresponding DUWO service or chat group, instructions should be provided for users (especially for new users who are not familiar with DUWO community service system), so that they know how to search and join related groups.

Role of the communitybot

There are some differences from the preset personality of the communitybot in the concept and users expectation.

Users want communitybot to act more as an assistant, only providing the important information they need, and not to disturb the users too much. They like the idea of communitybots proactively providing them with personalized information and suggestions, but these information and suggestions should be important. Too many trivial daily reminders will make them feel disturbed and cause them to ignore important messages of the communitybot.

However, how to determine what information and suggestions users need? The decision should be in the hands of the users. One possible solution is that users can ask communitybot to reduce the unwanted reminders or suggestions.

Neighborhood interaction

Participants have positive feedbacks on the idea of being able to send messages directly to other users on the platform without verification.

This kind of interaction is very consistent with the relationship between neighbors. It is just like knocking on the door when you want to find your neighbor. You can always delete the chat dialog and send a message the next time you need to talk to them, you don't have to keep in touch with each other.

But the participants also emphasized that users should have the right not to be disturbed. They

should be able to set themselves not to receive messages from other neighbors.

According to participants' feedback, the community atmosphere in the current concept could be stronger. After discussing with the users, I am considering to allow users to discover neighbors living in the same DUWO community, so that they can directly talk to nearby neighbors when they need.

Limitation of some groups

Participants expressed their questions about the limitations of the chat groups.

For many tenants-led services, the form of chat groups can meet the needs, such as information sharing, interest groups, takeaway ordering groups etc.

However, for some other groups, such as the second-hand trading group, the current form of chat dialogue makes it difficult for users to see the previous information (especially when there are too many messages in the group), and users cannot know whether the items posted have been traded.

One possible solution is to let DUWO to implement these services, but this does not guarantee that all the services required by tenants will be realized in the first time.

The second one is to optimize chat groups and add functions, such as posting posts and adding bookmarks to group messages.

Redesign consideration

Based on the test results and discussion, I am going to redesign the following aspects.

First of all, the role and responsibilities of communitybot need to be redefined. Communitybot will act more like an assistant or secretary. It is reliable, considerate and gives users a sense of trust.

Communitybot will send reminders to users when they choose to receive, and these reminders will pop up.

Communitybot takes the initiative to provide suggestions or information that users may need, and users can choose to reduce uninterested information, so that communitybot can continue to learn and become more in line with user needs.

Secondly, the form of chat groups needs to be reconsidered. Group chat is suitable for instant discussion, while posting threads is convenient for users to view important or long-term effective information. These two forms can be combined to meet different groups' purposes, so that groups can not only allow users to chat, but also provide the function of posting threads.

Additionally, in order to facilitate direct communication between users and their neighbors, I am considering to provide the function of discovering neighbors in the same DUWO community.

CHAPTER 5

FINAL DESIGN



5.1 Final concept

5.1.1 Concept introduction

DUWO's community service platform intends to act as a reliable, responsible and considerate virtual assistant for tenants. It accompanies the entire community life of tenants from moving in to moving out.

On this community service platform, tenants can easily find all DUWO's shared living services and the instructions for using them.

In addition to the convenience of using shared living services, the platform also creates added value for tenants in meeting their social needs. Tenants can easily contact nearby neighbors and establish interpersonal relationships between neighbors at the very beginning of community life. It becomes easier for tenants to meet like-minded neighbors and make friends with them. The contact between neighbors is not limited to the polite greetings when they occasionally meet. Many of the tenants' living and emotional needs can be realized through communication and interaction between neighbors, such as mutual help, information exchange, interest activities and so on.

Different from popular social platforms such as WhatsApp and WeChat, neighborhood interaction on the community service platform focuses on tenants' activities inside the community. Neighbors can send messages to each other without verification. Communication between neighbors is often based on temporary needs (such as borrowing items). When the temporary need is met, users can delete the conversation with neighbors at any time. Same for the chat groups. When users no longer need a group, they can leave it at any time.

As mentioned in Chapter 4, DUWO community service platform includes three main

components, namely supporting services, community interaction and communication, and communitybot. The main features and services of each component is as follows:

Supporting services

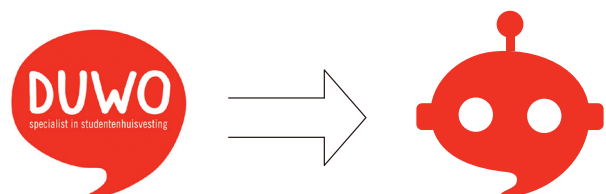
In addition to shared facilities and space, Duwo provides tenants with supporting services such as online reservation, instructions and maintenance, to help tenants better use these facilities and space. All supporting services are integrated in this platform.

Neighborhood interaction and communication

This platform offers an opportunity for tenants to build closer neighborhood relationship and enrich their community life. On this platform, tenants can communicate and interact with neighbors by joining groups. Users can chat and post threads in groups according to the purposes of different groups. When users have a new need but can not find the relevant groups, they can create new groups by themselves. Users can also categorize the joined groups and name the categories according to the purposes and types of the groups.

Communitybot

Communitybot plays a role as an assistant in tenants' community life. It will welcome the new tenants and answer their questions about DUWO's community services.

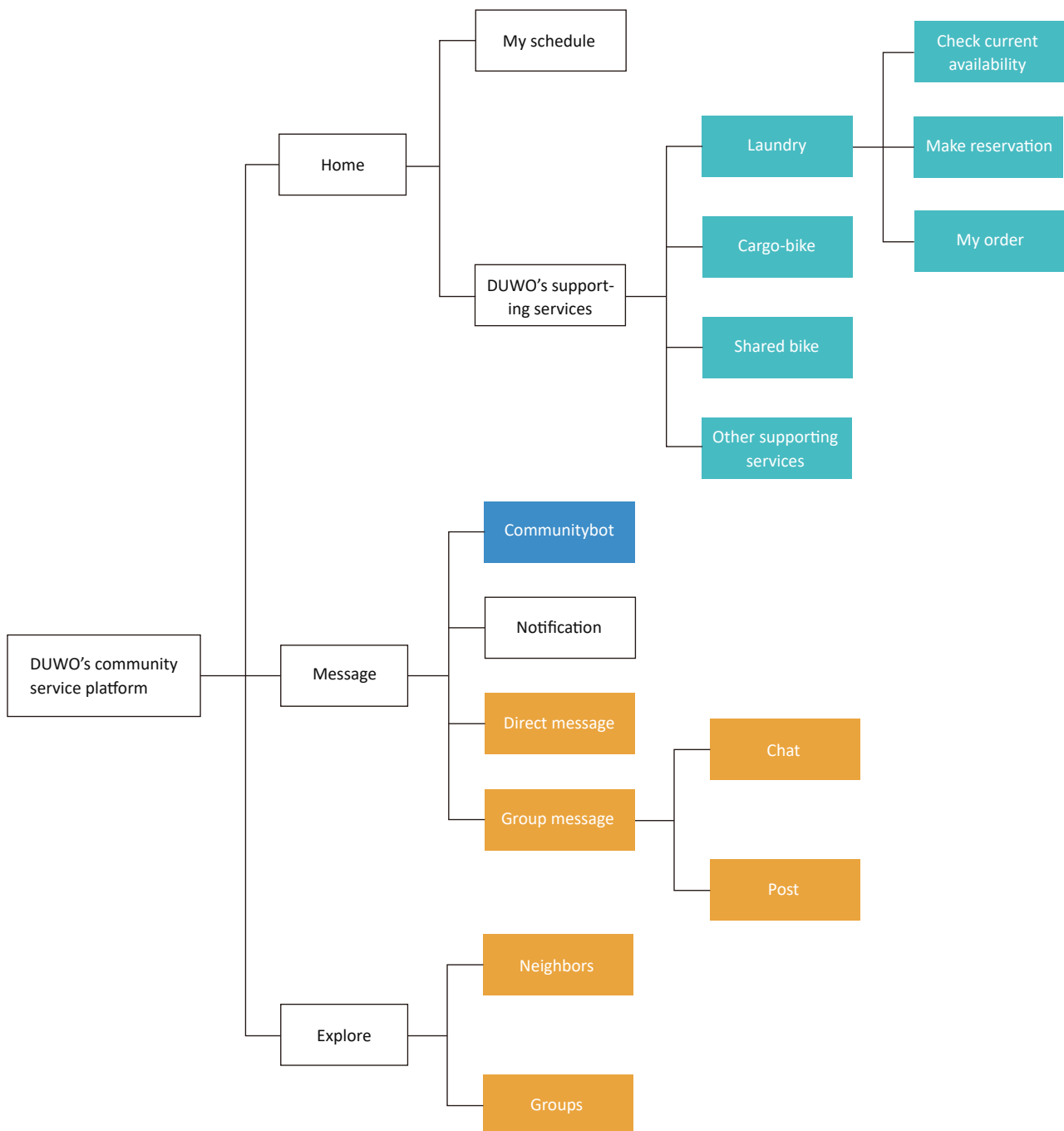


When designing the responsibilities of communitybot, I used the reminder function of slackbot (the chatbot of Slack APP) for reference. Users can ask communitybot to give them reminders, and these reminders will pop up.

But compared to slackbot, communitybot plays a more active role in the interaction with users.

Communitybot does not only passively receive users' requests and questions. It also proactively provides suggestions and information to users. By choosing to reduce unnecessary or uninterested messages, users can continuously optimize communitybot's suggestions and information to make them more suitable for their needs.

