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UNIVERSITY OF TECHNOLOGY

MASTER THESIS

Developing a flexible and scalable business model for light two-wheeled electric vehicles

Exploring the business and user perspective on emerging connected electromobility in light two-wheeled vehicles

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Master of Science Thesis

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Gothenburg June 9th 2020

Erik Ingemarsson

Hannes Mäki

TERMONOLOGY

BMS	-	Battery management system
EV	-	Electric vehicle
ICEV	-	Internal combustion engine vehicle
IoT	-	Internet of things
L2W-EV	-	Light two-wheeled electric vehicle
MaaS	-	Mobility as a Service
PT	-	Public transport

ABSTRACT

This study investigates how the facilitation of user-to-user interaction can be utilized as a key resource in developing scalable business models for light two-wheeled electric vehicles by approaching the topic from both the business and user perspective. This project aimed first to elicit the user needs of an L2W-EV, then explore how to create scalable business models through the use of connectivity and finally how these two could be combined into a business model that facilitates user adoption of the light two-wheeled electric vehicle at scale. The structure of the study is based on the design process. Starting with a literature study and user research, followed by an iterative concept development process and finally, a user testing. It was found that users were frequently unable to understand the potential cost and time benefits of using the vehicle type.

Further, it was found that it often being influenced by negative associations to mopeds and motorcycles, indicating the need to rebrand the vehicle type. The intended decentralized system that replaces the traditional sales channels and maintenance providers show great potential from both the business and user perspective in general. The participants of the user testing expressed an overall positive attitude towards participating in such a system. Although, the study was conducted with prototypes of the digital interface and lacked access to the physical vehicles, which opens for education further to evaluate the user experience of this type of system. Besides, it was indicated that this type of system needs to be adjusted after the specific vehicle, user segment and market to match the user expectation and in the extension being able to sustain a functional system by continuously keeping users active.

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Introduction

The introduction is the initial chapter and serves as a briefing. It describes the background, the purpose, limitations, and concludes this into detailed research questions.

1

1.1 Background

Today there are over five million registered passenger cars in Sweden (SCB, 2018). The car undoubtedly simplifies everyday life for many households and families, but it also comes with a high cost. Not only for the environment but also the financial sustainability of the individual since the monthly operation cost of a car in Sweden is on average between 4500 to 7500 SEK (Swiftcourt, 2020; KVD Bilpriser, 2018). Looking at the needs of the suburban commuter, the car is arguably a vehicle with highly excessive functionality. A driver makes nine out of ten commuting trips alone with none or small luggage (Trafikverket, 2019). Yet, most cars are made to fit four passengers, multiple bags and are designed for long-distance travel.

Another popular vehicle for commuting is the electric bicycle. It is far less expensive to operate than a car (Gössling & Choi, 2015), does not contribute to congestion and has a lower environmental impact ((Phelps, Lewis, Mobilio, Perry, D & Raman, 2004). However, the limited speed, range and the requirement of pedalling make it unsuitable for medium and long-distance commuters (Winberg, Lagerström & Bengtsson, 2020).

However, the way we travel is not only dependent on the types of vehicles we use, but also how we can access them. MaaS solutions that use a digital platform to enable access to different modes of transportation have shown the potential to reduce the need for private car ownership (Strömberg, Karlsson & Sochor, 2018). Yet, there is low user adoption of these types of mobility for commuting, and the car is still the most used means of transportation (Saxton, 2018). On the contrary, providers of pay-to-use electric scooters have been able to reach users at a large scale, by allowing access to their vehicles through IoT technology. Still, they are unable to substitute the car in most cases since they are limited to transport one person at the time, at low speeds and only in restricted areas. (Hollingsworth, Copeland & Johnson, 2019).

These aspects indicate that there is a need to develop a mobility solution that is more capable than an electric bicycle, less excessive than a car for commuting purposes and utilizes the potential of IoT to facilitate user adoption. Therefore, this project approaches the topic of light two-wheeled electric vehicles and IoT from a business-focused perspective to achieve the desired effect of improving mobility at scale.

1.2 Purpose

The purpose of this project is to design a business model of next-generation light two-wheeled electric vehicles that is flexible and scalable enough to enable implementation at various markets.

1.3 Limitations/demarcations

Throughout the project, a quantitative economic analysis was not required. The scope was limited to the Swedish market.

1.4 Research question

Following questions will be answered during the project:

- Is the L2W-EV suitable for suburban and urban transportation?
- How do people in Sweden perceive L2W-EV as a means of transport?
- What needs and requirements should an L2W-EV fulfil for users in Sweden?
- How can IoT be utilized in a business model for L2W-EVs to reach as many potential customers as possible?
- How can IoT be utilized for the business model to meet the needs of the customers?

1.5 Project Stakeholders

Company:
The Techno Creatives AB

Supervisors:
Joel Rozado, Jacob Ahrnstein, and Filip Svalander

Supervisor and Examiner:
Pontus Wallgren

Project group:
Erik Ingemarsson and Hannes Mäki

Method

This chapter describes the methods used in this project and how they were implemented. The project was divided into five phases, the Literature study, User study, Benchmarking, Context specification, and Concept development. The first three phases formed a pre-study that focused on creating a knowledge base of relevant and actionable information. Further, the Context specification phase defined the problems from the pre-study and set a vision for the business model. Lastly, with the pre-study and Context specification as a reference, the concept development focused on creating and evaluating a concept that fulfilled the vision.

2

2.1 Literature study

Transportation in urban and suburban regions is part of the average Swedish citizen's everyday life. There are many alternatives of modes to choose from, e.g. cars, public transit, two-wheeled vehicles, bikes, etc. Parallel to this, the society moves to increasingly connected existence, with smartphones and connected means of transportation, which enables new ways to transport people inside and outside cities. The literature study aims to investigate the relevant academic research done in these fields.

The primary material collected from various academic sources is available from Chalmers University of Technology's library. There has been relatively little research done specifically on light two-wheeled electric vehicles. This led to conclusions often being drawn from neighbouring research areas within mobility, e.g. electric cars, ICEVs, motorcycles, scooters.

2.2 User Studies

The user studies were conducted to gain knowledge about user behaviour and attitudes regarding L2W-EVs specifically but also transportation in general. The studies consisted of semi-structured interviews with users, non-users and retailers of two-wheeled vehicles as well as observation and a quantitative survey.

2.2.1. Interviews

The selection of participants was based on two criteria; either should the participant be an experienced motorcyclist with A-licence or not be a motorcyclist but being interested in driving a motorcycle. The findings were supposed to give both insights about motorcycle usage as well as perceived thoughts from non-bikers. Two of each criterion was selected, four altogether. All but one had owned mopeds when young. All of them had B-licence. The interviewees were aged 25 to 55, and all had at least one car in their household. The interviews were conducted for about 90 minutes. The purpose of the interviews was to get a brief understanding of the usage of two-wheeled vehicles, both with electric motors and internal combustion engines. The results from the interviews would be further investigated by a survey to get quantitative verification.

The interviews started with the interviewer displaying a map where the interviewees marked out how their daily routes looked like together with a verbal description. This was used to give the interviewee an easy entry into the interview. Further demographic questions were asked, e.g. age and living situation, to define the differentiation between the interviewees. The interviewer continued with questions about motorcycles in general, what they thought of them, what advantages the vehicles had. The same questions were then asked about EVs and then later about L2W-EVs.

Lastly, the interviewer presented what IoT is and asked questions regarding the application of IoT in L2W-EV. It was partly to understand what they thought of IoT in general, but also to gather ideas for the phase Ideation. The interviewer continued by asking what the interviewee thought about alternative ownership models that could be facilitated by IoT technology. The interview ended with displaying six different variants of L2W-EVs, where the interviewee chose one or two that they liked the most and answered why. Audio from the entire session was recorded and later transcribed. See Appendix I for the interview template.

2.2.2. Survey

A survey was conducted to verify the analyzed insight gained from the interviews by quantitative verification. Another purpose of the survey was to gain insights into the existing barriers and drivers that either attract or repel potential users of using an L2W-EV for commuting. The survey was used to provide support for the process of defining a viable target user group. The result was examined together with the results from the rest of the user study.

The survey consisted of 23 questions, written in English, see Appendix II. The first 14 questions gathered demographic information about the respondent, such as age, income, living situation, occupation, the most common means of transportation, driver licenses, etc. All questions had predetermined options for answering except for the questions about the respondent's occupation and preferred means of transportation. The two open-ended answers were then assigned to a fixed set of categories in order to allow analysis.

Questions were asked regarding their attitudes towards using electric moped or electric motorcycles for daily commuting. Further, the participants answered whether they would be interested in accessing electric mopeds from a station placed near or at the respondent's workplace. The respondent had to explain the reason for their choice and what would change their mind.

The survey was done through an online form, distributed through multiple online forums with a wide variety of topics. After 300 collected answers, the survey was closed. The aim was to have a sample that represented the adult population of Sweden, i.e. all people in Sweden that are over 18 years old.

2.2.3 Self-observation

A self-observation investigating the various aspects of owning an L2W-EVs was conducted. An L2W-EV from the brand Vässla, borrowed from The Techno Creatives, was used for five days. The participant registered advantages, disadvantages, opportunities, problems with the usage and general thoughts, based on the insight from the interviews.

2.2.4 Analyzing data from user studies

All the data gathered from the user studies were analyzed. The interviews were analyzed through KJ-analysis (Project-management.com, 2017) to structure the findings into logical groups. The data from the survey were categorized and analyzed statistically using software written in the programming language Python, using functions from the Panda's data science library (Pandas, 2020). The purpose of the analysis was to indicate eventual dependencies between answer patterns and expressed attitude towards L2W-EVs. Furthermore, this was structured by KJ-analysis into specific requirements and needs.

The data gained from the self-observation was analyzed through discussion and compared to results from previous user study methods. The findings from the user studies were summarized into actionable insights, and five personas representing the targeted user group. The personas were created as a reference of the user studies to the concept development phase.

2.3 Benchmarking

The benchmarking was performed to understand the market for L2W-EVs, what the different niches were in terms of different types of product models, features, technologies, and business models. Even if the main focus was companies on the Swedish market, the international market was considered, as well.

Further, a competitor analysis was produced. The method used was based on Becker's (2020) and Maksimava's (2019) versions of competitor analysis. First, parameters were selected for what should be included or excluded in the analysis. Thereafter thorough research of competitors was performed, chosen from the defined parameters. A comparison between the different competitors was made, using Porters five forces (Porters, 1979), where one determines the critical strength, weaknesses, opportunities and threats together with threats of new entrants, the threat of substitutes, and competitive rivalry. The analysis was based on information retrieved from the companies' websites but also by dialogue with companies, retailers and by visiting a trade fair for motorcycles.

2.4 Context specification

The context specification (Żytniewski, 2017) served as a summary of the Literature study, User studies, and Benchmarking. It defined what problems there was to solve, what aspects to take into account, and what vision to aim for in the concept development phase. The context specification is split into three sections, Problem definition, Societal aspects, and Concept vision. The three parts worked as a framework and guidance in the context of L2W-EVs.

2.4.1 Problem definition

The Problem definition aimed to summarize the result from the user studies into well-defined problems. It was to create an overarching perspective of all the factors that affect the system of the L2W-EV business model. The defined problems were divided into logical groups.

2.4.2 Societal aspects
Societal aspects of increased use of L2W-EVs were examined, as well as the ethical issues of implementing an IoT in personal mobility. The potential ethical and legal aspects of a product system that heavily relies on the user to user interactions, and the collection and use of personal data were investigated as well.

2.4.3 Concept Vision
The concept vision is a summary of the core requirements that the concept aimed to fulfil. It worked as a mission statement with the purpose to facilitate a comprehensive and consistent evaluation throughout the concept development phase.

2.5 Concept development
This section describes the methods used in the concept development phase and how they were used. The concept development was performed to create a concept that fulfils the aspects defined in the context specification. The development process was divided into four phases and presented separately. The steps were Ideation, Initial concepts, refined concept and user testing. However, there was not a linear order in which the actions were performed. Multiple iterations were done to keep the concept aligned with a context that was changing throughout the project.

2.5.1 Ideation
The goal of this phase was to generate a broad set of ideas through the use of ideation methods. The generated ideas would then be used to create the initial concepts.

Creative sessions
Multiple creative sessions were conducted as a method for coming up with solutions to the defined problem. Braindrawing, brainwriting, and brainstorming were used together with brain-draining sessions (Wikberg Nilson, Ericson & Törlind, 2015)). Under time constraint, different aspects of the defined design space were ideated upon. First individually, writing down or sketching solutions followed by a collective discussion for the participants.

Workshops
Workshops were held with the purpose to involve external stakeholders in the ideation process, with the goal that new perspectives and insights regarding the problem area would be brought to light. A pilot workshop was done as preparation for upcoming workshops with participating stakeholders from The Techno Creatives. The thesis workers took the roles of participants and performed the workshop as a method of ideation and as an opportunity to streamline the workshop process.

Key results from the literature study and user research were presented to the participants in the form of personas, representing potential user groups based on the results from the survey. Each persona was described with a demographic profile, values and use case that depicted use issues found in the pre-study. The participants were then asked to collaborate and assemble concepts that solved the presented issues and were appealing to the persona. The participants used cards containing either aspects of the physical product or the service system, based on the results from earlier brainstorm sessions. The participants were also encouraged to write additional cards with new solutions.

2.5.2 Initial Concepts
Based on the ideas and solutions generated in the Ideation phase, four initial concepts were developed. The purpose was to enable a comprehensive discussion with the company stakeholders and allow an informed decision about the further direction of the concept development process. This section describes the initial concepts and the selection process. The methods used to describe the concepts are presented below.

Business Model Canvas
The business model canvas (Osterwalder & Pigneur, 2013) was used during the development of the initial concepts as a method to consider the components needed in a business model systematically. It was used to facilitate the communication with the stakeholders from The Techno Creatives who had a background in business rather than design.

System Images
System images were made to visualize what components each concept consisted of and how they interacted. The purpose was mainly not to use these system images for external communication, but rather as a way to facilitate the process to develop the concepts.

User Journeys
User journeys were created as a method to present the initial concepts by portraying intended use cases and subjective experiences from the perspective of the personas.

2.5.3 Refined Concept
After the direction had been selected, a refined concept was developed. The aspects of the initial concepts and suggestions brought up during the presentation were used to create a refined concept. Design decisions were made to increase the concepts' ability to comply with the current capability and strategy of The Techno Creatives.

To enable user testing of the refined concept, the interaction design software, Figma was used to create an interactive prototype. The prototype simulated the interfaces of the refined concept. It was also used as a tool to refine the concept further since new aspects and issues occurred and had to be dealt with throughout the development of the prototype.

2.5.4 Concept evaluation
User tests were held with the purpose to answer the following two questions: To what extent were the participants able to understand the different digital functions in the mobility solution and what were the reasons for the participant's opinion of them.

Eight tests were conducted where the participants had been selected to represent all the personas defined in the pre-study. The participants were asked to explore the prototype by performing five tasks, each simulating a core activity of the concept. After each task, the participants were asked several open-ended questions about the completed assignment, see Appendix III.

The answers regarding each task were then analyzed to evaluate the core components of the concept individually, and finally, the idea as a whole. The insights from the analysis were then used to create the final concept presented in chapter 4.

Result

This chapter presents the results and findings, together with the process of how activities were conducted throughout the project. The chapter is divided into the same phases as chapter 2, Literature study, Benchmarking, User studies, Context specification and Concept development. The first three phases present the finding from the pre-study, the fourth concludes the results into the more defined specification and the fifth sums up the final results of the concept development process.

3

3.1 Literature Study

In this chapter, the theoretical background of L2W-EVs is described along with previous research on behavioural aspects related to mobility and the adoption of new technologies. Further, this chapter also addresses IoT technology and how it could be implemented in the L2W-EVs. Lastly, relevant business models and strategies to implement a solution, based on L2W-EV and IoT, are investigated.