Figure 32. Information architecture of DUWO's community service platform



Scenarios of using DUWO's community service platform

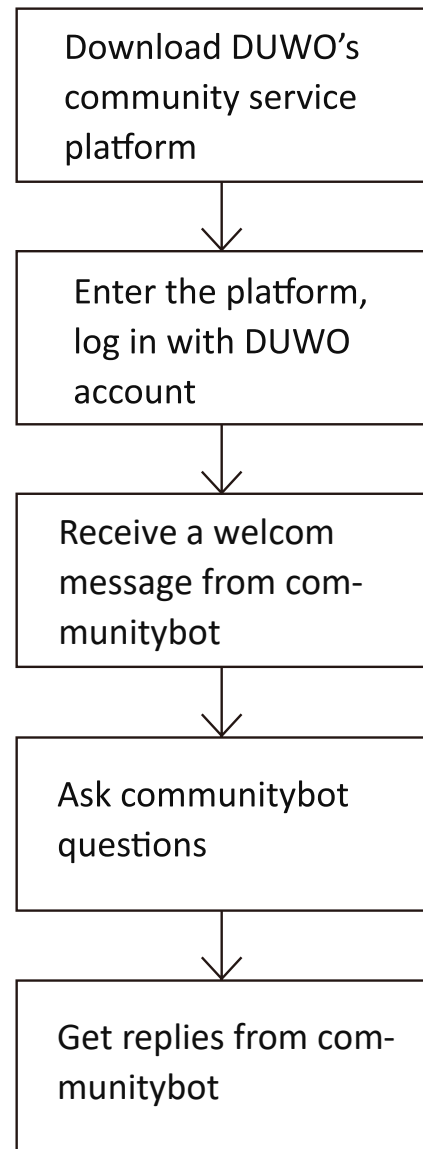
Scenario one: New user starts to use the platform

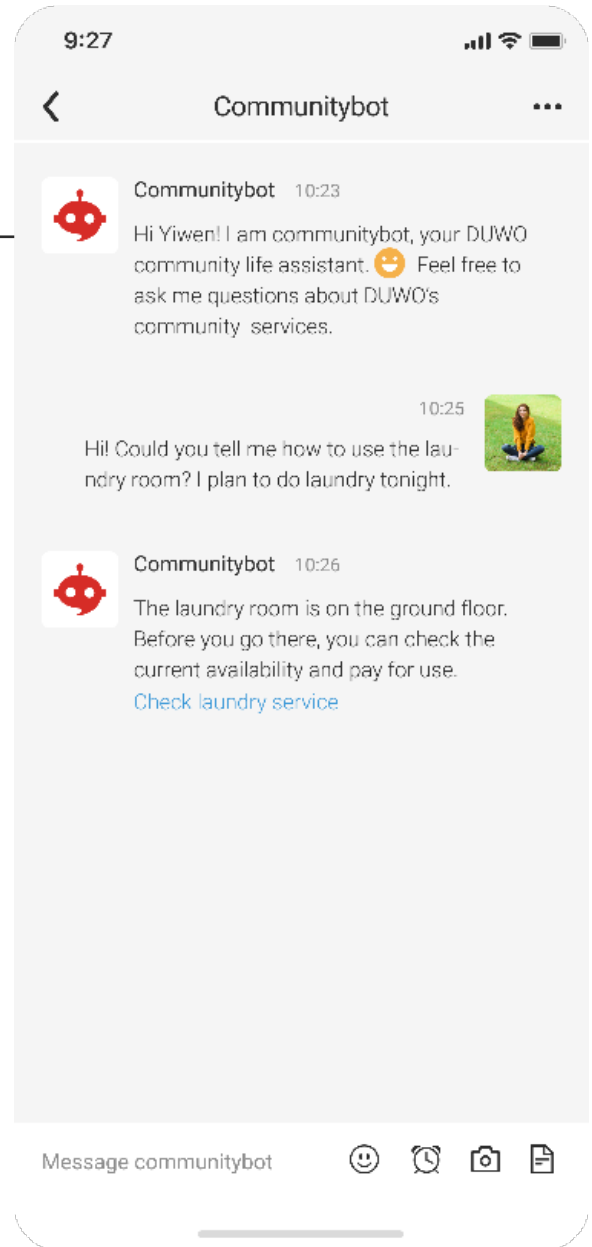
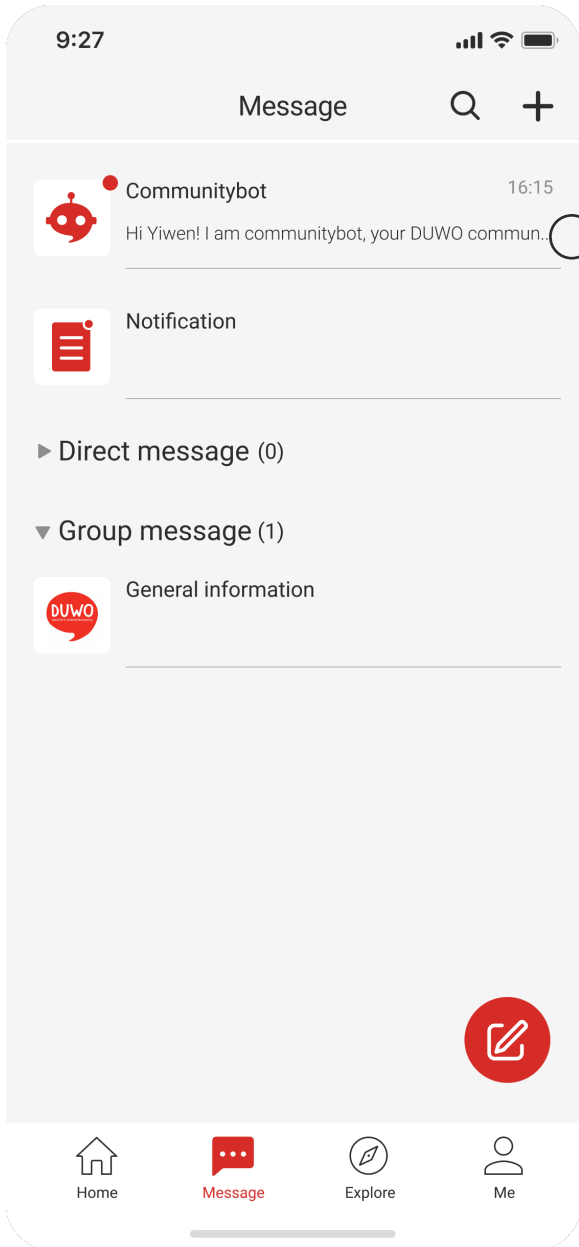
Before moving to DUWO community, the user received an email from DUWO, which recommended her to download this community service platform.



The user logs in with her DUWO account. Communitybot sends her a welcoming message and tells her that it can answer her basic questions about community service. She asks communitybot how to use the laundry service and quickly get a reply from communitybot.

The new user is also invited to join a DUWO managed group called 'general information', where she can learn about the situation of her DUWO community and discuss general issues about community services with other neighbors.



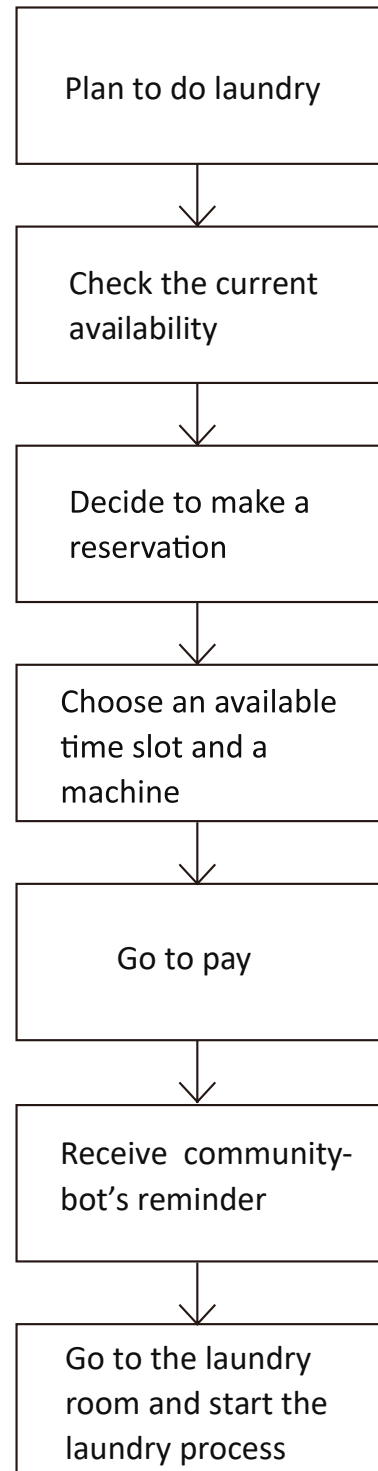


Scenario two: Use laundry service

The user plans to do laundry tonight but she doesn't know if the washing machines are available at that time. She wants to check it and decide whether to make a reservation.