3.1.1 Anatomy of the L2W-EV

To understand the context requires knowledge about the type of vehicle that is being used in it. This section presents a brief explanation of L2W-EVs and its design aspects that is relevant to the understanding and development of the concept.

L2W-EVs include mopeds and motorcycles that use an electric motor in its drivetrain. These vehicles may look very different regarding size, model, power, etc. However, the different classes of electric vehicles are often similar in technical architecture and design. The main components are the frame, drivetrain, handlebars, wheels, battery and driver interface, see figure 1.

The battery is the power source of the vehicle, and it affects the range of the vehicle and how much electrical power the motor can utilize. The battery is an assembly of numerous battery cells and the dominant type of cells used in vehicle batteries today is lithium-ion (Miller, 2015). The battery also has a battery management system, BMS, which is an electronic system that controls and monitors the state of the battery. It balances the charge between the cells while charging or discharging, shuts down malfunctioning or broken cells. The lifetime of a battery is often specified by several charging cycles before it starts to degrade and gradually lose its capacity. How fast a battery becomes worn out is dependent on its working conditions. At optimal temperatures, the efficiency is higher, and the wear is lower (Fleischhammer et al., 2014).

A hub motor or a central motor with a belt-drive, shown in figure 2, are the two main types of drivetrains currently used in L2W-EVs. Placing the motor in the hub of the rear wheel has the advantage of less moving parts in the drivetrain, which reduces its complexity and in extension, the cost (Mraz 2010). The unsprung weight is higher, which affects the handling of the vehicle. Still, it also removes the ability to use a transmission ratio other than one to one, i.e. the possibility of altering the torque. This makes hub motors more often being used in mopeds and light motorcycles. In contrast, the central motor with belt drive is commonly used in motorcycles designed for performance demanding applications and high speeds.

There are several additional components such as the wheels, suspension, handlebar, chassis. These components and their configuration have a great influence on the kinematics of the motorcycle, and in extension, the driving experience and the motorcycle performance (Cossalter, 2006).

3.1.2 Laws and regulations

In Sweden, there are currently two different classifications of two-wheeled vehicles, AM for mopeds and A for motorcycles (Transportstyrelsen, 2020). AM is divided into the subclasses AM1 and AM2. A is divided into the three subclasses, A1, A2, and A. A narrow specification of what separates the different AM and A class is illustrated in table 1. However, one main difference between them is the speed

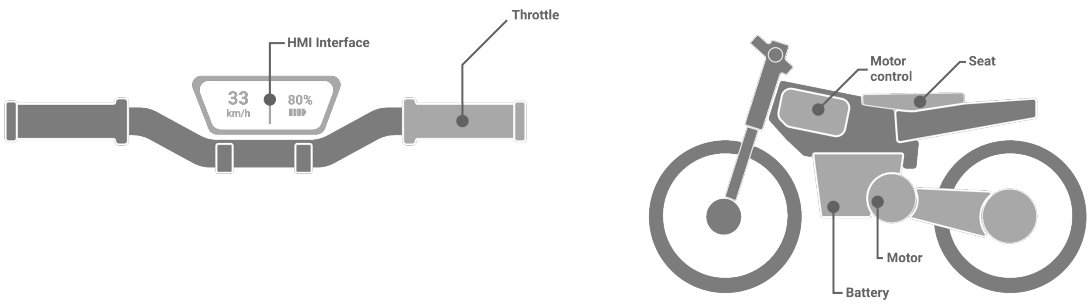

Figure 1: System description of an L2W-EV

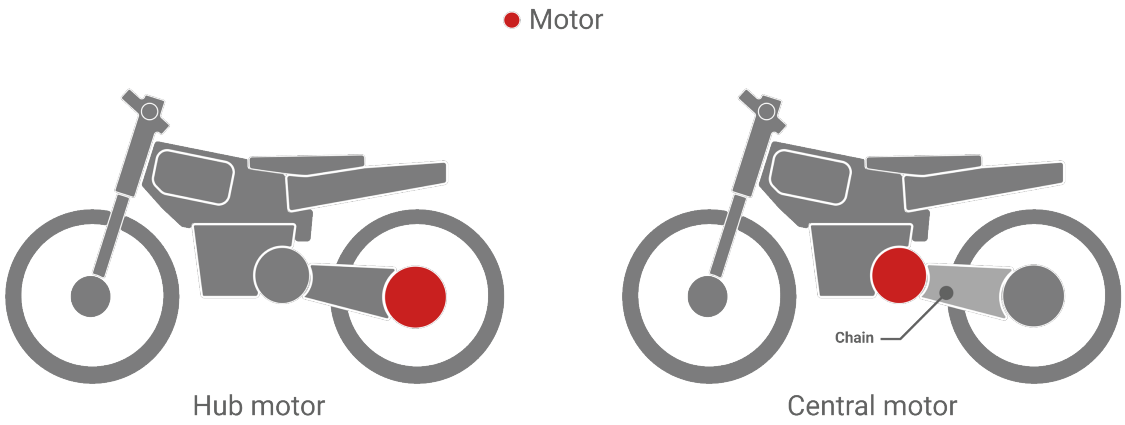

Figure 2: illustration of the motor placement of central motor with belt drive and hub motor

limitations which are set to 25 and 45 kilometres per hour for AM2 respectively AM1. Requiring the license for the AM classes demands significantly less time and economic resources compared to A classes. In Sweden, you are allowed to drive both AM classes if one obtains a B-licence, which is for the licence for regular cars.

The regulations in Sweden are similar to all countries in Europe, regarding what defines the different classes. However, there some differentiations regarding who is entitled A1 license according to the European Union (2020):

- In Spain and Poland, three years of holding a B-licence entitles an A1-licence
- In France and Luxembourg, two years of holding a B-licence and 7 hours training entitles an A1-licence
- In Italy, Malta, Latvia, two years of holding a B-licence and 10-hour training, entitles an A1-licence
- In Slovakia and Belgium, two years of holding a B-licence entitles A1-licence only with automatic transmission
- In Portugal, holding a B-licence and minimum age of 25 entitles A1 license
- In Austria, five years of holding B-licence and 6 hours training, entitles an A1-licence
- In the United Kingdom, holding a B-licence and CBT course entitles an A1-licence

3.1.3 Mobility trends

Due to the irregular travel patterns and occasional long-distance driving, the potential for the EV to replace the ICE car in Swedish households today are limited (Karlsson & Kullingsjö, 2017). The car provides door-to-door transportation but has some flaws from both a societal and individual perspective, such as congestion and finding parking space (Giovini, 2016). Although emerging mobility technologies may facilitate a more multimodal way of transportation instead of using a car alone. (Shaheen & Chan, 2016). Together with shared mobility and vehicle autonomy, the electrification of vehicles is an area of innovation that is predicted likely to disrupt personal mobility within the near future (Sprei, 2018). There is also a need for individual behaviour change when it comes to private transportation to meet sustainability goals (Marsden et al. 2014).

In urban areas, the average trip is less than 5 kilometres, according to Trafikverket (2019) and the average distance per day is 33 kilometres (Sveriges officiella statistik, 2018). This is within the average range of an L2W-EV. Therefore indicating the issue of range anxiety may be caused by psychological factors rather than rational.

When it comes to behaviour change and the financial risks of purchasing an EV, several psychological aspects need to be considered. Knowledge and acceptance about the need for actions to combat climate change are increasingly widespread within the Swedish population (Naturvårdsverket, 2018). There are overall strong concerns for the environment and positive attitudes towards alternative fuel vehicles. However, this has often a minor impact on the car purchase decisions, which is mainly influenced by the vehicle's price, performance and

Class	AM2	AM1	A1	A2	A
Constructed for speed limit of	25 km/h	45 km/h	none	none	none
Max. netto effect, 2 wheels	1 kWh	4 kWh	11 kWh	35 kWh	none
Max. netto effect, 3 wheels	n/a	4 kWh	15 kWh	15 kWh	n/a
Max. weight, 3 wheeels	n/a	270 kg	n/a	n/a	n/a
Max. netto effect, 4 wheels	n/a	4 kWh	n/a	n/a	n/a
Max. weight, 4 wheels	n/a	425 kg	n/a	n/a	n/a
Max. netto effect 4 wheels, 3 doors	n/a	6 kWh	n/a	n/a	n/a
Max. weight, 4 wheels, 3 doors	n/a	425 kg	n/a	n/a	n/a
Max. ratio netto effect / duty weight	n/a	n/a	0.1	0.1	0.1
Age limit	15 years	15 years	16 years	18 years	20 years
Licence plate	no	yes	yes	yes	yes

Table 1: vehicle restrictions and type of drivers licence in Sweden

convenience parameters (Turcksin et al. 2013). There are reasons to expect consumers to favour the maximization of their utility when it comes to mobility due to the general use of rational-choice theory when consumers are faced with high-private-cost decisions (Diekmann et al., 2003). In support of this, Warner states cost, availability, education, range anxiety and charging infrastructure as the driving factors for consumer adoption of electric vehicles (Warner, 2015).

The consumer's perception of value in a product is based on social constructs rather than logic (Dobers & Strannegård, 2005). For new alternatives to established technological paradigms to be generally adopted by consumers, the alternatives need to become socially embedded (Newton, 2002; Chesbrough, 2007).

Further, the perception and acceptance of risks have also been found to be strongly tied to social and cultural factors (Douglas & Wildavsky, 1982). Driving a car, taking a loan, or having children are decisions that come with tremendous uncertainty. Also, if new information contradicts the receiver's beliefs or creates a need for behaviour change, the data is more likely to be perceived as unreliable or incomplete (Nisbett & Ross 1980). These aspects are arguably influencing the decision making of purchasing an EV instead of an ICEV as well as the perceived risks of driving two-wheeled vehicles.

3.1.4 Traffic safety

Safety is an essential factor in all transportation solutions. Especially in the case of two-wheeled vehicles since the driver is not as protected as in a car, leading to more severe consequences if an accident occurs. Another aspect is that some ideals

related to motorcycles may facilitate a risk-taking style of driving. This chapter contains a presentation of different elements and statistics regarding the safety in motorcycles relevant to the vehicles used in this project.

In 2019, there were slightly over three hundred thousand motorcycles and around 4.9 million cars registered in Sweden (SCB, 2018). During the year, 116 persons were seriously injured or killed in motorcycle accidents and 473 who were seriously injured or killed in car accidents (Transportstyrelsen, 2020). This means that the number of severe accidents per motorcycle is four times higher than cars.

The type of motorcycle and the driver has a significant impact on the risk. The number of supersport motorcycles is only a few per cent of the total number of severe accidents for motorcycles in Sweden. Between 2006 and 2016, the percentages ranged from 25% to 56%, with a mean rate of 42.5% (Svenska MotorCyklister, 2017). Another aspect that also needs to be considered is the responsibility of the drivers. Statistics from 2017 shows that 28% of the killed motorcycle drivers in Sweden drove without having a driver's license (Valen et al., 2019). In the case of fatal accidents of moped drivers, 45% drove without a helmet, and about a third had alcohol in the blood when the deadly accident happened (SKL Kommentus, 2010). Further, a vast majority of the moped drivers involved in fatal accidents have less education of traffic compared to car drivers, making it difficult to compare accident statistics by the two vehicle types. The last factor to consider is the speed, in most single motorcycle accidents, it was judged that the driver exceeded the legal speed limits (Svenska MotorCyklister, 2017).

The public's perception of the danger and risk of motorcycles is crucial to facilitate safer and more responsible use of two-wheeled vehicles. In a Norwegian study on how the public perceives risk related to different types of transportation (Elvik & Björnskau, 2005), 53.3% of the respondents considered motorcycles to be "A little unsafe" and 14.8% as "Very unsafe". It was significantly higher

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Motorcycles										
Total nr	277745	280562	283942	284969	292368	299405	299505	300561	300704	302182
Stolen	2635	2995	2514	2680	2781	2895	2908	2590	2209	1788
Percentage	0,9%	1%	0,8%	0,9%	0,9%	0,9%	1%	0,8%	0,7%	0,6%
Mopeds AM										
Total nr	78348	75169	73163	73176	75211	75678	76704	83079	85878	91837
Stolen	7493	7754	6738	6534	7591	7120	6823	6428	6131	5789
Percentage	9,5%	10,3%	9,2%	8,9%	10%	9,4%	8,9%	7,7%	7%	6,3%
Cars										
Total nr	4,3M	4,3M	4,4M	4,5M	4,5M	4,6M	4,7M	4,8M	4,9M	4,9M
Stolen	21320	20095	16113	15278	14278	13235	12206	12141	11278	10297
Percentage	0,49%	0,45%	0,35%	0,34%	0,31%	0,28%	0,27%	0,25%	0,23%	0,2%

Table 2: The total number from SCB and number of stolen vehicles from BRÅ

than for the car where 9.6% of men and 9.2% of women considered it to be “A little unsafe” and 0.4% respectively 1.1% rated it as “Very unsafe”.

When considering the material security of vehicles, a significantly higher percentage of motorcycles and especially mopeds are being stolen each year compared to cars, see table 2. This makes it necessary to address the issue of vehicle theft to make two-wheeled vehicles a more appealing transportation alternative.

The reported percentage of stolen mopeds is around ten times higher than motorcycles, see figure 3. The statistics of the number of vehicles reported stolen per year indicates that the rates have decreased slightly. In an article published on the web magazine Bike.se (2014), a representative from the Swedish police and a vehicle expert at the insurance company IF claims that improvements of the anti-theft systems used in vehicles, e.g. GPS tracking has led to a decrease in vehicle thefts. They also state that expensive sport-motorcycles are being targeted by professional criminal gangs and sold abroad. Moped thefts are, on the contrary, often considered to be a youth-related crime (Ekman, 2019; Brå, 2020; Nordin, 2017).

3.1.5 IoT and its application

Internet of Things, IoT, is a term used to describe physical objects that have been equipped with an interface that can transmit and receive information over the internet, with or without a human being involved (ITU-T, 2012). The purpose is to make traditionally analogue products to become smart by the use of technologies such as embedded devices, communication technologies, and data analytics (Al-Fuqaha et al., 2015).

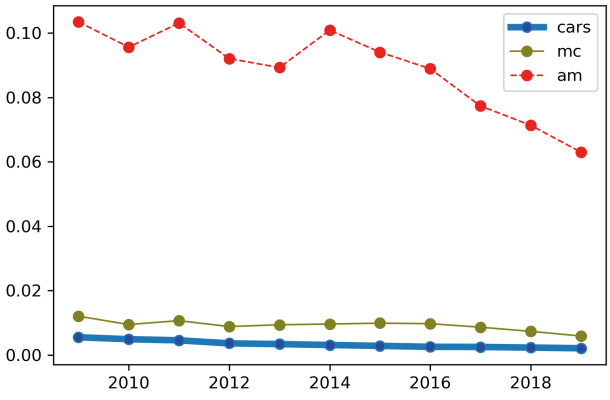

Figure 3: Reported stolen vehicles divided by the total number of registred vehicles by vehcile type

Since IoT is a broad term used for many technologies and applications, there are countless variations of how an IoT system may be configured. The basic principle of how a smart product works are illustrated in figure 4. A set of sensors registers how the physical product is interacted with and sends the registered input to the IoT-module where it is converted to a transmittable digital format. The IoT module then sends the data to a back-end server where it is stored. It may also trigger the back-end to send a responding signal to the IoT module to alter the state of the physical product.

Additionally, the IoT-module allows communication with other connected devices such as smartphones and home computers, either by directly connecting to the IoT module or through the back-end server that forwards the command to the IoT module. The quantitative data that are stored in the servers can be used for statistical analysis of the usage. Either for each product or all products and devices in the IoT system.

The large amounts of collected data also enable the training of neural networks and other machine learning algorithms, which is needed to apply to make the data useful (Yaqoob et al., 2016). A capability that becomes increasingly valuable for businesses since it can be used to increase productivity, facilitate informed decision making, and improve revenue generation (Saleem & Chishti, 2019).

Electromobility opens up for new potential means of transportation, especially when connected to the internet via IoT platforms (Gubbi et al., 2013). One example of this is the rise of companies that offer customers access to their free-floating fleets of electric scooters through smartphone applications (Voi, 2019).

The IoT module used in this project is the Elevate platform, a lightweight IoT module that is currently being developed by The Techno Creatives. It supports connectivity through multiple modes such as Wi-Fi, Bluetooth, and cellular. It has standard built-in functionality such as GPS, gyroscope, CAN-interface, which enables location tracking, remote

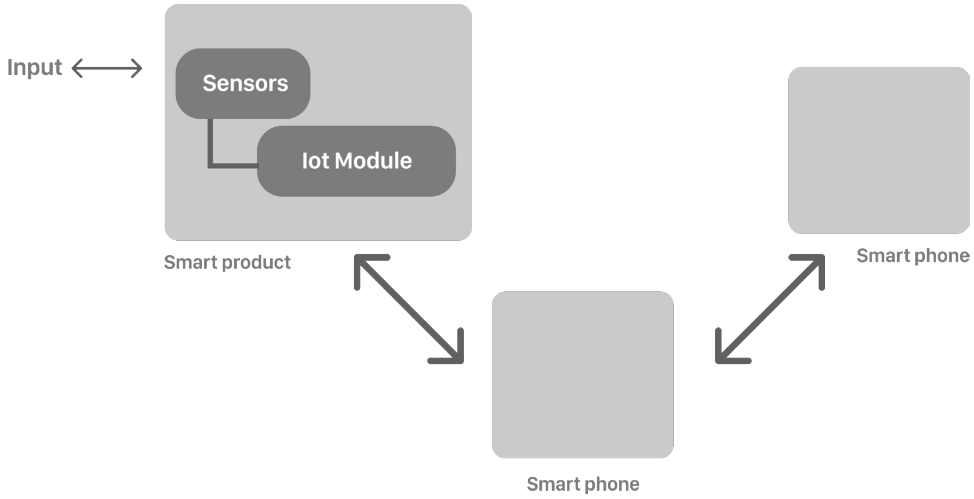

Figure 4 : Description of an IoT system

locking, monitoring of battery state and geofencing if used in a vehicle. The module is also designed to be easily connected to additional sensors or electronic devices which allow further functionality to be implemented.

3.1.6 Business models

A business model is a description of how an organization creates, delivers, and captures value in economic, cultural social contexts (Osterwalder et al., 2010). There are many business model designs, including the direct sales model, sharing business model, cutting out the middleman model, fee in free out model, to name a few. In the past, the business models describe mainly one factor, most commonly the revenue model, but today business models try to explain the entire business system. The business model of a company is seldom definite and is continuously changed to adapt to the current business environment.

Direct sales model and Cutting out the middleman model focuses on removing the intermediaries in a supply chain and selling directly to the customer (Belch & Belch, 2006). Instead of going through a middleman for the selling and marketing, these models focus on direct contact between the customer and the company.

A collective business model describes an organization where the different business systems, organizations or associations share information, services or resources within the business collective. This is to create an innovation community among the members and their development departments (Borgh et al., 2012).

Freemium business model describes a model where the customers can use a service or product for free, sometimes for a limited time. At the same time, the premium versions or special features are charged (Iglesia & Gayo, 2008). Companies such as Spotify use this for their music stream service (Desai, 2019), where unlimited streaming is charged, and limited streaming is free of charge. Freemium could also be applied to certain parts of a business, e.g. digital prototyping software Figma, the cloud services Dropbox, iCloud, Google Drive. In this model, it is vital to keep the limited version good enough to make people want to use it, but limited enough to make users want to pay for the premium version.

The sharing business model is a model that has been used frequently in recent times where the focus has moved away from conventional owning a product to owning a product together with others or subscribing to a service. In the transportation industry, the term Mobility as a Service, MaaS is often used. E.g. Instead of owning a car, one subscribes to a service that fulfils the purpose of a car without having to own one privately. A carpool is an example that uses this model. The shared vehicle will most likely wear out faster since its utility rate is higher, in combination with the less clear individual responsibility for the vehicle. Companies such as Voi, Lime, and Tier have managed to es-

tablish a system of shared fleets of electric vehicles available in a large number of cities all over the world. Their visions are to create a more sustainable alternative to transports in urban areas (Ridderstedt, 2019). However, some studies contradict that statement since the used vehicles are worn out rapidly (Hollingsworth et al., 2019).

3.1.7 Understanding startup strategies

In this project, startup strategies, models, and frameworks were relevant since a part of the project was to design a new business model. To understand the phrases and models that are used during the concept development phase, they are presented in this section. There are multiple frameworks of how to build sustainable businesses and successful startups. They are used by startups to specify which aspects are most important for the venture, what problems there are, and how to avoid failing. This research includes two main frameworks; Pirate Metrics and The viral Loop.

The Viral Loop

Viral Loop is a marketing phenomenon that emerged after the development of internet-based communication, services, and products. A successful viral loop makes the user invite or in some other way, introduce the next set of new users in that way and create a feedback loop. This exponentially increases the total number of users (Howard, 2005). When discussing the viral Loop as a marketing strategy, it would be what Woerdl et al. (2008) describe as a commercial viral loop, meaning that the spread is intentional and it aims to promote a product, service, or organization. Some of the potential benefits of a viral-loop marketing strategy are its low cost, high diffusion speed and its effective targeting of the audience (Dobele et al., 2005)

Numerous different strategies could be used to create such commercial viral loops. Some examples used by large companies today are social media platforms such as Youtube and Instagram, who let the users create and promote the content that is being shared. Or Dropbox, a provider of cloud-based storage that uses mutual benefits by offering both the invited and the person that invites a doubled amount of room.

Although there are also some risks associated with this strategy as well, if not done right, users might feel cheated or exploited by the company (Dobele et al., 2005). Others might think that the service tries to invade their privacy (Phelps et al., 2004).

Pirate Metrics

Pirate Metrics is a tool for creating a Viral Loop to facilitate quick and cost-effective brand recognition. The target is growth, since growth is key to a successful company, according to Dave McClure founder of the Pirate Metrics (Zaffonato, 2019). AARRR is an acronym for Acquisition, Activation, Retention, Referral, and Revenue. Pirate Metrics was developed foremost but not exclusively for SaaS, Software as a Service. It is common to use another A for Awareness at the start of the acronym.

Awareness focuses on brand-building aspects of customer relations. The main task is to create awareness of the brand and try to drive people into potential customers that interact with the company in a preferred way.

Acquisition focuses on how to get users to the product or service. This by using marketing channels with three factors in focus; reach out to as many as possible, with as low cost as possible, to convert them into customers, also known as conversion.

Activation focuses on making the user's first experience as pleasant as possible. The idea is to make the user stay for a specific time, look into a certain amount of pages and clicks, and use essential features that show the user why the product is right.

Retention focuses on making users come back continuously after purchase instead of dropping out. There are different ways to preserve users, e.g. status emails and notifications. However, there is a thin line between spam and encouraging users to use the product. If the retention is pushed too far, it will most likely damage the image of the business.

Referral focuses on making existing users introduce the next set of new users to the service by referring it to others and creating, e.g. word-of-mouth-chains. In this phase, it is crucial to encourage satisfied customers to spread the word of the product while convincing dissatisfied customers

not to. A positive message about the product will attract new users and increase the growth, while a negative review will damage the reputation of the product and repel potential new users.

Revenue focuses on the moment when the potential customer turns into a customer by deciding to pay for the company's products and services.

3.2 Benchmarking

Two-wheeled vehicles may be appealing to individuals for different reasons. Some are drawn to the biker image, and some are drawn to the ability to navigate through heavy traffic. One common reason is the driving experience, providing a sense of freedom and excitement. This benchmarking considers different aspects of 40 companies and 65 different models of L2W-EVs. Along with this, substitutes, such as companies selling electric bicycles, electric scooters, and podbikes have been studied as well. The benchmarking also includes the technologies used in the vehicles such as GPS, battery stations, theft alarms, digital applications, and finally noteworthy aspects of the business models and market strategies used by the examined companies.

3.2.1 Light two-wheeled electric vehicles

Following criteria were set as requirements when selecting vehicles to include in the benchmarking.

- The vehicle needs to be exclusively powered by electricity.
- The vehicle has exactly two wheels, no more or less.
- The vehicle fulfils either class AM or class A criteria.
- The vehicle needs to be able to pre-ordered or bought

The first criteria aim to exclude e-bikes and hybrid motorcycles that use electricity partly as power for the motor since it is out of the project's scope. The second criterion was set since the three, or four-wheeled vehicles vary too much in terms of legislation, safety, flexibility, identity, to be part of the project. The third criteria exclude all vehicles that are referred to as substitutes, e.g. electric scooters. The fourth criteria exclude all products that are on the concept level. They could be seen as an inspiration, but they can not be compared to vehicles that exist on the market.

After selecting the L2W-EVs brands, they were compared to one another. Comparisons were made to investigate in which phase they are, e.g. concept phase, implementation phase etc. Further, it was checked in what markets the vehicle is sold and if the company has reached a global market determined it is a direct competitor on the Swedish market. If the different companies have implemented IoT technology in their vehicles or planning to, were then examined. Cost, strengths, and weaknesses determine the different segmentations of the products, and the business strategy refers to how and where they sell the product. The comparison parameters are the following;

- Released product or pre-order state
- What geographical markets
- IoT connection
- Cost
- Strengths
- Weaknesses
- Business strategy

There is a wide range of L2W-EVs available on the global market. The retail prices start at around 20'000 SEK for class AM vehicles and range up to 500'000 SEK for the high-end class A vehicles. Class AM lies mainly between 20'000 to 50'000 SEK, while class A is mostly in the range from 60'000 SEK up to 250'000SEK. Around half of the 65 selected L2W-EVs are in pre-order status. The majority will be released during 2020 and 2021. This argues for a relatively young and growing market, but also that there are and will be intense competition. Of the released L2W-EVs, most can be bought globally. However, there are only a few L2W-EVs that are purchased and used widely in Sweden. These are Zero, Harley Davidsson, CAKE, Super Soco, NIU, NITO, Kymco and Vässla.

The American company Zero is the largest producer of high-end class A L2W-EVs. Their strength is the appeal of a traditional quality motorcycle brand, to convert motorcyclists into driving electrical alternatives. Their weakness is that they are in the higher cost segment and risk of having prob-

lems attracting customers that are not already bikers since the economic threshold is high. Harley Davidsson's LiveWire targets the same segment as Zero and uses the electric motorcycle to attract more environmentally conscious customers to the Harley Davidson brand. CAKE is at the moment the only Swedish manufacturer of class A L2W-EVs. They have two different vehicles, Ösa and Kalk. Kalk targets the younger, adventurous and sporty segment. Meanwhile, Ösa targets an extensive range of persons, e.g. mothers, surfers and carpenters. Both of them are designed to be easily repaired and serviced by the owner. Ösa is modular to fit the customer's needs. Both Kalk and Ösa can be used as class A and AM. The weakness is the high retail price of their vehicles compared to competitors and to the purchasing power of the intended customer segment. None of them uses any IoT configurations.

On the Swedish market, there are four main competitors for class AM L2W-EVs, Super SOCO, NIU, Vässla, and Kymco. NIU, Vässla, and Kymco produce standard mopeds with weather shields. Meanwhile, Super SOCO looks like a smaller motorcycle but is limited to class AM's 45 kilometres per hour. Super SOCO targets persons that do not want to be compared to a regular class AM vehicle. There is no significant difference between the others regarding the targeting. However, Vässla is the only one that provides test drives via owners of the vehicle.

3.2.3 Substitutes

Electric bikes are a growing market as well. People that want a more effective way to transport by bicycle to work choose electric bikes instead. In Sweden during 2018, subventions from the government were done for people buying electric bikes, as a sustainable transition from cars and busses to a more environmentally friendly alternative. Although, research suggests that commuters are well aware of the positive effects of substituting the car with an electric bicycle, making it inefficient to spend effort convincing car commuters to adopt the use of electric bicycles (VTI, 2014).

From 2019 electric scooters have been introduced to the Swedish urban market. The scooters can be rented for a limited time and range, with the method pay-by-use. Since the introduction of the pay-to-use electric scooter services, the user adoption of the vehicle type has arguably increased on a societal scale.

3.2.4 Business models

As described in the Literature study, there are various business models. Vässla, the Swedish class AM L2W-EVs company attempts to implement a novel strategy to offer test drives of the vehicle. Instead of only having retailers and showrooms where the customer can see and try out the product, Vässla uses Heroes instead (Vässla, 2020). A Vässla Hero is an owner that signs up to be visible at Vässla's website to receive test drive requests from potential customers. Both Tesla and Cake also try to exclude retailers from their business model to lower the price. Tesla does it by having their shop completely digital without any physical stores. There are Tesla showrooms that only showcase the product instead of being a shop (Tesla, 2020). CAKE currently uses a similar model but limited to one showroom in Stockholm (CAKE, 2020). CAKE brings the idea further by not having any official service or maintenance shops. CAKE's vision is to build a vehicle that is easy enough to be repaired and serviced by anyone, including the owner.

Another type of business model that is used in the transportation sector is MaaS, described in the literature study. Voi allows the user to pick up and drop off the vehicle wherever they want, inside a geographically predefined area, and only pay when they use it. The Gothenburg bike MaaS Styr & Ställ (2020) offers a similar solution, but with bicycles instead. This lowers the threshold to start using it since the user does not have to invest a substantial amount of money. It is similar to renting. Instead of renting the entire vehicle, the company Etergo offers the service to swap empty batteries for charged ones at stations placed out at various locations in cities (Electrek, 2018). The user subscribes to the service and has unlimited swappings. Since the battery is a significant part of the investment cost when purchasing an L2W-EV, the company lowers the financial threshold but still enables the users to drive their vehicles.

Recruiting or referral is crucial to any business and can be done in many ways. The telecom company Vimla's solution to referral is that your monthly payment decreases the more people you recruit

(Vimla, 2020). If the user succeeds in recruiting ten persons or more, the amount is zero. The hired person gets a decreased payment as an incentive. However, if any of the recruits ends their subscription, the benefit of the reduced fee goes away for the user who hired too. This is similar to gamification, which is strategies to motivate, engage, and encourage specific behaviours by applying game mechanics to mundane, or not-leisure tasks. Running apps for smartphones, such as Strava and Runkeeper, are using gamification by rewarding the users with, e.g. digital medals for accomplishments. This encourages the user to stay healthy and leads to that the user uses the app more. Stravas revenue streams come mainly from three different parts, premium user's subscription, selling metro data, and selling advertisement slots.

3.2.5 Technologies

An IoT platform enables new technical improvements to a vehicle that was not previously possible. In this section, technical concepts will be presented and why it could be beneficial in a system for L2W-EVs.

With an IoT platform, monitoring of the vehicle is enabled. Since it is connected, one would be able to see where it is parked, how much battery is left, how far one would be able to go, etc. These functions are already implemented at some L2W-EVs, such as NIU and Ujet, among others. Crash notification is a function provided by Ajja and Atlantis, which notifies pre-set ICE addresses when the user is in a crash accident. I LOCK IT (2020) is a locking system where the user gets a notification when the vehicle is about to be stolen. The same technology could also be used to provide tipping notifications. The Swedish company Voi, distributor of the electric scooter service in urban areas, uses a technology called geofence, which restricts the user only to use the scooter within a specific geographical area. If the user tries to drive out of the area, the vehicle will first warn the user and then shut down. Tesla uses the function of remote unlocking and the start of the car. As an owner of a Tesla one could use the app to unlock the car and start it, e.g. lending it to someone. This could be further improved to sharing a digital key to others, set for a specific time, so the owner does not have to unlock it at the time. NIU uses a statistics log from the usage of the vehicle. Today it is mainly a record of where and when the vehicle has been used. In some industries, the statistics are used as a service and maintenance reminder, giving specific and narrow information about different parts of the vehicle. Economical and ecological statistics could be compared between the vehicle and other alternatives to understand when the vehicle is the most suitable. The IoT will also enable OTA updates over the air updates if digital updates are needed. Tesla uses this function for their vehicles.