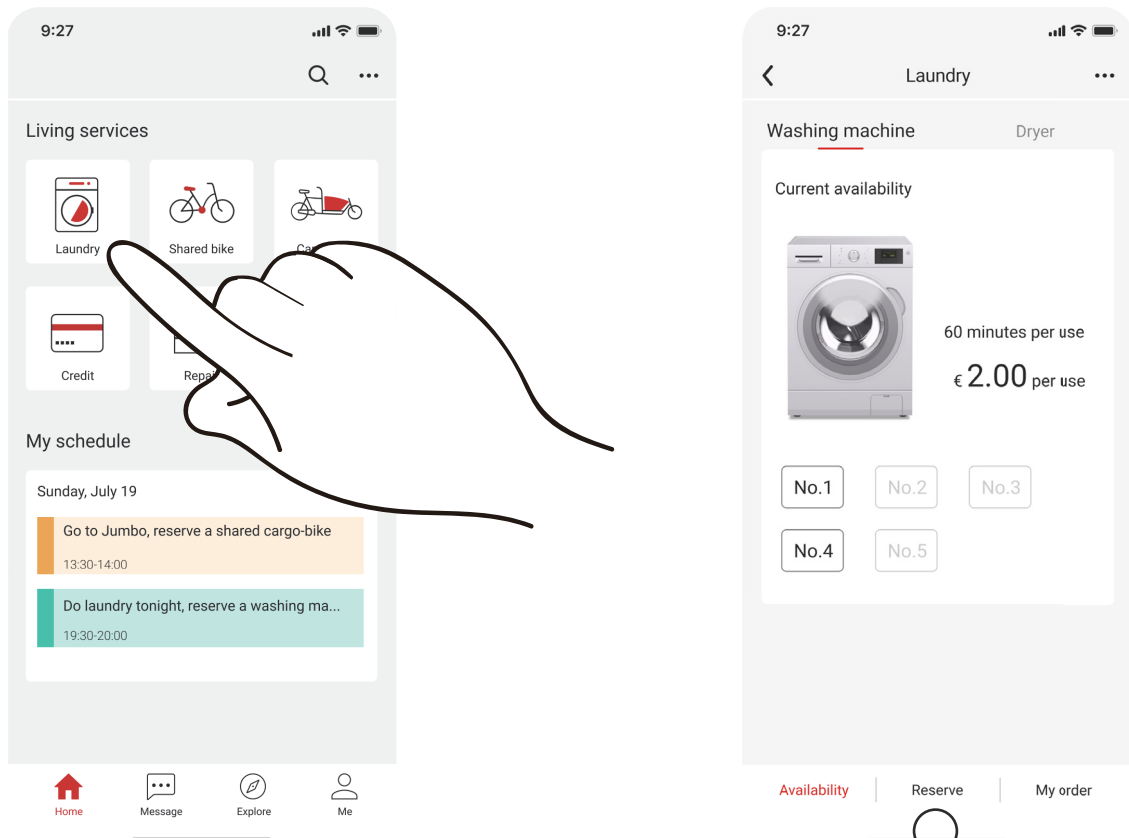
So she opens the DUWO's community service platform. On the home page, she can find the frequently used DUWO's supporting services. She clicks on "Laundry", and then she can see the current availability status of washing machines and dryers. In order to ensure that she can do laundry tonight, she decides to reserve a washing machine. She selects an available time slot and the number of the washing machine to be reserved.

When she successfully reserves the washing machine, a prompt pops up and asks her if she want to let communitybot to remind her take out her laundry when the washing process finishes. She doesn't want to forget to take out the clothes and cause inconvenience to other users, so she chooses to accept the reminder.

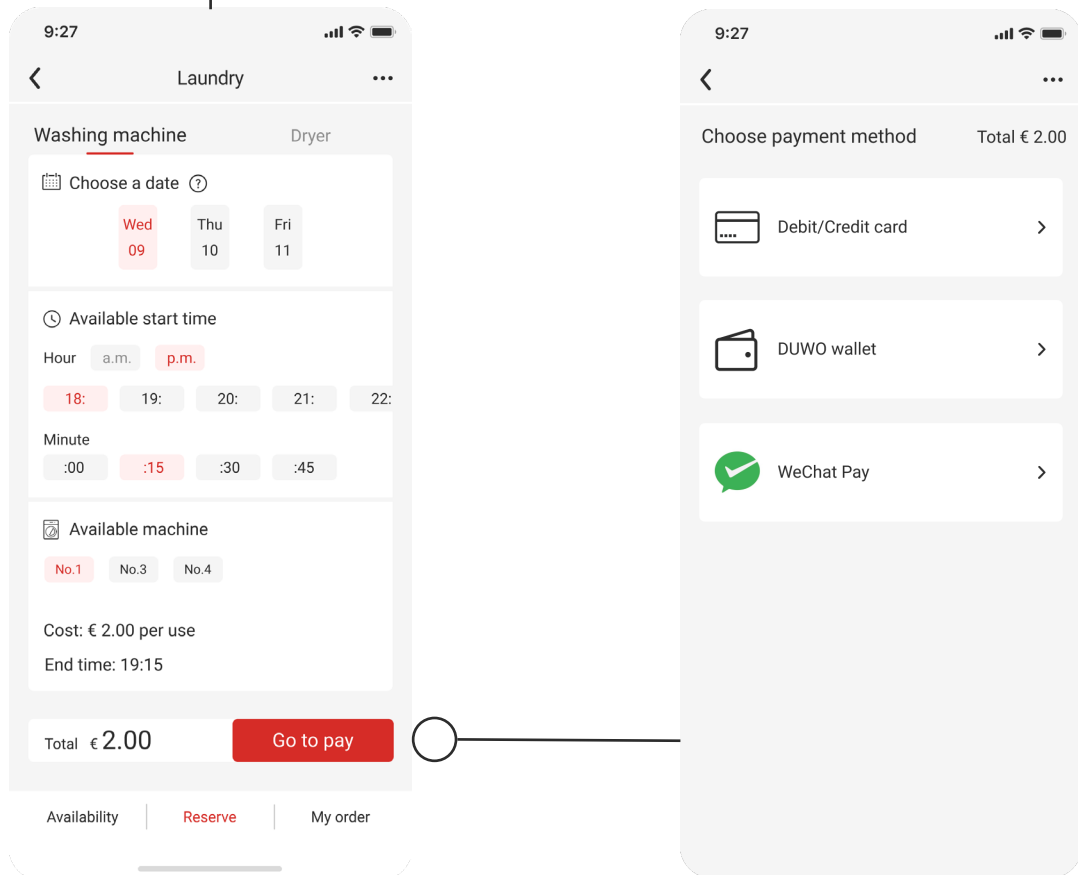


1

Click "Laundry" on the home page



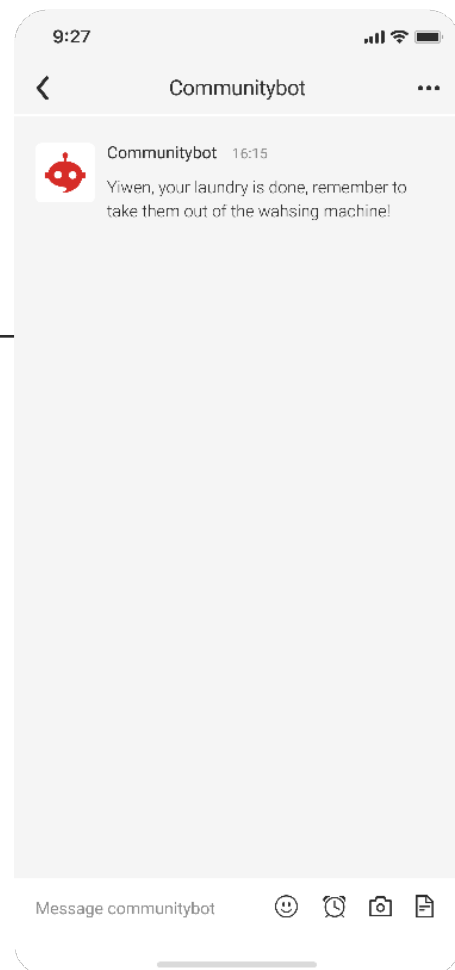
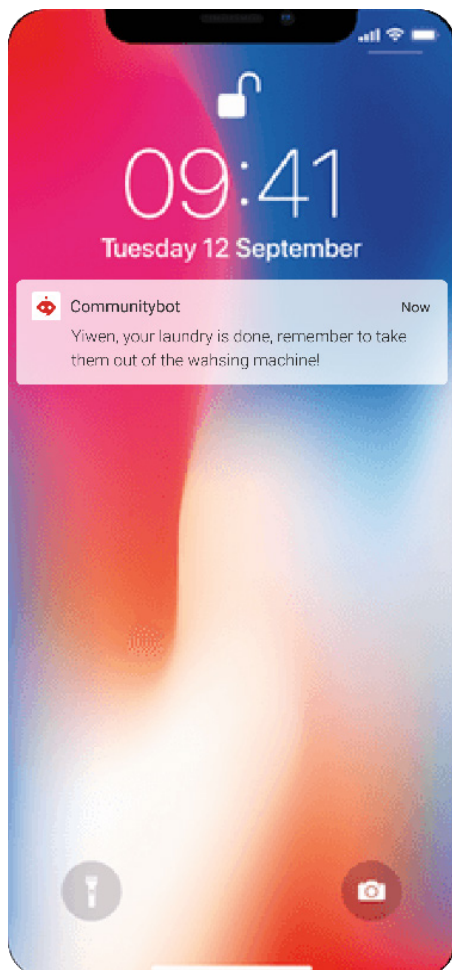
2



3



Now the laundry is done. The user receives communitybot's reminder, she will go to the laundry room and take her laundry out right now.