3.3 User studies

In this chapter, the relation between different means of transportations and its users were explored. This was connected to their thoughts of L2W-EVs. The user studies consisted of interviews, surveys and observations.

3.3.1 Results from interviews

The interviewees used various means of transportation, e.g. public transport, car, two-wheeled vehicles, and bicycles. However, three of the four interviewees mainly used the car for transport. The choices varied depending on what they were ought to do, but most travelling's purpose was to commute to work. The fourth person went by motorcycle or moped around 90 per cent of the time. The only time he did not go by two-wheeled vehicles was when there was snow or ice on the ground. Since all of them thought their workplaces were too far away to either use public transportation or bicycle, the car was perceived as the only viable choice of transport. Two persons claimed bad connections and sparse time schedules as reasons why they chose the car over public transportation. When asked about monthly spending on transportation, some of the interviewees initially answered one amount, but then calculated the costs and changed it to a significantly larger amount.

One person claimed that the car increased freedom of transportation. It was always there, outside one's house, and could be used anytime. Further, some interviewees meant that the car gave more freedom in spontaneity since they would be able to pick up persons, and it was not limited to time schedules. It would therefore not be interesting to have a sharing

owning model for most of the interviewees. However, if the system would schedule all the vehicles to be available when the user wants them, it would be considered. Another problem with sharing owning models according to the interviewees was that it would be hard to ensure that a vehicle is in good and proper condition after being used by others.

Flexibility was brought up repetitively during the interviews. The perceived benefit with a two-wheeled vehicle according to the interviewees without A-licence is that one could filter through traffic in congested areas and park almost anywhere. At the same time, both of them considered the behaviour to be unjust to the car drivers and risky behaviour. The two other interviewees with A-licence stated that filtering through traffic is generally too dangerous and smaller roads at limited speed.

Implementing an IoT platform was considered desirable according to all of the interviewees. It was a wide range of ideas they would like to use it for, e.g. stealing and rollover alerts, maintenance and driving statistics, battery management, planning routes, environmental footprint comparison, repairing guides and verification, sharing with others, automatic ICE send-out and sharing your profile with others. They thought it would be interesting to be able to modify the vehicle digitally and physically with the IoT platform.

All of the interviewees wanted to lower their expenditure on transportation. All of the interviewees argued that it is idiotic to use the car in the city, especially the one that lives in the centre of the town, who claimed that it was ruining him. They did not know whether an EV was cheaper in the long term compared to an ICEV. None of them gave a clear answer to how much they spend on transportation each month, either they change their response over the interview or answered with a relatively broad price range, e.g. 2500 SEK to 5000 SEK. Even if the EV would be cheaper in the long term, the interviewees considered EVs to be too high investment cost and therefore an economic risk. A subscription would, therefore, be considered less risky, as it divides the price, even if it would cost more long term compared to conventional buying. For the younger interviewees, electric two-wheeled vehicles would be attractive if it was better in terms of economy.

Three of the interviewees, in the lower age span, were interested in recruiting others to the brand for a beneficial bonus, both to gain money but also solely on additional benefits. One would rather have perks than money when being an ambassador. One person would be interested in tinkering and repairing the vehicle. However, he thought that there was a limitation in the knowledge about it at the moment. Both interviewees with A-licence did most or all of the repairs by themselves, both to keep down costs but also to get a sense of accomplishment-driven satisfaction from tinkering with the motorcycle.

For the question of why they did not want to use class AM electric vehicles, they answered that it was not socially desirable. They perceived it not cool enough, and it was only teenagers that drove these vehicles. Further, they added that it is not fast enough. One of the interviewees claimed the moped would be too slow, even since he only had around 10 % of his commute on roads limited to 70 km/h, and the rest were either 30 or 50 km/h. Nominally the trip with the car would take 17,5 minutes, and the trip with a two-wheeled vehicle limited to 45 km/h would take 20 minutes. For the other interviewee who did not have an A-licence, the car driver would take between 17 to 35 minutes, depending on traffic. However, a two-wheeled vehicle limited to 45 kilometres would take nominally around 25 minutes, excluding congestion.

The main reason that the interviewees without A-licence did not choose to drive motorcycles was mainly because of the time they had to spend on getting an A-licence. For all of the interviewees, the main reason that they did choose the car over the motorcycle was that they did not think that there was enough room for packaging. The two interviewees that did not have A-licence claimed that they wanted to get an A-licence, but that was foremost to be able to drive motorcycles in spare time rather than commuting.

The two that did not have A-licence claimed that they perceived driving motorcycles would be too risky for their safety to be considered as a means of transportation. One of the interviewees with A-licence contended that there is a difference in safety between the different types of two-wheeled vehicles. Motorcycles are straddled, and the users

have a more horizontal position, allowing the user to control the balance by moving the centre of gravity. This is preferable at higher speeds, at country roads, or anything over 50 kilometres per hour. Mopeds with windshields offer a more vertical position, which allows a better turning ratio, which is preferable in cities at slower speeds.

A reason that one of the interviewees without A-licence would not consider driving an electric two-wheeled vehicle is that he perceived it to be too quiet. He claimed that one of the primary reasons to own a motorcycle is the sound of the engine. However, the persons with A-licence had the opinion that the sound is only fun in the beginning, but after everyday use, they would prefer a silent electric bike.

The results from the interviews laid the ground for what would be asked in the upcoming survey to verify the problems brought up in the interviews.

3.3.2 Results from the surveys

The survey had 323 respondents. The test's population was compared to six different demographic parameters with the Swedish people, provided by SCB, Swedish central bureau of statistics. The comparison shows that the test's population differs at most 13 % for the age of 25 to 34. According to SCB's statistics, the amount should be 24 % of the population between 20 to 64 years, where the test's population of 25 to 34 was 38 %. This means that the test was over-represented by persons between 25 to 34, leading to an under-representation of 35 to 44, 45 to 54, and 55 to 64 by respectively 3.78, 4.26, and 10.59 %. Further, the test contained 50.8 % of women compared to SCB's 49.6 %. In this chapter, the term electric moped includes the electrical vehicles allowed to drive with an AM licence and the term electric motorcycle the ones that require the class A licence.

Out of all 300 respondents, 26.0 % answered that they would be interested in driving an electric motorcycle to work, and 29.3% responded that they would be interested in driving an electric moped to work. The main reasons for not driving an electric bike were in the order; safety issues, weather issues, no A-licence, impractical, and not interested. However, the reason for not driving an electric moped was in the order; too far to work or too slow, weather issues, safety issues, impractical, and traffic issues.

The gender distribution of the respondents was even. The share was expressing a positive attitude towards driving an electric moped among both populations at one-third of the respondents. The ones that were positive to drive an electric motorcycle, 73% were men, see figure 5. When comparing within the gender groups, there was a difference of 23.7% regarding the share interested in driving an electric motorcycle. 14% of the female respondents were interested compared to 37.7% of the male.

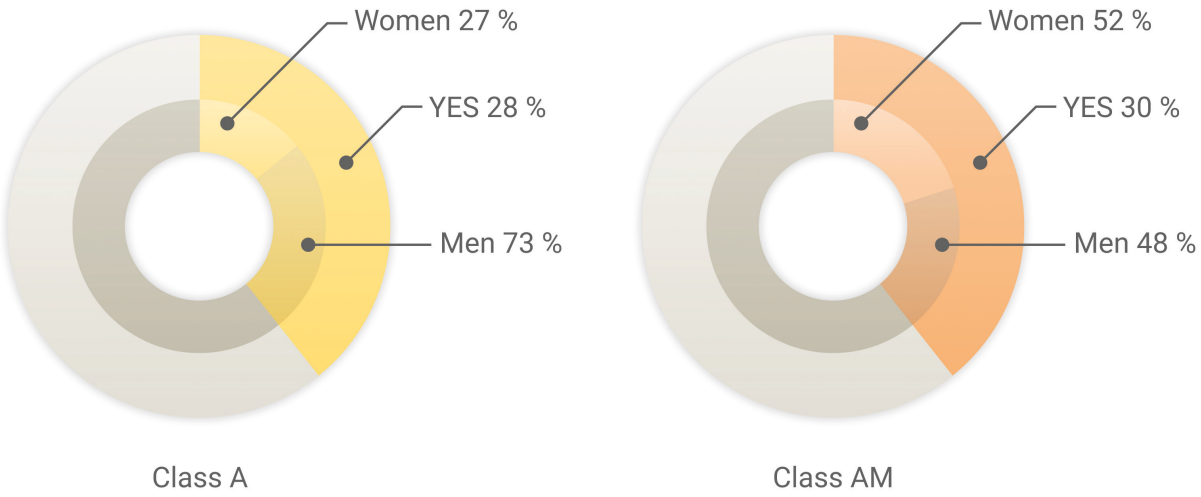

Figure 5: Vehicle Attitudes in total and by gender

Household size and the income of the respondent did not seem to have any significant effect on the attitude towards the vehicles. Although this is not to confuse with the probability of actually purchasing such a vehicle in reality since studies have shown that the use of electric vehicles is more frequent among individuals with high income as described in the literature study.

There was a higher expressed interest in vehicles correlated with an increased probability of being interested in driving an electric motorcycle (EA) and a lower likelihood of being interested in driving an electric moped (EAM), see figure 6. This indicates a possibility to attract new users by either offering an EAM developed for persons with a high interest in vehicles or an MC designed for persons with low vehicle interest.

Persons who stated Public transportation as the primary means of mobility had the highest interest in EAM with 40% being positive while car drivers showed the lowest share of interest at 17%.

A share of the answers from the mandatory open-ended questions where the respondents were asked to explain the reasons for earlier answers was answered in a nonsensical way. It was assumed that the first answer was valid even though the respondent avoided giving the reason why. The interest of both vehicles decreased with the respondent's age with a more significant decrease around the average age to become a parent in Sweden.

3.3.3 Results from observations

The first part of the self-observation was conducted for five days. Three days were during weekdays and two days over the weekend. The user was considered as a low experience user of the light two-wheeled vehicle, and first time user of light two-wheeled electric vehicles. The routes were mainly between home to work, i.e. ca. five kilometres of urban transport. The average time was around ten minutes. The same trip using a bicycle or public transport was 16 respectively 25 minutes.

The user thought the experience was over expectation. The sense of range anxiety was not an issue since the distance was relatively low compared to the battery's capacity. The battery could be used around four to six days before it would be discharged. The vehicle was small enough to get past cars in congestion at wider roads. However, it was not small enough to do the same manoeuvring on relatively tight roads. Another benefit was that it was able to be driven and stored indoors since it doesn't emit gas exhausts and has very low noise. The limited sound enabled it to be started inside the small courtyard at the home of the users since it had a low risk of disturbing the neighbours.

However, the user found the storing of the helmet to be problematic since the storage options for this particular vehicle were limited to fit the battery and charger. The helmet had to be carried along or locked to the bike, exposed to the weather. All storage had to be brought, e.g. as a backpack. The locking system was a regular chain lock, which was not

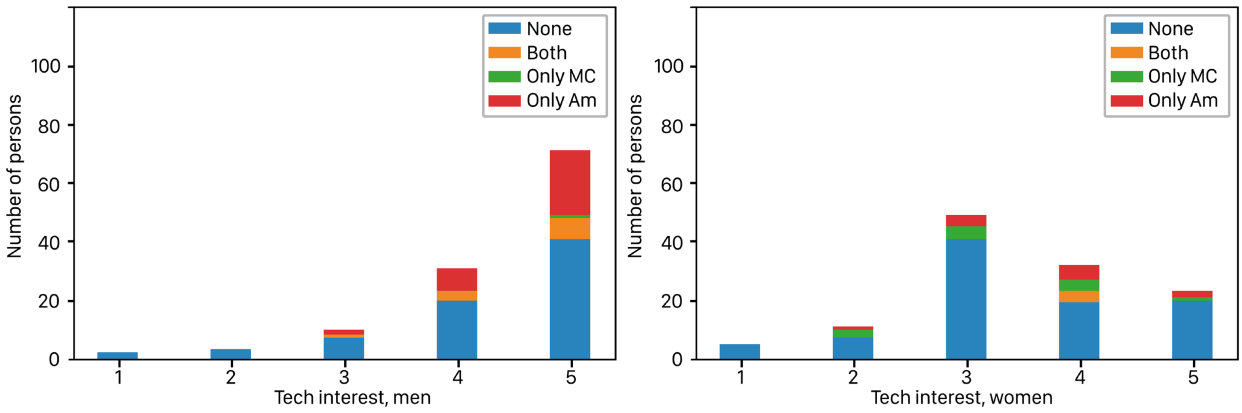

Figure 6: Illustration of Tech interest, men and women.

appreciated. The user thought it to be exhausting physically and mentally to lock the moped, especially when compared to a car.

3.3.4 Personas

To use the data and result from the user studies effectively, five personas were created. The personas were created to easily be used during ideation and evaluation as a reference to the previous studies. They were based on the interviews and the survey. The parameters used to determine the personas were; gender, age, income, most common means of transportation, number of cars in the household, number of kids under age 18 in the house, time spent on commuting per day and technical interest. Comparing these parameters to our survey, through a program written in Python, showed the individual characteristics of each persona. The result was five different personas that were most likely to become a potential user for L2W-EVs.

The Sustainable, see figure 7, represents an environmentally conscious female who works and lives in the city. She lives in an apartment and uses public transportation or her e-bike to ride to town. Her main barrier is that she prefers bicycles or E-bikes since she thinks it is good with the daily exercise. She also perceives motorcycles to be dangerous.

Man with small kids is a male, see figure 8, who recently became a father, lives in an apartment but plans to move to a house in a suburban area. He mainly drives their car to work, but since he has to share it with his partner, he sometimes has to take public transportation. His main barrier is that he is affected by the feeling of responsibility with the small child, and he has too little time to spare to get an A-licence for motorcycles.

The Motorbiker is a male, see figure 9, with grown-up kids that have moved out and live in a house close to a large city. He likes motorcycles, tinkering with them, and the smell of them. He drives his motorcycle to work if the weather allows it. Otherwise, he uses his. His main barrier is that he considers the ICE motorcycle as a reference, he likes the sound of ICEV and tinkering is a hobby.

The Svensson is either male or female, see figure 10, lives in a house close to the city with a family of four. The two children are 10 and 14. They

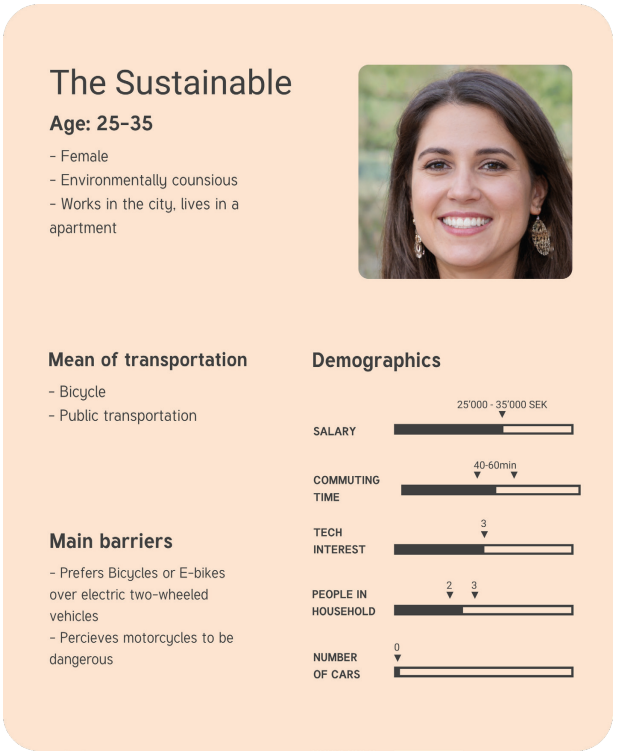

Figure 7: Illustration of the persona "The sustainable"

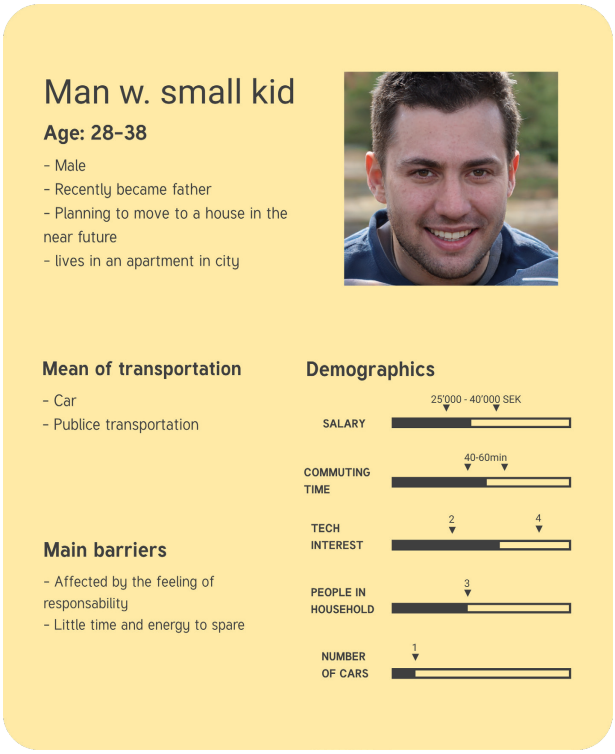

Figure 8: Illustration of the persona "Man with small kids"

have a busy life, working in the city and driving the kids to school, friends, and sports. The Svensson has two cars, one relatively new and one that is old and used as little as possible. Their main barrier is that they perceive L2W-EVs to be inconvenient for their busy life.

The Tech Guy, see figure 11, is a male that works within IT, has high income and loves technology. He lives in a house in a suburban area with his partner and their child. He works in the city and commutes 40 to 90 minutes in his car. His main barrier is that he has never driven a motorcycle before.

3.4 Context specification

In this phase, the results from the previous chapters are summarized into a context specification that serves as a reference to the concept development phase. The initial Problem definition covers the findings from three areas: User, Vehicle and Business. Further, the social aspect of the context is brought up. Lastly, a concept vision is presented.

3.4.1 Problem definition

There is no one-fit-all L2W-EV. Even if excluding the brand identity, the needs are too varied between the different users. A person that is living 20 kilometres away from work would most probably not be interested in a vehicle limited to 45 kilometres since one would not be able to use the high-speed roads. A person living inside the city, would on the other hand maybe not want an electric motorcycle, able to be driven 150 kilometres at a top speed of 130 kilometres per hour, since it would be too expensive.

User

For the users, the brand and what kind of L2W-EVs regarding size and classification matter significantly. The main difference in the view of class AM compared to A is that AM is considered to be silly, only used by teenagers and too slow meanwhile class A is deemed to be dangerous to drive.

Commuters' awareness and knowledge about their usage of vehicles are considered relatively low (KVD Bilpriser, 2018), same as their knowledge about commuting alternatives benefits and disadvantages. The average distance for a commuter is

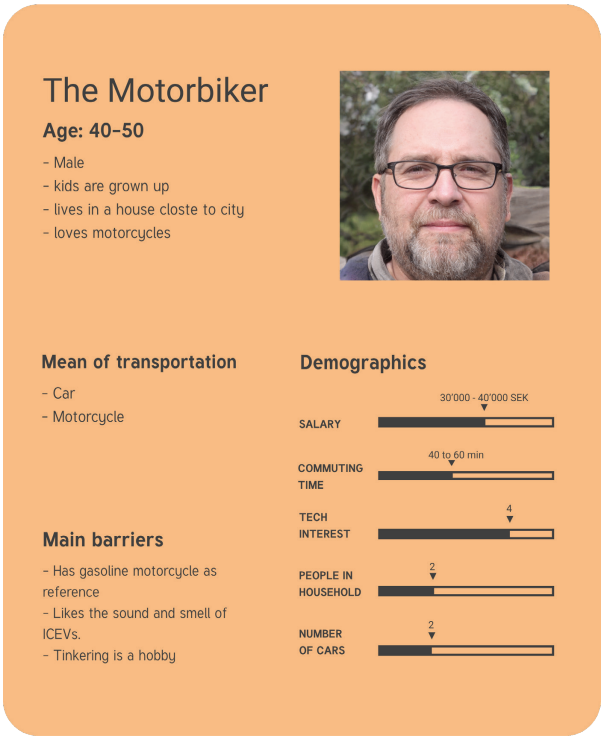

Figure 9: Illustration of the persona "The Motorbiker"

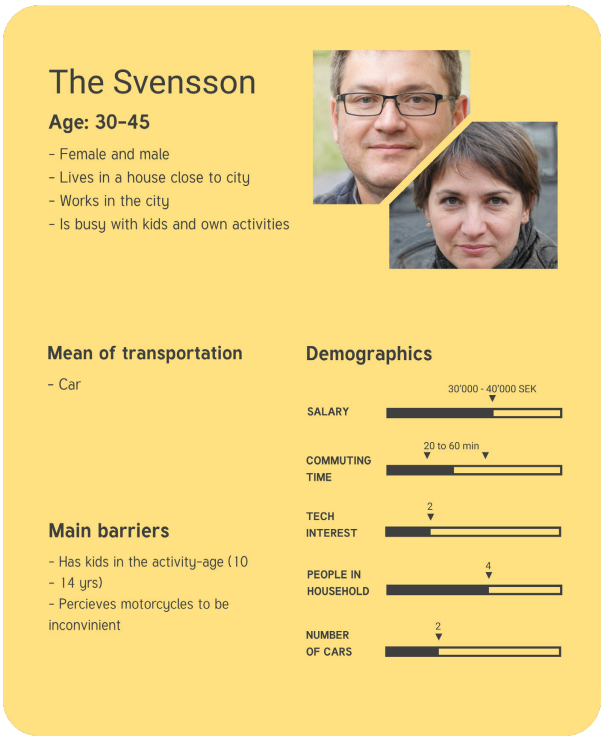

Figure 10: Illustration of the persona "The Svensson"

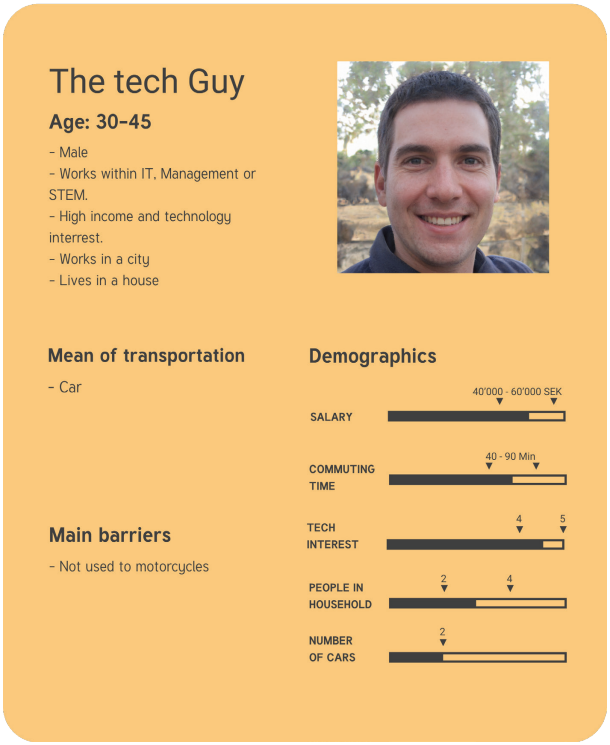

Figure 11: Illustration of the persona "The Tech-guy"

33 kilometres each day, and the average trip is five kilometres (Trafikverket, 2019). For a class AM vehicle, 33 kilometres would take around 44 minutes to drive, which is in the range of the average commuter overall. Therefore there is a significant chance that class AM L2W-EVs would probably not have a significant negative impact on time spent on commuting. It might very well have a positive effect instead. When calculating the economy of the different alternatives, one could see that class AM L2W-EVs is the best economic alternative for commuters. The main cost for class A is the purchase price for the vehicle, while for class AM it is the insurance. For any ICEV the main cost is fuel and additionally, repairs if the car is relatively old or congestion fees in cases where the commuter lives outside but works in a city. However, these calculations are rarely done by commuters and therefore are not considered by them.

From the user study, there was a difference between the perceived experience of non-bikers and the perceived experience from those who own bikes. A conclusion is that a test drive would be great for the non-bikers since the two views did not match very well. When buying a vehicle, the interviewees thought that the salesperson's goal is to sell and does not consider the customer's best. Since the salespersons do not own the cars themselves, they can not speak from their own experience, which would be appreciated by the customers. Therefore, having a dialogue with an actual owner of the vehicle would be preferred according to the user study. However, this is a method with less control since the company has less possibility to manage the quality of the test drives. Therefore a conventional test drive might have higher quality, as it is an educated person that hosts the test drive. Some customers would also like to test it on their own, without a supervisor or guide because it stresses them. However, if the user got free hands, it could cause stress because of the lack of knowledge of the vehicle. There is also a higher risk that the customer will not treat the vehicle with caution since the owner is not nearby.

Most trips are made alone and without large packing. However, the user study showed that the need for freedom and spontaneity of being able to bring friends and packages are high. A conclusion is that if the user has a car, then an alternative will be compared to the car. The L2W-EV is unable to compete with the car as an all-around solution, but it is a viable alternative for more specialized applications such as commuting. There is also a variation between women and men, where men were found to prefer motorcycles over mopeds, and vice versa for women.

Vehicle

The different types of L2W-EVs have different driving characteristics, where class AM is better suited in the city, and class A is better suited outside the city. The legal factors vary significantly in Europe, which leads to that one type of L2W-EVs that suits great for a user group in one country might not suit the same user group in another country. This is a challenge for a company since the vehicle needs to fit different markets and risk to be unspecific. Otherwise, the company needs to have a range of products, which leads to a higher investment cost.

Three problems regarding the physical aspect that was brought up during the user studies were the helmet, locking system, and the physical settings

of a class A vehicle. The helmet is considered as rather intimate and would not likely be shared by unknown people. It is heavy and ungainly, which leads to frustration having to carry it around. The locking system is wearisome since it has to be handled manually at the wheels close to the ground. For a class A vehicle, various physical settings need to be adjusted depending on the characteristics of the driver.

Business

There is no perfect business model, and it is hard to know what will work before it is up and running. Models such as direct sales models and cutting out the middleman are attractive when entering a market without having to invest too much money. The model is more scalable compared to traditional retail since it is less dependent on costly and cumbersome stores. The stores have fixed costs such as rent, utility, and paying employees, and they are also unable to swiftly adjust their capacity as the demand changes. The demand increases, a store would still be unable to provide its function outside its geographical proximity. It is hard to match this with a balance, compared to a digital webshop. However, compared to the physical store, a webshop does not include the physical interaction with the products, which is crucial for many customers.

The problem with having conventional test drives is that it is not flexible and scalable for the company. The costs for showrooms and employees are fixed, whether customers are there or not. Therefore by letting the owners of the vehicle host the test drive for compensation, the cost will be balanced to the demands of test drives.

The participants in the user study expressed that they would gladly be ambassadors or helping out in exchange for money or perks. However, to help, they would have to feel that they have enough experience or knowledge about the problem. Lack of knowledge and how to gain it was an obstacle to tinker. They expressed that some service would be done by themselves, however depending on the brand's identity on the scale of luxury, the self-service and maintenance should be included or not.

There was scepticism towards shared ownership. Due to a lack of trust, participants believed that others would not treat the vehicle the way they wanted and would treat it themself. Shared ownership was also perceived to limit their freedom since the vehicle would not be available at all times. These negative perceptions outweighed the potential economic benefits from shared ownership of an L2W-EV.

3.4.2 Societal aspects

This section presents the social aspects deemed relevant to the project. While acknowledging that the environmental and social impacts associated with the production and usage of two-wheeled electric vehicles are highly related issues to consider, they do not affect the outcome of the project of developing a mobility system rather than the vehicle used in it.

The concept aimed to utilize the potential of IoT to manage resources efficiently to be economically sustainable. In addition to this, the aim to remove overcapacity in auxiliary functions such as retail, logistics, and service of the vehicles may also lead to an increased potential for the concept to be environmentally sustainable as well.

From a societal point of view, the concept should aim to create an active and inclusive community that adds value to the everyday lives of its members. When successfully implemented, such a concept, relying on user-to-user interaction arguably has the potential to foster collaboration and trust within the community.

When the trust is insufficient or when users either purposely or unawarely act in wrongful manors, there is a need to have measures preventing such behaviour. Since the concept aims to be based on digital functionality in the vehicle and users' smartphone, safety features will be digital and activated remotely as well. These functions need to be designed in a way that prevents them from being used in other ways than intended or without the consent of the user. For example, infrastructure to track the vehicle location in real-time might feel like a justified or even necessary function to increase the safety during test drives but used otherwise would be to violate the privacy of the vehicle owner. Another example is the geofence technology that could be used to help owners to feel comfortable lending out the bike to strangers without losing control, but it

requires the even more robust measure of accessing the motor control remotely, something that may have catastrophic consequences in the case of a hacker attack.

3.4.3 Concept vision

The concept vision was used as a reference framework to evaluate ideas and concepts throughout the concept development phase is presented below, followed by an explanatory dissection of it.

"Through an understanding of the user, the concept aims to increase the use of light two-wheeled electric vehicles by providing a scalable value proposition that is a rationally justifiable and emotionally desirable alternative for the user."

Through an understanding of the user means that the concept should take the results from the user research into consideration. This should be done by acknowledging that the process of understanding the user is a continuous process, and therefore, the concept needs to be designed to facilitate continuous development.

To reach the aim of increasing the use of L2W-EVs, the concept needs to have the capacity to provide a good user experience with no matter if there are one or a million active users, i.e. Providing a scalable value proposition. The intended purchase and owner experience should, therefore, aim to be independent of secondary stakeholders such as retailers and maintenance providers.

As concluded from the literature and user studies, the decision whenever to purchase an EV is rarely based on rational factors but instead on symbolic and emotional aspects. Therefore, the concept should aim to be Emotionally desirable, appealing to a broad customer segment by offering a desirable and novel user experience containing elements of gamification in addition to the appeal generated by the sustainability values intrinsic to EVs.

To be perceived as a viable alternative to other mobility solutions from a practical point of view and to combat existing biases toward light two-wheeled vehicles, the concept should communicate its favourable and advantageous characteristics as a rationally justifiable means of transportation. It should be Rationally justifiable.

3.5 Concept development

This section presents the results from the different methods used in the concept development process. It started with a broad set of ideas, part solutions, and strategies that were created using generative methods. This is followed by a description of how these were combined into the four concepts. They were used in the process of iterative refinement, evaluation and elimination, eventually resulting in the final concept presented in the last part of this section. This is illustrated in figure 12.

3.5.1 Ideation

This section presents the execution and results from the generative methods used in the ideation process. The outcome was a large set of ideas and part solutions that later were used to develop the initial concepts.

Creative sessions

The creative sessions generated hundreds of potential solutions that may be used to solve different issues within the defined design space. The ideas covered all different system levels. This includes everything from high-level aspects such as where to locate distribution centres, payment models, and marketing strategies to specific elements of the physical design of the vehicle such as locking mechanisms, battery carrying solutions, and how to enable modularity. The ideas were written on paper and then summarized digitally to allow easier access and storage.

Each area was individually brainstormed and then discussed within the project group how the ideas could be refined and combined with previous solutions. The ideas were put into concept, described in 3.5.2 Initial concepts.