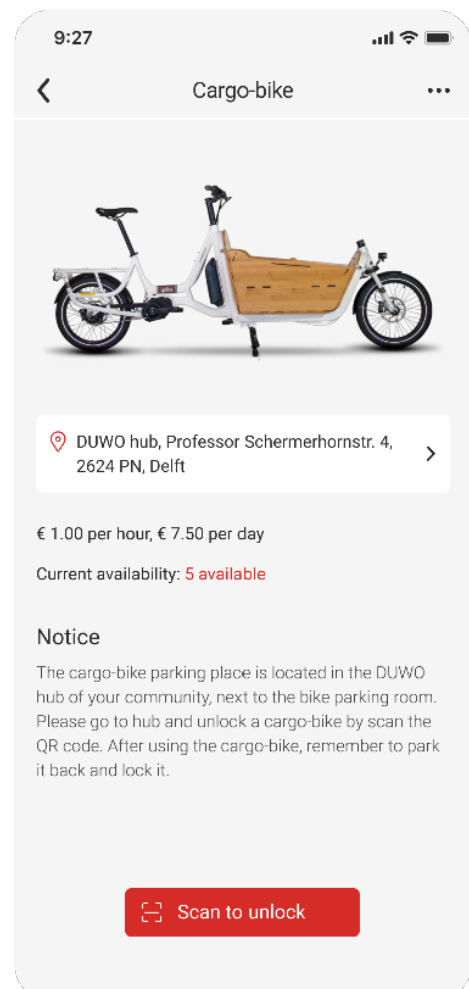
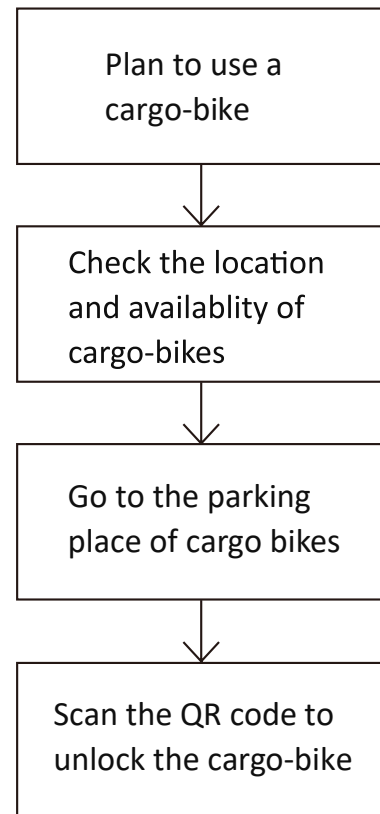
Scenario three: Use shared cargo-bike

Shared mobility services become part of DUWO's living services. DUWO provides tenants with shared cargo-bikes, tenants can find the cost and location of the cargo-bikes and use the platform to unlock the cargo-bikes.



When the user plans to go to the nearby supermarket to buy a lot of things. She finds that it's too heavy to carry the bags, so she wants to ride a cargo bike.

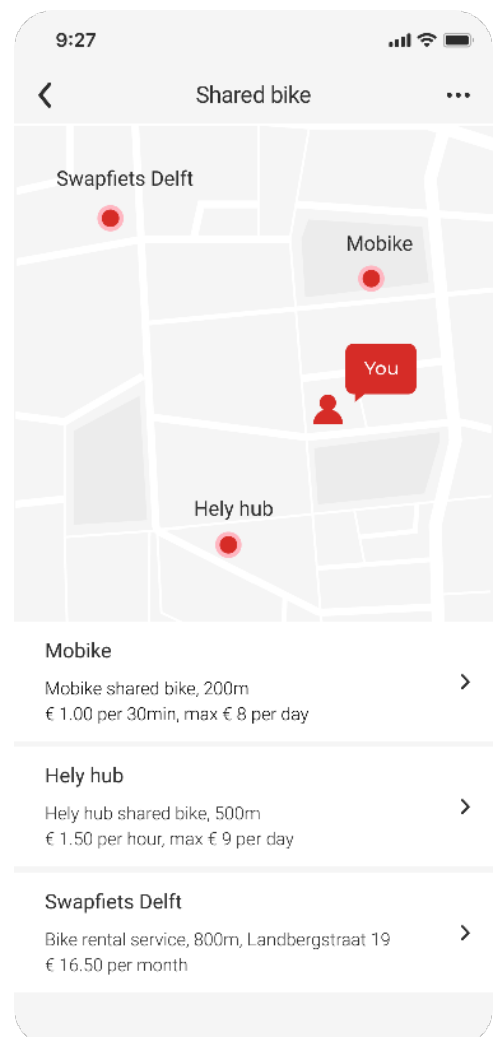
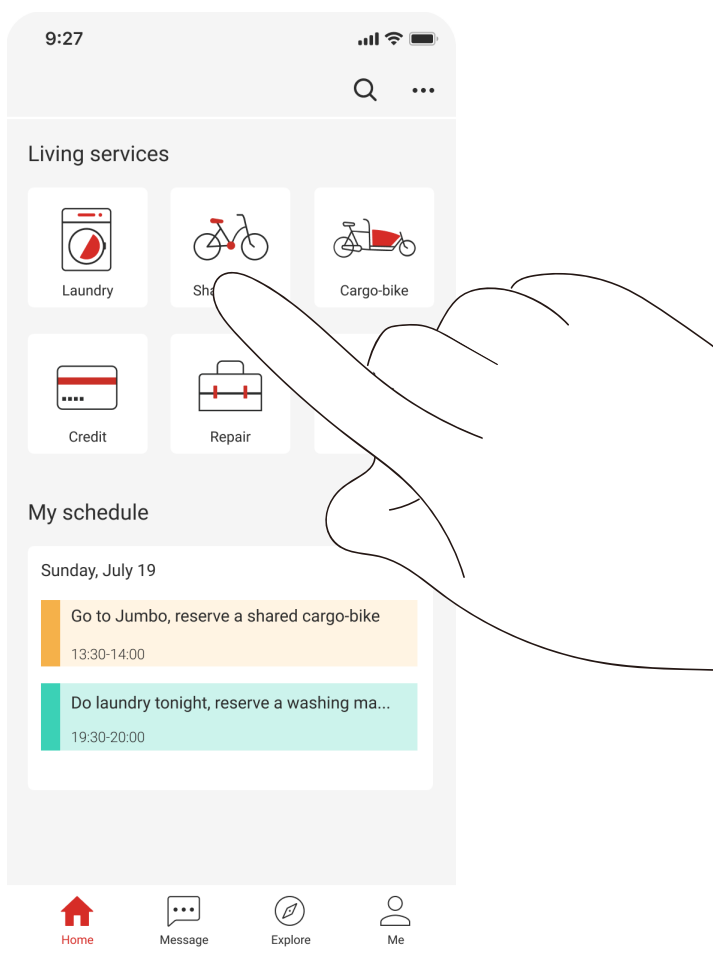
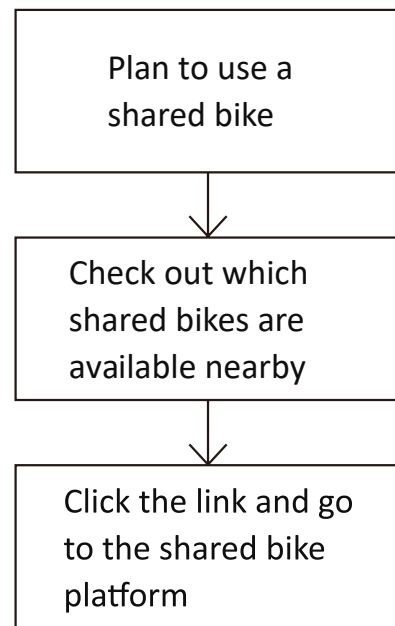
She clicks the 'shared cargo-bike' button on the home page, and finds that there are many cargo-bikes available now. She checks where the cargo-bikes are parked, then she goes to the parking place, scans the QR code and unlocks a cargo-bike.



Scenario four: Find nearby shared bikes

Considering the demand for shared bikes and the high maintenance cost, DUWO does not directly provide shared bike service, but cooperates with external shared bike companies.

On this community service platform, users can search for shared bikes near the DUWO community, and find their locations and cost. When users decide to use a certain brand of shared bikes, they can click on the link to enter the corresponding platform to unlock the bike and pay.



Scenario five: Join an interest group

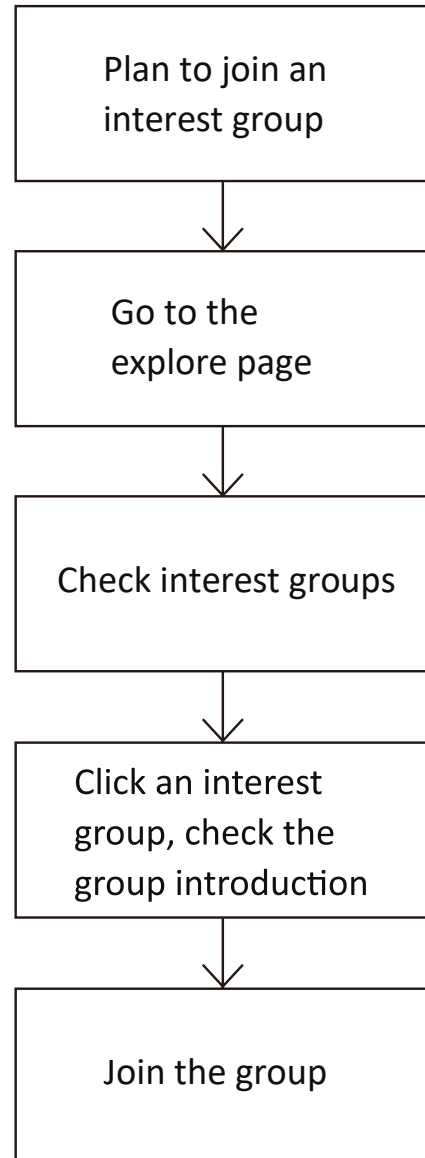
The user has been living in the DUWO community for a while. She wants to know some neighbors with common interests and participate in more neighborhood activities.