Workshop

During the initial workshop, the participants often chose to focus on individual problematic aspects that were presented, such as the use and storage of the helmet, the locking mechanisms, and cargo spaces on the vehicle. The result from the pilot workshop did not turn out to be satisfactory, the tasks were not misunderstood or done incorrectly, but the result did not contribute to the progression of the project.

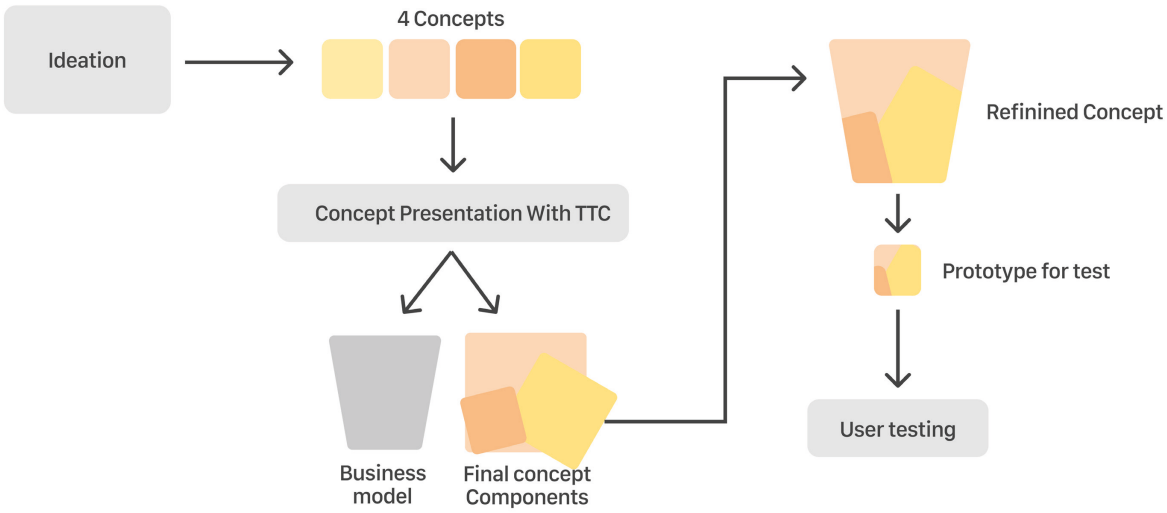

Figure 12: Illustration of the Concept development process

The participants might have been able to contribute, but the workshop context showed to be an ineffective strategy to produce desired results. The general scope of the problem at hand and its complexity made it difficult for the participants to reach the level of understanding needed to contribute with any more in-depth insight during the limited duration of the workshop. It was not that the participants failed to generate solutions but rather that the vast majority of the solutions had already been thought of.

The workshop did not contribute to the progression of the project as intended. Instead, it indicated that a sufficient level of understanding regarding the needs and requirements of individual users and use cases had been achieved. Further development of the systems perspective and service design were to be prioritized. Instead of redesigning the entire workshop in an attempt to make it more useful, a decision to evaluate the initial concepts was made.

3.5.2 Initial concepts

This stage of the concept development process presents the first iteration of complete business model concepts based on ideas from the ideation phase. The concepts represented different alternatives to fulfil the concept vision and had the purpose of facilitating the following decision regarding which concept to select for further refinement.

Flexifleet

Concept Flexifleet is based on a B2B model and MaaS, illustrated in figure 13. The idea is instead of a conventional ownership of an L2W-EV, a station of L2W-EVs should be sold to companies. The company would offer its employees to use vehicles as a benefit. The company could also rent it out for other companies. The distributer Flexifleet could offer different packages to companies.

This is a convenient and economical substitute for the car for commuting employees at companies, both large and small. It would be flexible for the company, which would determine how the employees can use it. For example, the company could give the employees 24h access so the employee can use it to get home after work and bring it back the day after. They could also use it over the weekend. This would be flexible for the employee since they would not have to own a vehicle and only use it when they need it. The company could use this as a competitive advantage as an employer.

Flexifleet would provide the stations with L2W-EVs as a complete package including digital and physical service of the vehicle and stations. The main activities would be the production of L2W-EVs and stations, setting up stations, repairing and servicing, and software development. It requires a digital platform where the connected vehicles are accessed to succeed.

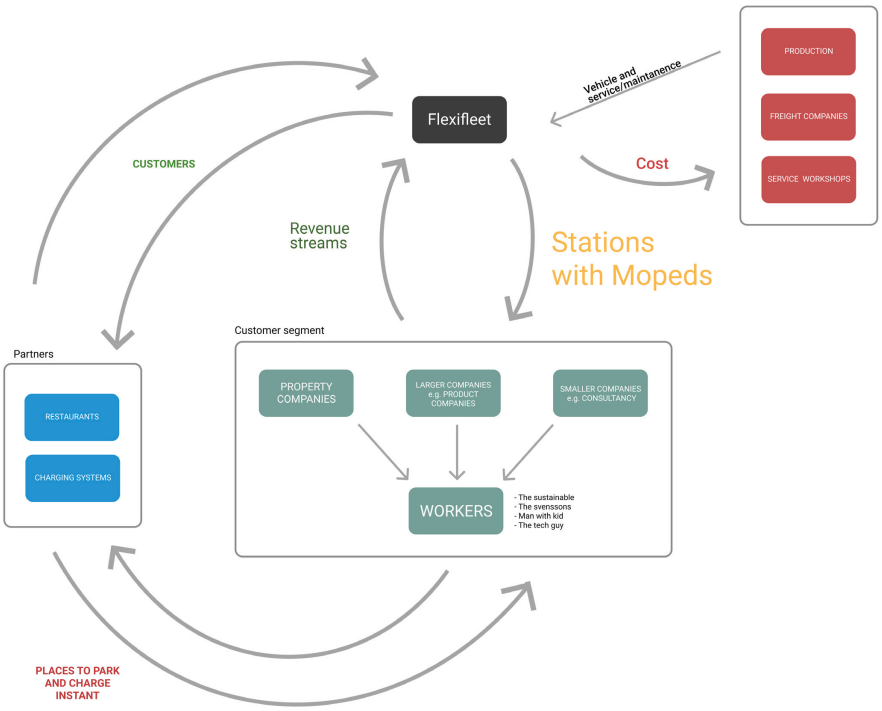

Figure 13: System description of the Flexifleet business model

TinkerBike

Concept TinkerBike is a business model, illustrated in figure 14, based on B2C, and the product is a highly modular L2W-EV. The user would be able to change the vehicle from their own preference, to have a more personalized experience. It solves their basic needs of transportation but offers opportunities to become a tinker with guidance from software created by the company. The L2W-EVs would be delivered as a blank spreadsheet with different presets that could be configured. It should be open source so the user could configure it by themselves to improve the vehicle. The user would be able to share their development via a community.

The primary customer segment is customers with high technical interests, e.g. consumers, tech companies, and universities. The Tinkerbike company would assist with updates for the platform, but the regular service and maintenance is up to the user to decide. TinkerBike Company would initially host events for programming the vehicle, but the long term strategy was to act as a catalyst that incentivizes and enables members of the community to host events themselves.

TinkerBike Company would create the communication channels, but the vehicle owners should produce the content. The owners can earn rewards from providing content that is ranked high and used by many others.

The revenue will be generated from the purchases of the vehicle but also from premium software updates. There will be various accessories available for sale, such as different handlebars, lamps, fenders, etc. in multiple configurations. The content produced for the community where the producer could sell will be a smaller fee added to, just like application stores for smartphones.

FunRide

The FunRide concept is based on a direct sales business model, illustrated in figure 15, where the product is divided into two major categories, a class AM L2W-EV and the experience. The main focus is on the second one, the experience. The vehicle should be simple enough to fit almost anyone, and the idea is that the user should see the product as a fun experience rather than an excellent means of transportation. The concept originates from Nintendo Wii, an electronic game console that had lesser performance compared to its competitors Xbox and Play-

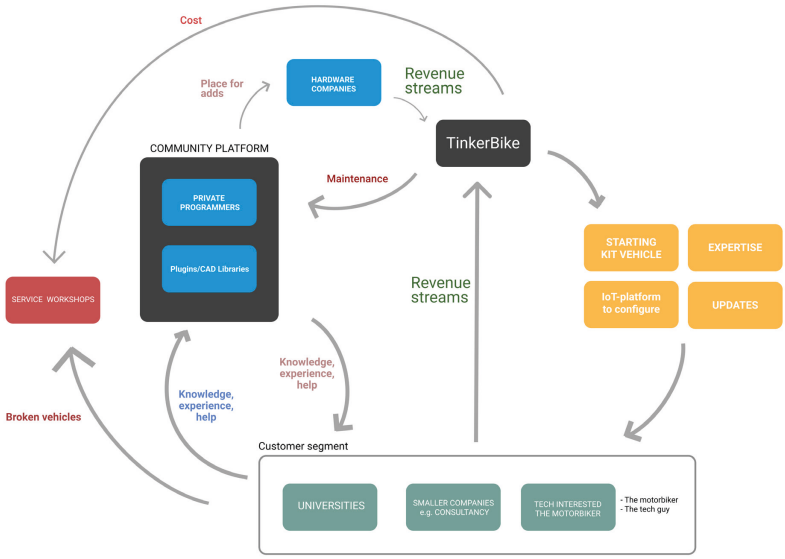

Figure 14: System description of the TinkerBike business model

station but focused on being justifiable by offering a significant amount of entertainment at a low cost. The vehicle should be marketed as a great summer experience where you can do different challenges with your FunRide.

The customer segment is customers with middle to high income with relatively low tech interest that want to try something new. The idea is that this should fit anyone in the family, both teenagers, and their parents. The user should not feel that they have to be afraid to use it since it will be low weight and low-performance class AM L2W-EV.

A large part of the experience will be the digital layer, a digital platform where the user creates an avatar and carries out challenges and games, alone or with friends. This could be sold or rented out to events, e.g. festivals.

SmartRide

The concept of SmartRide is based on a direct sales business model, illustrated in figure 16, where the product is a smart L2W-EV. The aim was to make a vehicle that can be more than just a means of transportation be perceived as an extension of the owner. The vehicle would not only be able to assist by providing transportation but also aiding in auxiliary tasks such as planning the everyday life of a commuting family. It would also alert when diversions from changing routines may affect the regular use since the vehicle learns and adapts the habits depending on how it is used.

The strategy would be to heavily utilize the digital layer to create a unique user experience designed to favour word of mouth marketing and facilitate the viral loop by creating emotional bonds with the owner and using visual aspects of the physical appearance to spark the curiosity of onlookers. The customer segment is technology interested persons born from the 1980s to 2000s belonging to generation X and Y. The SmartRide would expand the existing customer segment by downplaying the technical aspects of the vehicle and emphasize the unique user experience to reach customers that do not identify with the traditional motorcyclist ideals.

Concept selection with The Techno Creatives

The four concepts were presented for the stakeholders of The Techno Creatives. The discussions were mainly about what aspects that fit the ambition and capability of the company and what they could benefit from their existing resources. The main decision made from this selection was the following.

MaaS was not desirable since such a model requires significant initial investments in order to create the fleet of vehicles, is dependent on sizable active customer groups to be financially viable, and requires a considerable continuous effort to keep the fleet in operational condition. Therefore, the FlexiFleet concept was deselected.

The idea of a community, described with the TinkerBike, was considered to have potential. The stakeholders wanted to dig deeper into how to exclude the service and maintenance providers from becoming less dependent on third party stakeholders.

The SmartRide's idea of connectivity where the user was able to personalize the vehicle was appreciated. All data that is collected from the usage of the vehicle could be beneficial to develop the concept further. The idea of presenting statistics of the usage for the company and the user was seen as a resource.

The reward system of the gamification strategy was found to be interesting while other aspects were seen as possibly useful but far from essential to the business, such as the avatar personalization and the trivial Challenges.

Other outcomes were that the focus should shift to what is the core of the business model and what is additions. The core should be built on cornerstones that constitute the fundamentals of the business model. The rest of the features should be considered as features or additions. Furthermore, it was asked to make it as scalable and flexible as possible to meet different markets. The focus should be on what parts of the business could be excluded without risking to damage the company.

3.5.3 Refined concept

This chapter describes the refined concept, called FreeRide with focus on larger areas, the business model and the strategy, called the funnel. This is followed by an evaluation done together with The Techno Creatives.

Business model FreeRide

The concept FreeRide is based on a class A L2W-EV that can be converted into a class AM. Since it is connected via an IoT-platform, it has a digital layer that enables a vast amount of features. That includes remote locking and alarm systems, remote tests drives, flexible service and repairs. The business model is scalable and cuts out costly retailers.

The foundation of the concept FreeRide consists of four cornerstones, see figure 17, a digital platform, connecting the three other cornerstones, the Champion, the Hub and the Van.

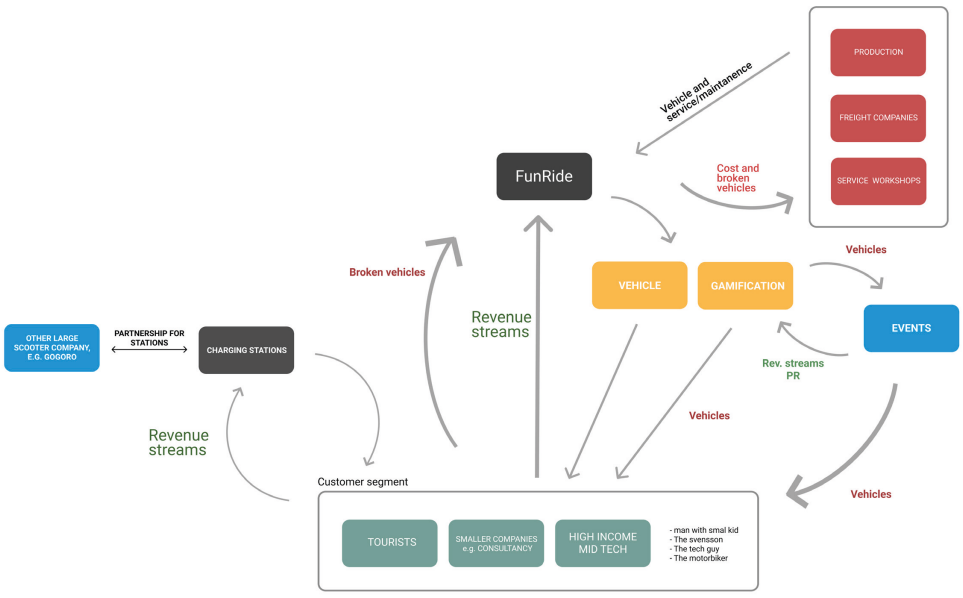

Figure 15: System description of the FunRide business model

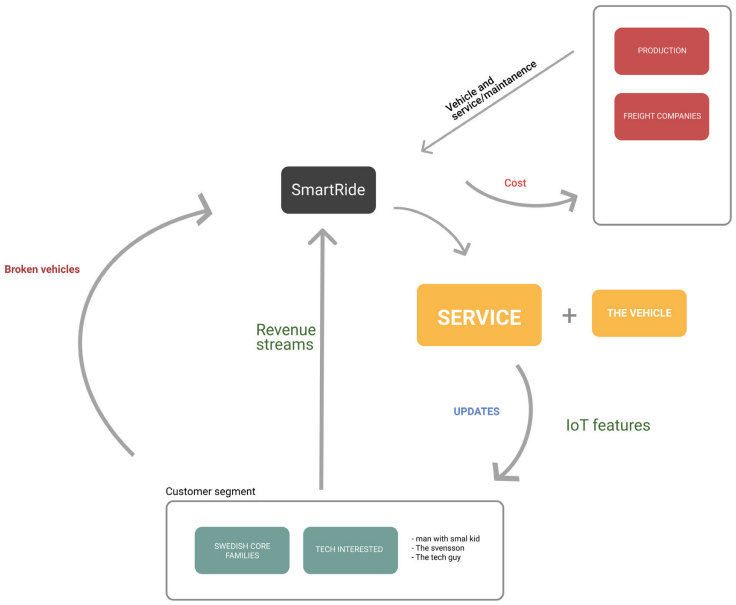

Figure 16: System description of the SmartRide business model

To hold test drives, offer flexible service, and repair, the business model, needed resources that were not a retailer. The only ones that have sufficient knowledge about and access to the vehicle are the owners. The idea is that those who want to share their understanding of the vehicle and earn from it should be able to do so easily. An owner who does this is called a Champion. The Champion is similar to an ambassador of the brand. However, anyone that owns a FreeRide and wants to become a champion can be one. The Champion is divided into four different categories, Tester, Tinker, Rider, and Inviter. The Tester helps out with test drives, and the Tinker helps out with maintenance, repairs, and service. The Inviter invites new people to the brand, and the Rider markets the brand by the usage of the vehicle as a Champion one raises in levels and earns points. The points can be exchanged for discounts, benefits, merchandise, upgrades, and money. The threshold to becoming a Champion should be as low as possible. To achieve this, easy tasks are available such as inviting friends in the beginning. The goal is to make the Champions remain active by offering increasingly higher rewards, creating a desire to achieve the next level. The rewards will be proportional to the required effort of the tasks and therefore, being a Tester or Tinker will yield more valuable rewards and even money.