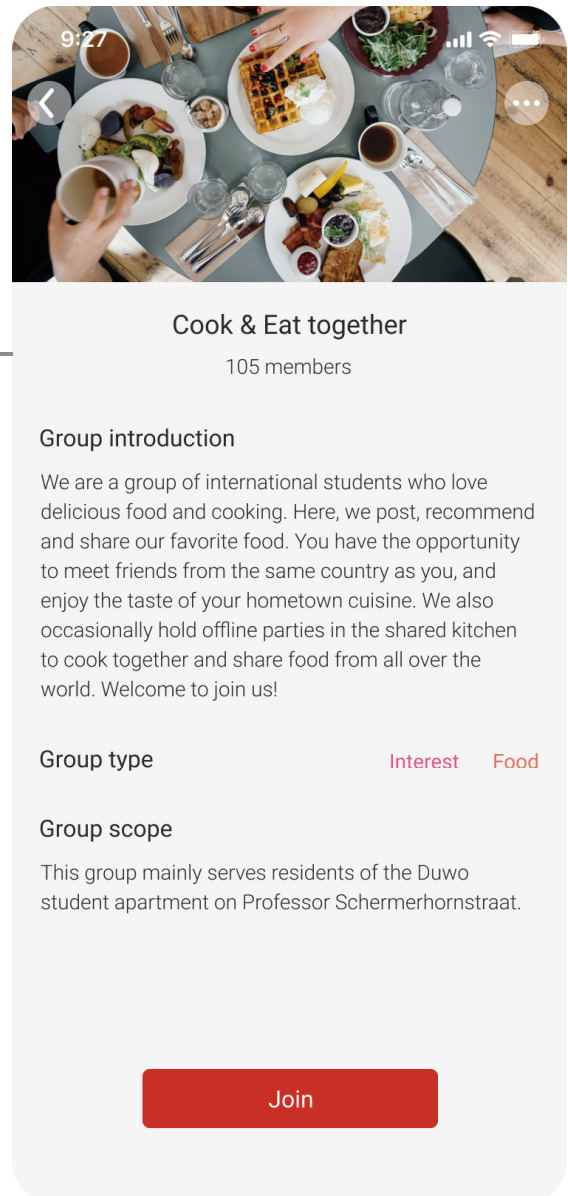
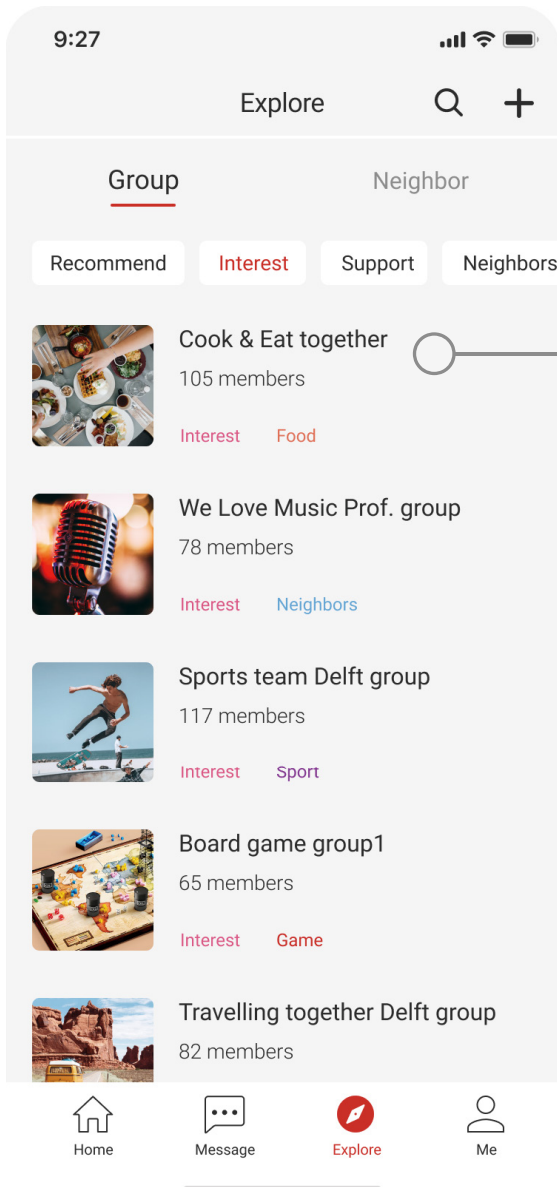


She enters the community service platform and finds many groups on the explore page. She selects the 'interest' tag and finds that there are many interesting groups.

This 'Cook & Eat together' group sounds good , so she clicks to view the group introduction and scope.

She joins the group, and meets neighbors from different countries who love food. They often share food recipes in the group and sometimes cook together on weekends.

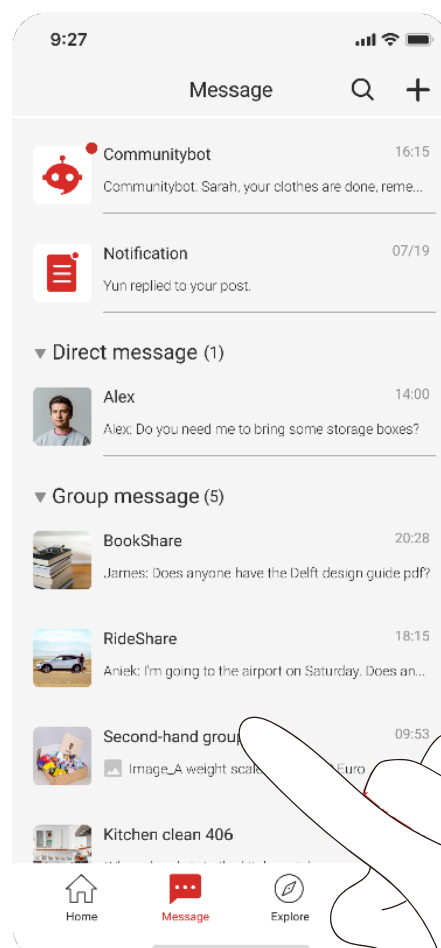
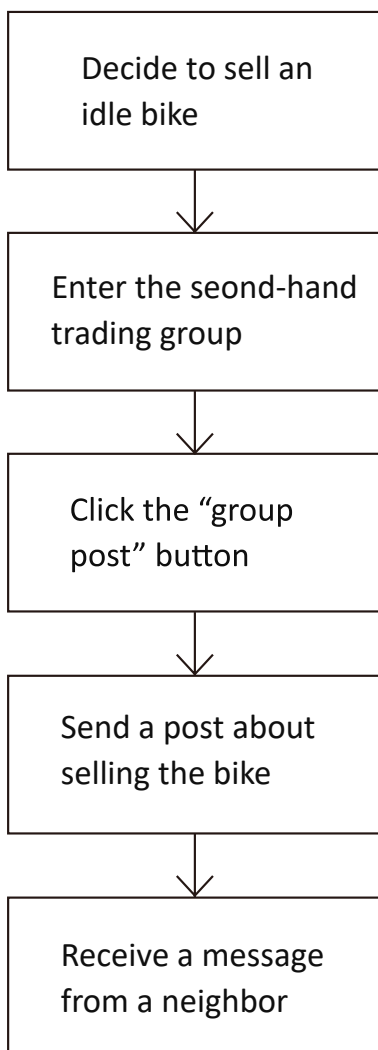




Scenario six: Sell a second-hand bike

The user is going to move home and wants to sell a bike that she doesn't use anymore.

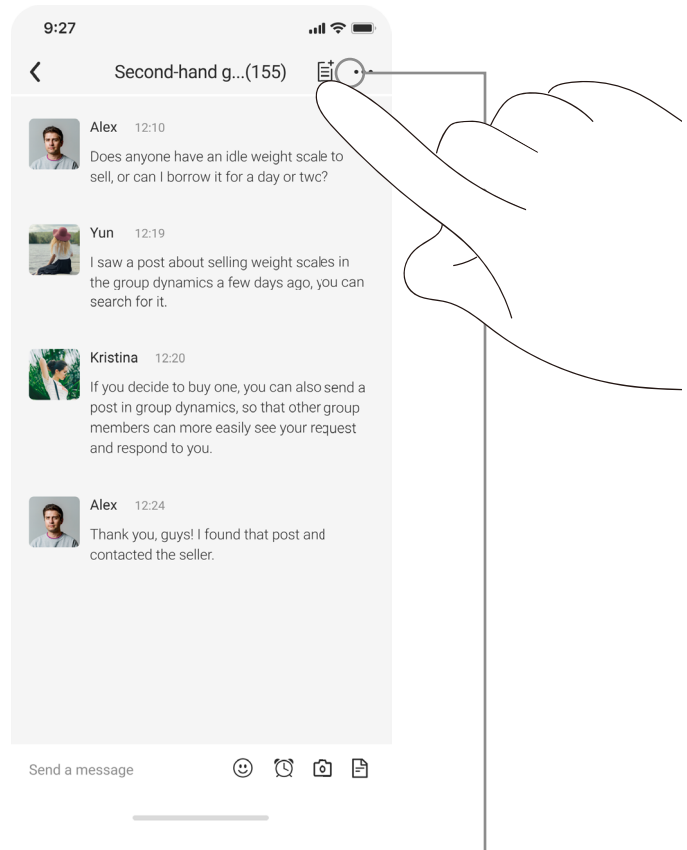
She has joined a second-hand trading group on the community service platform. She feels that it is more convenient and safer to sell second-hand items to neighbors in DUWO community than people outside DUWO. So she decides to send a post about selling her bike.



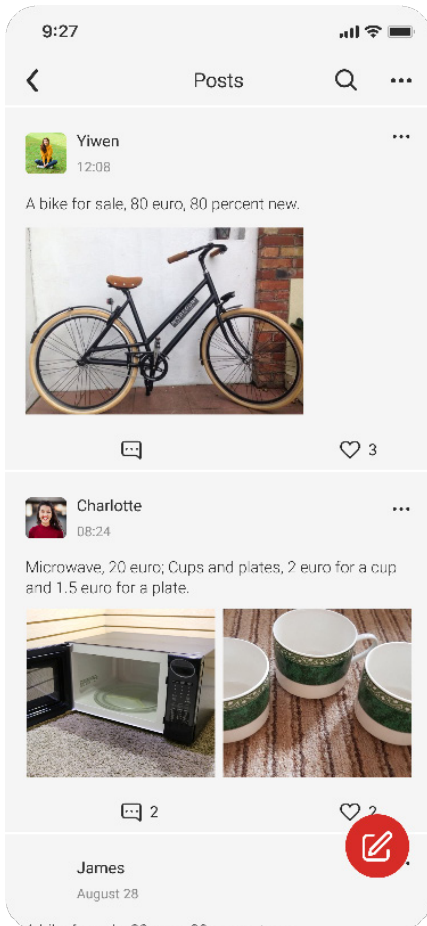
She opens the chat dialog of second-hand trading group, clicks the post icon at the top right of the page, and enters the group post page. Here group members can post sale and purchase posts, which is convenient for other group members to search and reply.

She sends a post and later she receives a message from a neighbor. They quickly make a deal and decide to meet downstairs.

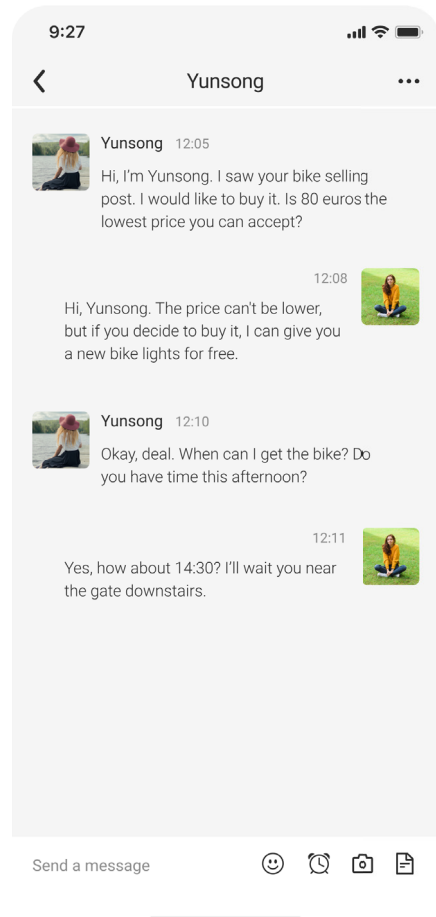
Click the post icon on this page



Send a post of selling the bike



Receive messages from a neighbor



Scenario seven: receive communitybot's messages

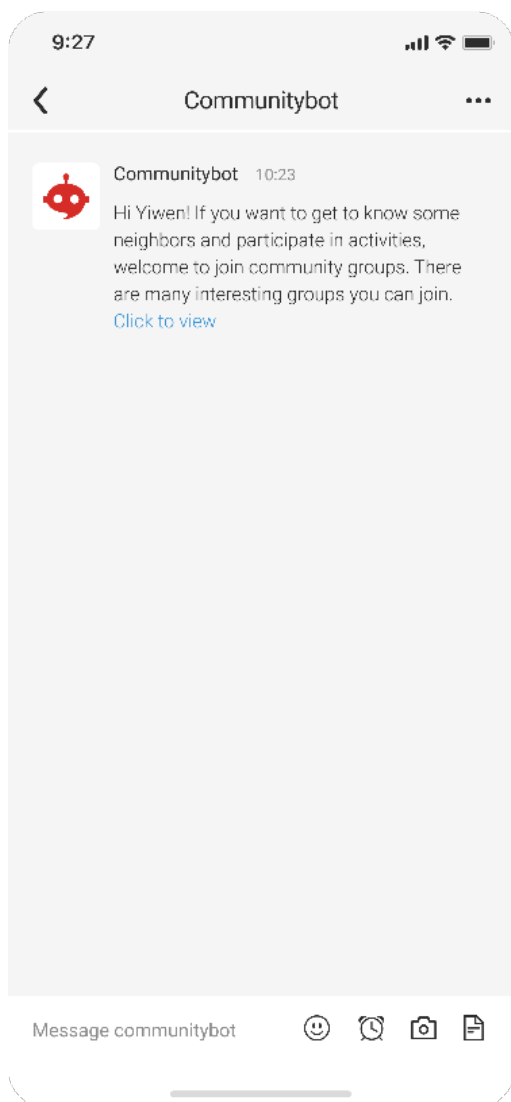
Communitybot proactively provides users with information and suggestions based on their current living conditions.

When new tenants first move into DUWO community, communitybot will advise them to join groups that they may be interested in, and recommends some community activities to the users, to help users meet neighbors and enrich their community life. Users can click on the link at the end of the message and directly go to the group explore page.

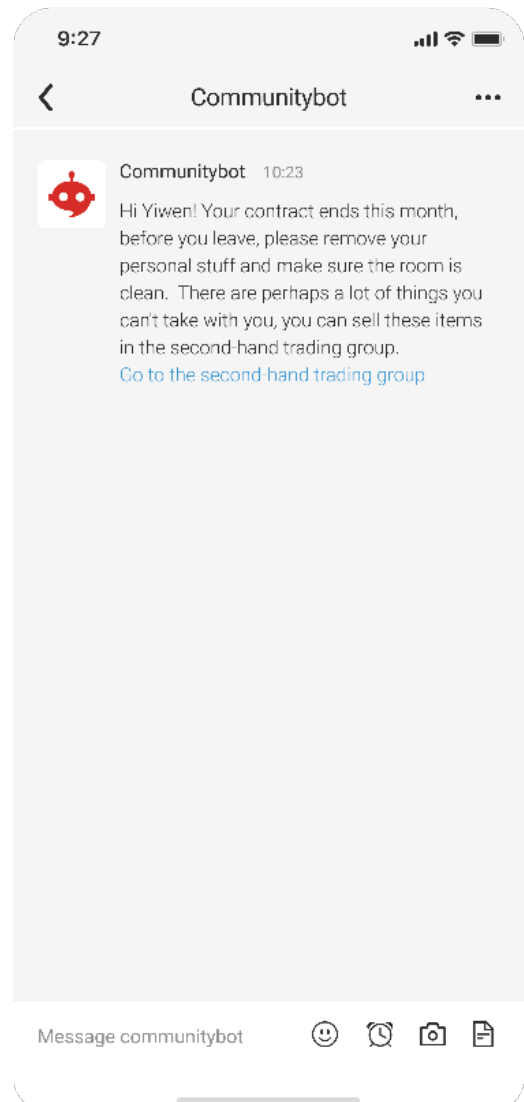
If users are not interested in these suggestions, they can let communitybot reduce similar messages.

When users are going to end the contract and move out, communitybot will send them moving instructions, informing users which space and items to clean up before leaving. It also advises users to sell the items that cannot be taken with them in the second-hand trading group. Users can click the link

Communitybot advises users to join groups



Communitybot sends moving instructions to users



5.1.2 Implementation

In order to ensure that DUWO's community service platform can achieve the goal of helping tenants enjoy a convenient and harmonious community life, it is necessary to explore the issues that need to be considered in the implementation of this concept.

Optimization of physical facilities

DUWO's community service platform is part of the entire DUWO community service system. Without the collaboration of physical shared facilities, the supporting living services on the platform will not work.

Therefore, some of the physical shared facilities should be optimized accordingly. For example, some users often forget to take the clothes out of the washing machine after the laundry is done. Therefore, in addition to the reminders sent by communitybot, some temporary clothes storage boxes could be placed in the laundry room to ensure that the next users can use the washing machine normally.

What's more, the newly added cargo-bike sharing service requires DUWO to not only purchase cargo-bikes, but also set up cargo-bike parking spaces.

Collaboration with external companies

Some of DUWO's living services are provided by external companies. The community service platform supports plug-ins, which enables DUWO's partners integrate their service system into the community service platform.

For example the laundry service is actually provided by DUWO's partner company, but tenants can reserve machines and pay directly on the community service platform.

Technical limitations

Compared with shared cargo-bikes, the demanded number and frequency of use of shared bikes are much higher. Taking into account the cost of implementation and the

difficulty of supervision, I suggest that DUWO cooperate with existing shared bike companies. This means that the shared bikes are provided by external companies, while DUWO only needs to provide tenants with access to these services.