The Hub is a stationary base that is remotely supervised by employees of the company. These are based on larger cities. In the Hub, potential customers can have remotely guided tests. The instructions will be displayed on the monitor inside the Hub, see figure 18 for layout, and the potential customer carries out the test by themselves. The Hub is also used for pick-ups of new vehicles that have been bought. This strategy is not as scalable as using Champions, but considerably more scalable than using showroom and retailers with employees.

The third cornerstone, The Van, is similar to the Hub but is mobile instead of stationary. Its primary purpose is to make it possible for people outside more substantial cities and has no Champions living nearby to have a test drive. When a potential customer requests a test drive on the website, the company stores its geographical location. When there is sufficient enough request in the area, a Van will be placed there. The user receives a notification in advance that it is possible to book a test drive at the Van. The Van will also work as marketing at events such as festivals, fairs, etc. It could also be used by Champions when they perform tasks, see figure 19.

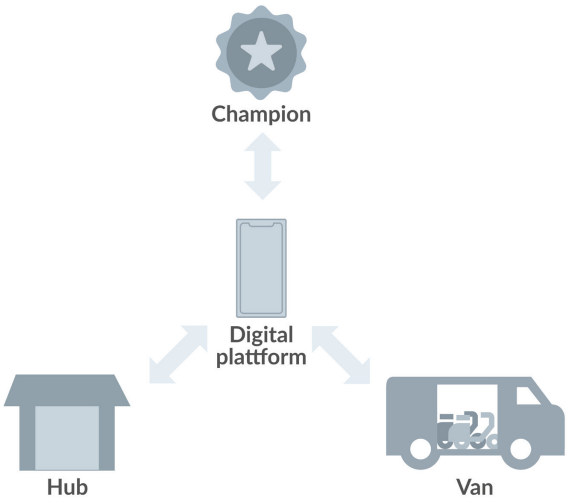

Figure 17: The four cornerstones of FreeRide

The digital platform is what connects the components of the system. The user will mainly interact with it through a smartphone application. The user is able to monitor the status of the vehicle, receive notifications, be able to contact FreeRide and other Champions or carry out challenges and champion tasks.

The Funnel

The cornerstones model describes how the different parts of FreeRides interact with each other when it is fully implemented. The Funnel describes the different steps a customer will take throughout the process and how the business model will work. Figure 20 illustrates the Funnel, where the grey sections display customers, the purple represents the champions, and the green line is the revenue line. It is divided into five steps, awareness, acquisition, first time experience, retention, and referral.

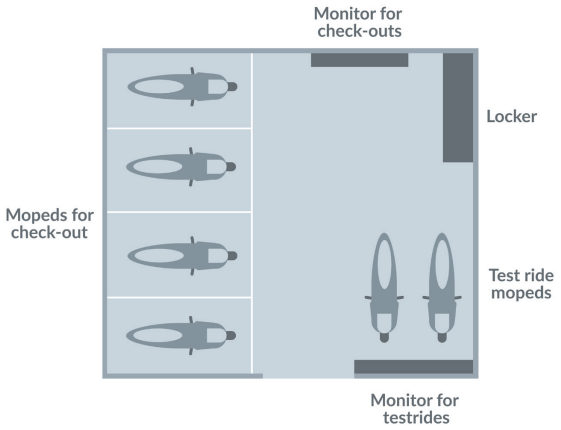

Figure 18: Example of Hub layout

The goal is to keep as many customers and champions throughout the Funnel as possible. Naturally, there will be a disappearance between each step, and therefore it is essential to counteract this effect, i.e. increasing the conversion rate. The Funnel will be continuously filled with new potential customers or recurrent customers, via retention, referral, the Viral loop, and Acquisition loop.

The first step awareness focuses on raising interest in people. The goal is to make people interact with the FreeRide Company, either by the website, events, the Hub, the Van or the Champions. The risk, in the beginning, is that there will not be enough active Champions to cover the demand for test drives. In this case, there is a need for doping the system, i.e. employ a person to be a Champion until there are enough Champions of their own will. The principal activities in this step are marketing.

Figure 19: Illustration of additional uses of the Van

The second step Acquisition is about converting potential customers into customers. Here, the main focus is on making potential customers test the vehicle via test drives, the Hub, the Van and Champions. These three will be the tools of the FreeRide Company to make potential customers understand why the vehicle is a better alternative. All purchases will be made via the website, to exclude any physical stores. The test drives will be either guided by the Champion Tester for the potential customer that prefers interpersonal interaction during the test drive. For people who favour testing the vehicle without direct supervision, the Hub and the Van would be the better choice. After the test drive, the potential customer will achieve a discount as a further reason to buy it and keep the downloaded app. If the customer purchases a vehicle, the Tester will gain a reward.

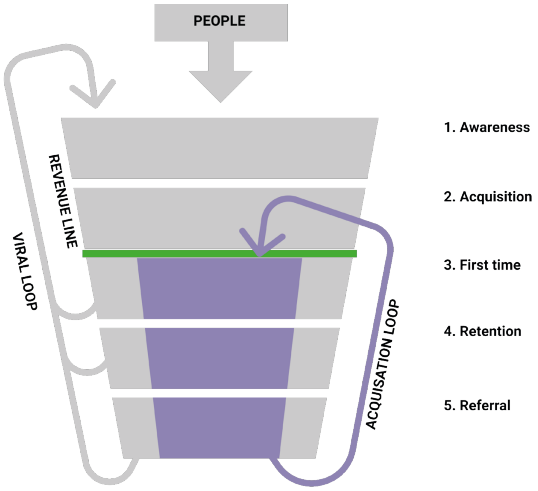

Figure 20: Illustration of The Funnel

The third step First Time experience when the customer has purchased the vehicle is essential to manage and exceed expectations, move on by introducing the digital platform, and facilitate word-of-mouth marketing. This step is divided into two phases, First delivery, and Second delivery. To lower perceived delivery time and steer the expectation, the customer will receive a first delivery of the IoT platform and battery together with QR code. The customer can scan this and start to configure the digital preferences of the vehicle. Since the battery will be charged when the second delivery, the vehicle delivery, will arrive at the risk of range anxiety and a bad first experience will be lowered.

The fourth step Retention starts when the user of FreeRide has been owning the vehicle for a while and might be ready for exploring further. The goal is to build customer loyalty, feed the funnel with new customers, and introduce them to be a Champion. This is divided into four parts. The first parts are the exploration of functionality where the customer is added to digital planning tools for charging and driving routes, statistics of their usage, road assistance, previous routes logging, enabling sharing the vehicle with others. Second, the customer will personalize the vehicle, both virtual and physical. They will be able to change their avatar depending on what rewards they get from performing different tasks. The user can upgrade the vehicle's aesthetics and performance or anything that will make them prone to talk with others about it and trigger the Viral loop. Third, by introducing them into the gamification part where they can carry out challenges and earn points, they get used by the point system, and this would lower the threshold to become a Tinker, Inviter, or Tester. Fourth, by integrating the channels for service and repair to the digital platform, the users will be encouraged to carry out the repairs and maintenance by themselves and help others by becoming a Tinker.

The fifth step Referral is when the user has become used to the Champion system and starts to recruit others. The goal of this step is to acquire as many potential customers as possible. This is mainly done via Rider and Inviter together with the Viral loop and Acquisition loop.

The Revenue line, represented with a green line in the figure is where the purchases are made, and revenue streams are generated to the FreeRide Company. The idea is to make the existing users and potential users to cross this line over and over again. Another aspect of the revenue is focusing not only on sales but rather on the cost. In this presented business model are there not any retailers cost, low showroom costs, low service and maintenance costs, low inventory costs. By lowering the cost, the profit from the purchase increases without having to increase the price. Since this business model is scalable, it is possible to enter the most market without high investment.

Concept refinement with The Techno Creatives
The concept was presented again for the involved stakeholders at The Techno Creatives. The stakeholders positively accepted the overall concept. This was followed by suggested improvements together with a discussion of how to bring the project further. That includes what parts needed to be tested and how they should be tested. Conclusions from the presentation and discussion are presented below.

- Instead of focusing on creating a start-up, make a business model that they can sell to an L2W-EV brand.
- Focus on what the ecosystem of the business is, streamline the model and ask yourselves how to kickstart it. Move the Hub and the Van from the ecosystem and use it as doping.
- Bypass how to build a brand, skip the first step

Awareness since it is brand-specific and focus on the next steps.
- Find where it is most critical with investment and make suggestions of what the investment should be.
- Create a sense of urgency in the business so that the customers are pushed to action.
- Evolve that this is not a substitute for an E-bike or a car, rather a new way of transportation.
- Create hypotheses and assumptions; try to verify them as good as possible.
- Develop further within personification with ideas.
- Prove the value of being a Champion. Why should one become a Champion, and how is it one.
- Enhance the physiological aspect of the test drive, e.g. safety and trust. Define the participant's and Champions' needs.
- Determine if the events should be facilitated by the company or catalyzed by the company and facilitated by Champions.
- The delivery needs only to be good enough. The idea of having divided deliveries and delivery centres, the Hub, is excessive. Focus on creating a digital context for the unboxing.
- Investigate further about the driver for Champions, e.g. monetization, gamification, social perks.
- Attach to the arguments of having an L2W-EV more.
- Create a general model for any brand or vehicle instead of a start-up strategy for a particular company.

The Techno Creatives decided to pivot from developing their vehicle to selling this business concept and needed IoT hardware and software to already established manufacturers of L2W-EVs. By removing the first step of the funnel from the scope, it became easier to focus on the core aspects of the business model concept. Implementation of elements that provoke a sense of urgency during the purchase process had already been discussed during the early stages of ideation. The reason that it was not in the concept was not to give a negative feeling about the system. However, this was not tested during the workshop, so the meeting decided to prove it. The Hub and The Van concept was kept but moved away from the cornerstones to making the business model more scalable and flexible. However, they were kept as potential measures to dope the system until the system became self-sustaining. The Techno Creatives thought the concept of two-part deliveries to be redundant. Even if this could be a potential concept for premium versions, the meeting agreed to leave it since it would not be part of the general business model. Further suggestions were taken into account, and the concept was refined further before the prototype for testing was built.

Prototyping for test

A prototype of digital interfaces representing the concept was produced for the concept evaluation phase. It visualises the five main stages of user interaction with the concept. It includes the perspective of new potential customers interested in the concept and the vehicle owners interested in exploring additional aspects of the concept. The aim to visually represent the user interface of the concept resulted in a prototype consisting of 317 interactive wireframes.

Since the participants of the test can choose what vehicle to buy in the real world, the prototype was designed to allow a quick change of the vehicle, theme and imagery used in the visual representation of the system. This allowed participants to select the most appealing out of six predefined vehicles before initiating the test. The prototype was made in a way that allowed quick changes of the vehicle and graphical interface to allow each participant to select the most appealing vehicle out of the six shown in figure 21.

The functions and components that were used in the concept had been specified. However, designing how they would work and interact with each other on a detailed level was mainly done while developing the prototype.

The purpose was to use the prototype to evaluate the concept as a system, the usability, and aesthetic qualities were only needed as a means to communicate the underlying structural aspects that are critical for the business model to be viable.

3.5.5 User testing of refined concept

This section presents the results and insights from the user testing. The test results are presented stage

by stage, illustrated in figure 22, starting with a description of the stage content followed by the findings connected to it. The final section presents the overall results that are not linked to any specific stage or the usability of the prototype.

Booking a test drive

The first stage simulated the initial contact where a person enters the website intending to learn about the brand, the test drive function, and finally booking one. This includes learning about the Champion system and the available types of test drives.

From the perspective of the customer, the test drive concept was perceived to be a viable alternative to the conventional retailer experience if it was covered by insurance and facilitated in a safe way. It was consensus among the participants that the experience was expected to be more authentic and preferable since it was to be assisted by an actual user of the vehicle instead of an employed salesperson.

When selecting a champion to host the test drive, convenience was expressed to be the most important factor followed by the characteristics of the Champion. This indicates that an essential element is to have high availability of Champions, something that has proved to be a challenge for current companies that offer similar types of test drives.

The majority of the participants prefered the remote test since it would allow them to test the vehicle at their own pace. Multiple participants also thought it would be easier to find a test occasion since the guide does not need to be physically present.

Two persons expressed that receiving the address would be preferable instead of the map since they wanted to use another navigation app that they were accustomed to using. This was also expressed about the inbox function from multiple participants who prefered to manage the communication through their regular email provider.

Remote test drive and introduction of reward system

The second stage starts after a test drive has been successfully booked and focuses on the test drive experience from the tester perspective. The step evaluates if the information and instructions provided before the test drive were understood. Further, it investigates whether the concept was perceived to be reliable and desirable, as well as if the user-to-user interaction was seen to be safe to use. Finally, the stage introduces the tester to the reward system.

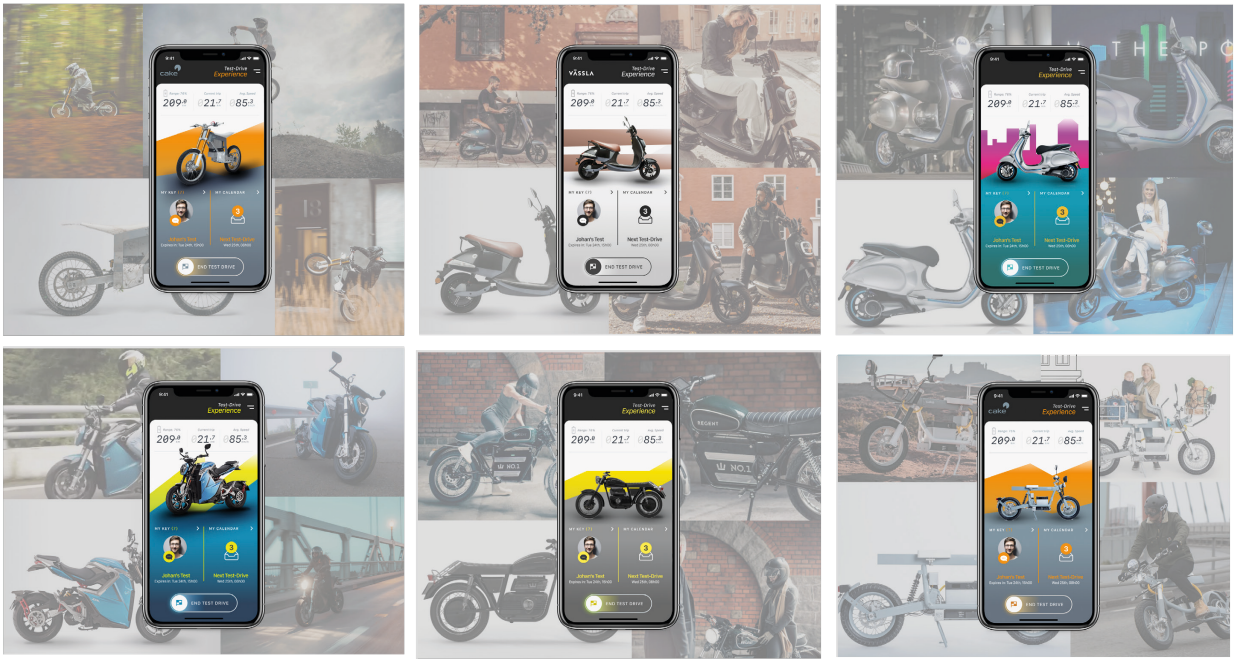

Figure 21: Illustration of the six versions of the app.