However, due to technical limitations, it is very difficult to integrate different companies' shared bike service systems into one platform. Therefore, currently the platform informs users which shared bikes are available nearby and provides cost information and links. Users can click the link to enter the corresponding bike sharing platform to use the service.

Ambassadors and management of groups

When tenants use the community service platform for the first time, they will be invited to join a fixed group called 'general information', which helps tenants understand DUWO community and discuss general issues about community services.

The ambassadors of the fixed group are DUWO employees. They are responsible for creating the group, inviting new users, updating the content, and supervising the information published in the group.

For groups created by tenants, the active tenants in the group and DUWO employees jointly serve as ambassadors. In the early stage of the implementation of the platform, it is recommended that only a limited number of community groups be created, so that it is easier to supervise group content and ensure that there is no illegal information and spam in the groups.

5.2 Evaluation of the final concept

After completing the final concept, with the help of Advier, I conducted two evaluation sessions, one with DUWO's experts and managers, and the other one with an expert from Greystar. Since only one expert attended the session with Greystar, and the received feedback overlapped with feedback from the session with DUWO, so in the following part, I will skip the session with Greystar and elaborate on the session with DUWO.

The purpose of this evaluation session is to understand the opinions of DUWO's experts and managers on my concept, and to discuss the necessary conditions and limitations of the concept in real-life implementation.

A total of 7 experts and managers from different departments of DUWO participated in the evaluation session. Before the session, I sent the participants an introduction of my final design, including a video demonstrating how to use the community service platform.

Process

The session consisted of two main parts, including an introduction to the project and my final concept, as well as feedback on the concept and discussion of implementation issues.

Firstly, I presented the design goal of this project, which is design a living as a service concept including shared mobility services for DUWO community, to support tenants' community life. Next, I explained why DUWO community is chosen as an example, and why DUWO tenants are targeted users.

After that, I explained the analysis of DUWO's current living service system and the motivations and barriers of DUWO tenants using these living services. This part aroused

great interest and attention of DUWO's experts. Take the lack of service instructions and reminders as an example, some DUWO's experts had received similar complaints from tenants in their past work experience, but they didn't realize that these deficiencies in DUWO's living service system would have such a big impact on tenants' use of living services.

Next the final concept and the main scenarios using the community service platform were introduced, followed by a video showing the journey of a DUWO tenant from using this platform for the first time to moving away from DUWO community. After the video, I further explained how the services on this community service platform work.

After the presentation, the discussion around the following four questions began.

1. What are your general opinion of this concept?
2. What do you think will be the success factors?
3. What would be necessary to implement this concept?
4. Are there specific attention points to make the concept fit the DUWO brand/services (communication style, functions, etc)?

DUWO's experts were asked to write down their opinions and answers to these questions, and then the discussion started. Each participant shared their opinions on this concept, and discussed the success factors and implementation issues.

Results

After the evaluation session, I collected the participants' answers to the above questions, summarized and categorized them. An overview of the results is shown in Figure 33.

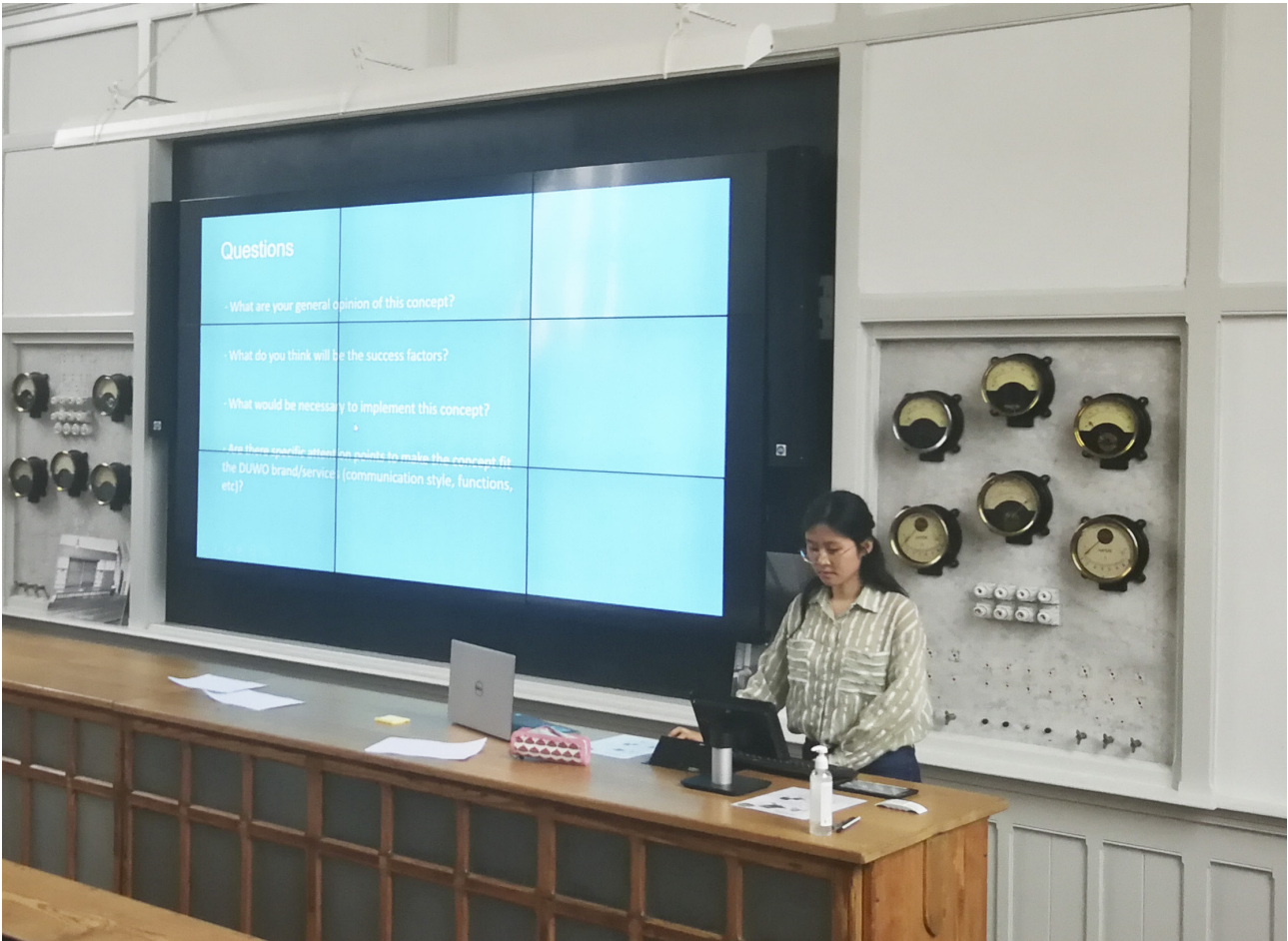


Figure 33. Results of the evaluation session with DUWO experts

General opinion of the concept

“I think we do need such a concept.”

“I want it now.”

“We want such a concept. It is tenants-friendly.”

“Very good concept, especially for the international students. I like it!”

“It is a realistic view of the future.”

Success factors of the concept

“The dedicated students need to stay involved in updating the info in the groups.”

“The content of groups are for students, and created by students.”

“The all-in-one concept is very convenient.”

“Simplicity, all the services are easy to use.”

“Every feature in the APP has to work perfectly.”

“Fast and easy processing of reservation.”

Implementation considerations of the concept

“Sufficient technique.”

“Technical possibilities to link to every service. ICT (Information and communications) technology capacity.”

“Connect to DUWO’s ERP system.”

“DUWO’s partners should be able to connect to the platform.”

“Collobaration with tenants, for example the student association.”

“Students’ involvement.”

“Privacy, safe of the data.”

“To make sure the communitybot can answer some difficlut questions, it may require DUWO’s employees to help and give accurate answers.”

Specific attention points to make the concept fit the DUWO brand/services

“It needs to accessible for DUWO’s community in other cities, Amsterdam, Leiden, the Hague...”

“Different content for different cities.”

“DUWO logo will be enough.”

“Nice look and feel.”

“Meet DUWO’s brand manual.”

“Privacy, safe of the data.”

“All data must be safe.”

Discussion & Recommendation

In general, the community service platform concept has received recognition and interest from all DUWO participants.

Compared with DUWO's current living service system, the community service platform is future- and service-oriented, and also promotes the community atmosphere of DUWO. In addition, the research of this project provides valuable insights for DUWO to understand the motivations and barriers of tenants (especially the international students) to use shared living services.

Success factors

Regarding the success factors of the concept, the opinions of DUWO experts can be divided into two categories.

The first category is related to the tenants involvement in the chat groups. Many DUWO experts emphasized the importance of the chat groups staying alive. As one DUWO expert said, DUWO should provide only the basic set up, the content of the groups is for tenants and is generated by tenants. Therefore, the dedicated and proactive tenants who can continuously update the content of chat groups are the key success factor of the neighborhood interaction service.

The second category is about ensuring the perfect operation of shared living services and the ease of use of each service. To achieve this goal, it requires sufficient technical support and collaboration with external partners, which will be explained in the following part.

Implementation considerations

Some implementation considerations were put forward in the session, first of all the technical possibilities. The platform makes it convenient for tenants to use, reserve and pay for all DUWO's living services, some of which are currently provided by DUWO's partners, for example the laundry service, so technical

support is needed to connect these partners to the platform.

Secondly, the participation and cooperation of tenants is highlighted by many DUWO experts. As mentioned in the part of success factors, active tenants are the key to keeping the chat groups alive and attracting new users.

In the early stage of implementation, DUWO staff can cooperate with student organizations to create some interest groups and gradually attract other tenants to spontaneously participate in group discussions and create more chat groups.

Another practical implementation issue is data safety and privacy, which also mentioned by many DUWO experts in the next part.

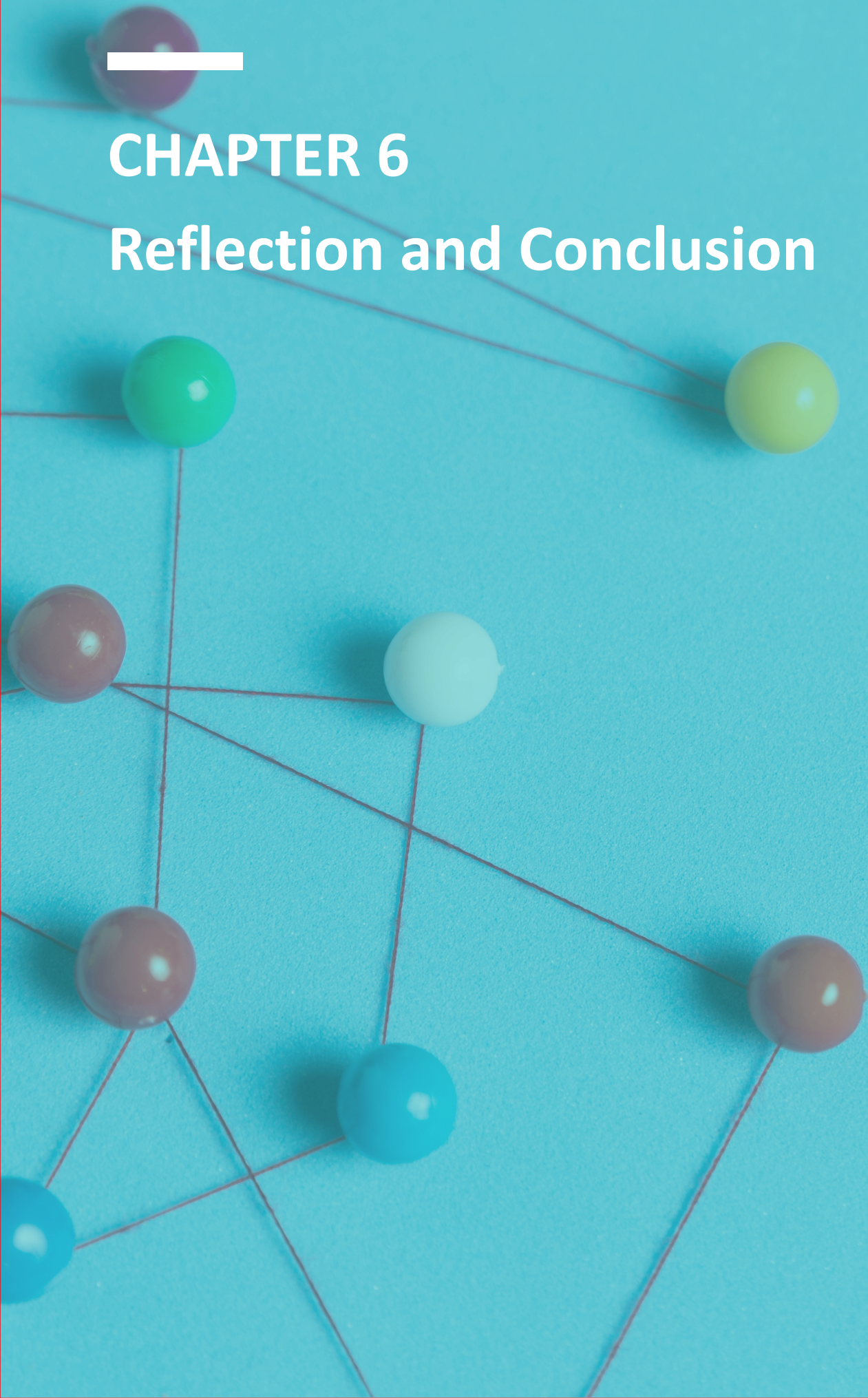
Among all the services of the platform, the implementation of communitybot has caused the most concerns of DUWO experts. There are technical difficulties to realize that communitybot can answer most of the tenants' questions, thus it may require the assistance of DUWO staff. Hans, the director of DUWO apartments Delft branch, said that communitybot will create 10 times the amount of contact, which means DUWO has to upscale their customer service, otherwise communitybot can only play a limited role in solving tenants' problems.

Specific attention points to make the concept fit DUWO brand

To make the concept fit DUWO brand, DUWO experts mainly put forward three attention points. The data of tenants must be safe and the look and feel of the platform should meet DUWO's brand manual. Furthermore, the platform should be accessible for DUWO's communities in other cities, and the services should be adapted to the corresponding cities.

CHAPTER 6

Reflection and Conclusion



6.1 Reflection

In general, in this graduation project, I have achieved the goals I set in the project brief, and the value of the final design was approved by the target users and DUWO experts. In the following part, I will reflect on my performance and results in the entire graduation project from several aspects.

Research and design process

In the design brief, I set myself a goal of understanding shared services in depth, which was well realized through literature research and user research. Through this project, I learned about the business model of shared mobility and shared living services, understand how different types of users participate in shared services, and their perceptions of sharing and ownership.

It is a brand-new concept to integrate shared mobility services into living services. There are currently no mature cases for reference.

In the research phase, through online surveys and qualitative interviews, I discovered the importance of the sense of community in realizing this concept, and take DUWO community as an ideal example to develop the service concept. These findings are very valuable for my concept design.

In the design process, due to the impact of corona virus, I conducted online sessions to brainstorm with target users. During this process, I learned many online design tools and methods to conduct online collaborative sessions. These are additional learning achievements of this graduation project.

Quality of the final design

The final design, DUWO community service

platform, has achieved the initial goal of the project, which is to integrate shared mobility services into living services.

But the final design is not limited to the functional integration of DUWO's shared services. It satisfies users' needs of neighborhood interaction and communication, makes up for DUWO's current living service system's deficiencies beyond meeting tenants' basic needs.

In terms of feasibility, I took into account the technical limitations, service management issues and cooperation with external companies. Most of the services provided on this platform are feasible, but there are still technical difficulties to fully realize the functions of communitybot.

Communication with supervisors

Throughout the project, I maintained active communication with supervisors.

In the early stage of the project, the communication between me and supervisors was limited to online meetings. In the mid-term feedback form, I reminded myself to strengthen the communication with Advier, and make every meeting with supervisors more efficient. The communication has been greatly improved in the middle and late stages of the project.

In the last stage of the project, Advier and my company mentor, Minze, provided me with great help in arranging evaluation meetings with DUWO and Greystar experts.

Limitations

The target users of this project are defined as tenants living in a shared living community taking DUWO as an example. In the ideation and design process, the DUWO community located

on Prof.schermerhornstraat, where most of the tenants are international students, was selected as an example for concept design.

This fact leads to the result that all the participants in the collaborative session and user testing are international students.

Therefore the final design is focused on the needs and expectations of international students. In terms of neighborhood interaction and communication services, the groups that Dutch tenants are interested in may be different from international students.

In addition, compared with international students, Dutch tenants have established a relatively stable social circle, and may not be so dependent on the interpersonal relationships in DUWO community.

So when we are going to apply the community service platform to other DUWO communities, it is a question how to attract Dutch tenants to join the groups on DUWO community service platform.

6.2 Conclusion

This thesis starts with the initiative to make a mobility hub as part of living services.

In this context, the service scope of the mobility hub is limited to a community, and the service targets are the residents of the community.

The scope of living services has also been clarified. In this project, living services refer to the living service package provided by housing corporations, which include the rental service and a series of additional shared services.

Through desk research and user research, this thesis has the following findings:

People's participation in shared services and their demand for shared services are closely associated with their living situations.

The target users of this project are tenants living in shared living communities, compared with other people, they participate in more shared services to enjoy a higher quality of life at an affordable cost. This is why the shared living community (DUWO student apartment as a typical representative) is used as an example for the further concept design.

In the design process, it is found that users' expectations for community-scaled shared services are not limited to physical shared facilities and spaces. Supporting services must be improved at the same time to reduce users' concerns and barriers to using shared services. Additionally, neighborhood interaction services are added to help users establish interpersonal relationships in the community and meet people with similar interests and values.

All these services are integrated to form a complete community service system, helping tenants enjoy and manage their community life.

The final design, DUWO community service platform, is not only applicable to DUWO, but also has great potential to be applied to shared living communities of other brands, cities and even countries.

In today's situation where housing prices continue to rise, the young generation is facing tremendous pressure to afford their own houses. As an emerging trend, shared living services are a new solution to the housing problem of young professionals in big cities.

In addition, as people have increasing awareness of sustainability and shared mobility services are widely used in many cities around the world, people's reliance on private cars has gradually decreased. Especially in big cities, more and more people regard shared mobility services as their first choice.

Therefore, participating in shared mobility and shared living services is very likely to become the mainstream lifestyle of the younger generation in the future. By keeping the service framework and flexibly changing the specific services according to the target users, the community service platform can be used as a template to be applied to different types of shared living communities.

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