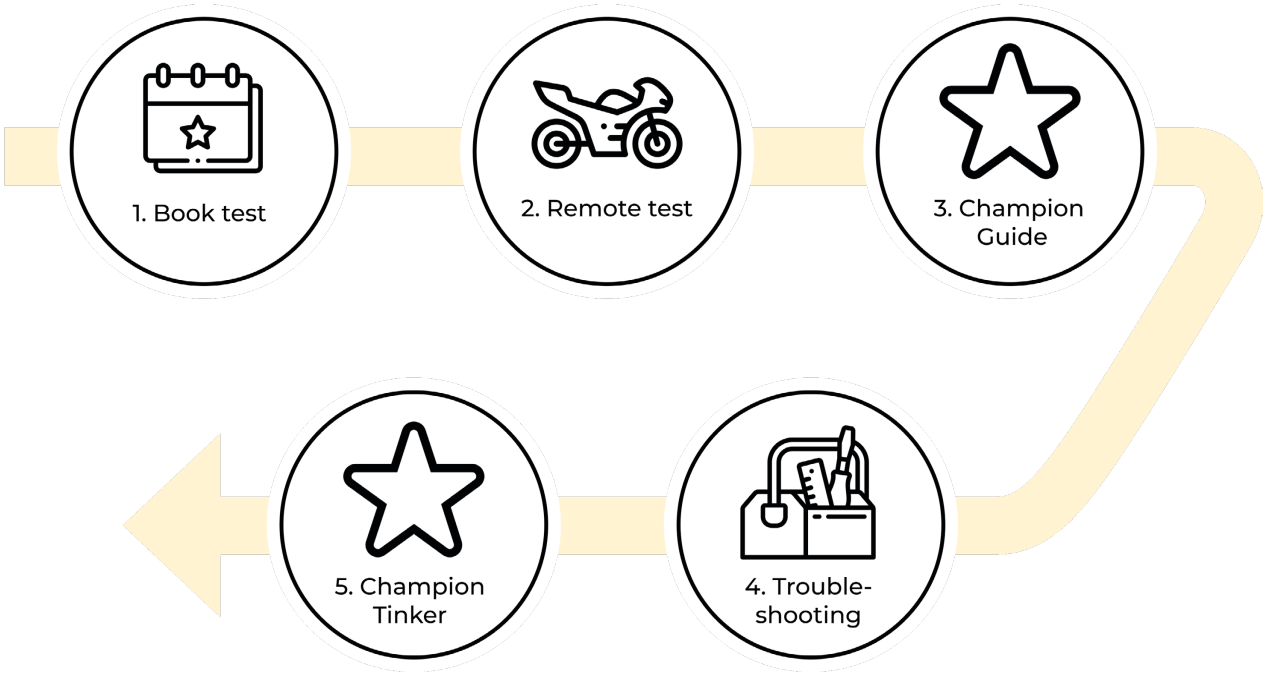

Figure 22: The five stages of the user test

The results showed that some of the functions were perceived as unclear, indicating the importance of the instructional videos that would explain the test drive in detail in a real-world setting, but were not possible to simulate with the used prototype approach.

One participant expressed that the challenges would make her choose to use the vehicle more often instead of other means of transportation. The majority of the participants thought the idea of gaining rewards and benefits would make them use it more. All but two participants were indifferent how it was presented as long as the benefits were communicated, while the other disliked it. It was also noted that the challenges based on using the vehicle might cause a backlash to its sustainability since the owner is encouraged to use it when it is not needed.

Signing up to receive test drive requests and hosting one

The following stage is set at a point where the test person supposedly has bought the vehicle and is interested in becoming an active champion guide that hosts test drives. This stage includes signing up to receive test drive requests, booking and finally hosting a remote test drive.

Most participants expressed a positive attitude towards providing test drives in exchange for rewards. The signup process was perceived to be unclear by the majority of the participants since there was no detailed description of the terms, responsibilities and incentives of being a champion in the prototype.

Hosting a guided test drive was perceived as a less risk when it came to the treatment of the vehicle, but less secure since it requires meeting a stranger. It was seen to be more convenient to host a remote test drive and would be preferable if facilitated in a safe way.

Using troubleshooting, repair guides and hiring a tinkerer

The two final stages focus on the functionality in the concept that aims to reduce the dependency on repair and maintenance providers. First, by simulating a scenario where the test person notices that something is wrong with the vehicle and is prompted to take action. Using the troubleshooting function, decide to either perform the repair themself, following the repair guide function or requesting a Tinkerer champion to fix the issue.

The diagnosis functions were generally appreciated disregarding if the participant intended to contact assistance or perform the repair with the support from the repair guide.

The attitude of doing the repair themself was dependent on the participant's interest in doing repairs. One participant who did not have any experience of doing repairs expressed that he would use the repair guide system as an opportunity to learn about his vehicle and repairs in general. It was also stated that doing repairs would be desirable only if it were significantly cheaper than paying for someone else to do it.

All participants who chose to fix the issue themselves were positive to the repair guide since it removes the current, time consuming and unofficial practice of finding the information by searching blogs and forums online.

Small specific aspects of the system were especially appreciated such as keeping track of the exact name of components, logging when parts were last changed and when they are expected to need maintenance or replacement and the function to order spare parts directly through the app.

Receiving and respond a request to repair another person's vehicle

In the final stage, the participants are the Tinkerers that receive a request to do a repair on another user's vehicle and replies with an offer.

The interest in being a tinker was also connected to the general interest and experience of repairing or tinkering but also how they prioritized their time. One participant that had little spare time and a high income expressed tinkering to be a hobby but would not consider to do it for others no matter the payment.

If the participant had performed the requested task before, they expressed that they would feel confident in their ability to perform the task for others. And one participant stated that if a repair guide were available, it would be sufficient to support any repair task.

General results

How the participants answered were found to rather be dependent on specific individual personality traits and experiences than the persona they represented. This indicates that the use of personas might not be the most effective way of categorizing potential customers. It also was apparent that the vehicle itself is an important aspect that was difficult to deal with during the test, the quality of the vehicle was expressed by multiple participants to be more important than the other components of the vehicle system.

The system seemed to be appealing in general, but more attention is needed on communicating how it works and what the benefits are. There might be a potential mismatch in the prefered way to test the vehicle and prefered way to allow a stranger to test their vehicle.

Proper insurance was found to be an essential aspect that is required in order to create the security needed for the champion system to work.

The participants from southern Europe also expressed a desire to be able to ensure that the vehicle condition is representative of a new one and that it is safe to drive during the test since their perception was that people do not take care of their vehicles in general.
The possibility to earn cash was expressed as a desirable incentive by all participants. However, if the desire of acquiring a new accessory or an instalment on the purchase of the vehicle is existing, then discounts become an appealing payment. The possibility of unlocking additional features as an incitement for being a champion was expressed to be very undesirable by one participant who would be upset that a product that he has paid a substantial amount of money for was intentionally made worse in order to get him to do work for the company.

Both hosting test drives and performing repairs were perceived as a potential opportunity to get some benefit or extra cash when the participant had time to spare, but would likely not allocate time for it periodically.

Throughout the tests, it was apparent that the usability of the prototype needed to be improved in general. Some of the participants were confused or

to some degree misinterpreted parts of the terminology such as Tinkerer champion and remote test drive. The usage of new words and concepts that are not self-explanatory should, therefore, be kept at a minimum.

It was also unclear to the participants when decisions actually were made and expressed that confirmation questions of the type “You are about to ... do you want to proceed?” would be desirable.

Final concept

This chapter presents and describes the final concept. It relates the final result to the concept vision and the improvements done from the user tests. In this chapter, the concept is established and defined in two sections, The FreeRide concept and the strategy.

4

4.1 The FreeRide Service concept

One reason to use L2W-EVs as transport compared to its alternatives is that it is cost-efficient. The more it is used, the lower the cost per use will be since it is the largest cost in the purchase of the vehicle. Another significant contributor is insurance. Compared to cars, is it easier to park since one can use both parking lots for cars and motorcycles. There is neither any smell from the ICE that sticks in the clothes. If it is compared to an e-bike the distance possible with an L2W-EVs is far longer, leading to less frequent need of charging. They are also more sustainable alternatives compared to cars.

This concept stands out compared to other L2W-EV companies since it uses a different business model that allows the business to better scale from a small local market to large metropolitan markets. This is something conventional business models with dealerships and showrooms have a hard time to do. They have fixed costs for the premium dealership, and their physical stores are not creating a global reach. Previous concepts focused on that The Techno Creatives should purchase L2W-EVs from a manufacturer, integrate the IoT platform in it and sell directly to customers, i.e. B2C. However, the more scalable and flexible business model presented as the final concept builds on a B2B sales model. Moving away from producing a specific vehicle model, the concept focuses on selling an IoT based solution for L2W-EVs as a service for L2W-EV brands.

4.1.1 The model

The model consists of three cornerstones, the Digital platform, The FreeRide bike and The Champions. These three interconnected cornerstones work in the context of potential customers and owners. The digital platform is a system of connectivity. The IoT platform integrated into the L2W-EV is connected to the app and website. The FreeRider bike is an unspecified L2W-EVs, manufactured by the companies that purchase the service from The Techno Creatives. The Champion is the owner of the FreeRider bike and user of the digital platform. Through incentives, the Champions will offer their service in different areas to replace retailers and service workshops. The three cornerstones are further explained in 4.1.2 to 4.1.4. The model is beneficial to the customer, the bike owner and the business.

The customer benefits by being able to speak to someone that has the experience of owning the bike and understands their needs and concerns personally. Furthermore, they are able to test drive in non-major cities, where no store or retailers exist—the bike owner benefits by having incentives of being a Champion. Being a Champion allows them to earn rewards, in terms of unlocking features, discounts or even cash payments. It is also beneficial since they can lower their own costs by doing it themselves, compared to having it repaired and maintained by expensive workshops. There is no need to set up a dealer network, retailers, showrooms, certify workshops for service of the bike when entering a market. This enables scalability for different markets and regions that earlier would require high investments. The Champions concept will further increase the brand loyalty and engagement, which by itself can make the business grow further.

4.1.2 The Champions

The idea of Champions is to make test drives of the vehicle accessible, flexible and honest in a cost-efficient way. To make owners become active Champions and make existing Champions stay available, they need incentives. The incentives can be divided into two categories, status-driven and reward-driven. Status-driven incentives increase the perceived status as a Champion. There could be both digital, physical and contextual. A digital status-driven incentive could be for example new features for a digital avatar or medals displayed at your user account, physical status-driven incentives could be explicit accessories, and contextual status-driven incentives could be invitations to special events. Reward-driven incentives, on the other hand, are rewards that can be translated into monetary value. These could be items that otherwise could be bought, discount codes in the shop or even cash payments.

From an economic standpoint, the incentives should not exceed the cost of having retailers and service workshops. The reward system should, therefore, encourage the Champions to use their rewards gained from their Champion tasks by, e.g. offering discounts instead of money. However, if discounts would not be enough then monetisation should be implemented.

There are two categories of Champions, Guide and Tinker. The Guide hosts a test ride as their primary activity while the Tinker helps other owners with repairing activities. In the following two sections, the key activities of the respective Champion are described.

The test drives of Guides

The test drives are the core of this business. Three experience principles have been created to make the engaging experience of the test drives, incentivised, trustworthy and business-driven. The test drives should encourage both potential customers and Champion to stay in the loop by offering incentives.

A secure and convenient booking system is provided in the service where the customer can choose between a specific request or a general request. The particular request is displayed as a map with all available Champions nearby. When choosing a Champion from the customer's preferences, they can either choose a time slot set by the Champion or send a request of preferred time. The Champion then responds to the customer with either a suggestion of time or verification of their opinion. In the case when there are no available time slots, and the customer does not care about who is the Champion, one could send a general request. The general request goes out to all Champions nearby, and any of them can respond to the customer with suggested time slots.

According, both as a Champion and a customer, it is essential to feel confident and secure about the test. Therefore both remote and guided tests will be available. In the guided test, the Champion will be participating at the physical location, answering questions and guiding the customer through the test drive. In the remote test, on the other hand, the customer will be given access to the vehicle, and the Champion can remotely monitor the test via the app.

All customers and Champions will be ID verified via the app to make the users feel secure about the test drive. It will also work as fraud prevention. It is not until the verification is done the exact position of the vehicle will be displayed for the customer. The ID verification will also investigate if the customer has the proper drivers licence to use the vehicle.

Before the test drive, the Champion can via the app create a geofence that limits a test drive area where the vehicle can be driven. If the customer drives beyond the predefined zone, the Champion will get a notification. At the same time, the test driver should notice the bike slowing down, thus encouraging the test driver to stay in the geofenced areas. The Champion and the test driver can interact with each other via chat and calling functions. In emergencies, both of them can call the company for assistance.

For extra security, fraud prevention and lower insurance costs of the business, the test driver needs to guarantee partial payment of the damage caused by the test drive. Thus one needs to verify the customers' credit card before, in case the vehicle gets damaged during the test drive. Just like any vehicle rental service, it is within the test driver's expectation.

To fully leverage the benefit of a digital service, both parties need to go through an insurance protocol. It contains taking footage of the vehicle at different angles. The footage is used as documentation of the bike condition in case any damage happens during the test drive. The exchange of the digital key happens automatically after both parties have taken the video.

User engagement is the key to test drive service. Thus conversion needs to be considered to encourage users to stay in the loop. Converting from website to app is one of the triggers for user retention. A mechanism such as a fast track for test driver's ID verification can be introduced as an app, the only feature, thus converting more potential test drivers to download and use the app earlier in the journey.

The repairing of Tinkers

To offer flexible alternatives to service workshops for maintenance, upgrades or repairs of the vehicle, the second category of Champions is introduced, the Tinker. The Tinker is an owner that helps out other owners with their vehicle in exchange for rewards. To increase the retention of owners and as a selling point for potential customers, the idea is

that the tinkering should be easy or at least accessible. First, the app contains functions that enable users who want to tinker with their bikes themselves but feel that they do not know how to. For further information, see 4.1.3 The digital platform - functionality. Secondly, the owner can choose to get the vehicle fixed by the Tinkers. To be able to offer this solution, there must be enough Tinkers with knowledge and experience. Therefore self-repairing will be encouraged to increase the knowledge base of the vehicle owners. After finishing a repair task on the vehicle, the user will be asked to accept requests for the same task and become a Tinker.

When the owner requests help via the app, the request goes out to Tinkers nearby that respond with a time, spot and price suggestion. The owner decides who should carry out the repair and send a verification. If there are no Tinkers available, suggested professional workshops are displayed. This, however, will be primarily out of the service from FreeRide.
To ensure that the repairs are carried out correctly by the Tinker, they need to be certified by the company. The certification will either be based on previous repairs on their own vehicle or by an online tutorials programme. The tutorials will have general courses for the repair together with elective courses for more specific tasks. Since the request goes through the digital platform, the company will be able to select Tinkers that is certified for the specific tasks.

4.1.3 The digital platform

This section presents a description of the digital platform used in the concept. The content and functionality has been the main focus of the platform development and were prioritized. It was left room for improvement, considering the way functions are organized.

Platform during daily use

The home screen, see figure 23, displays information and enables direct access to functions relevant for the daily use of the vehicle such as the state of the battery, the location of the vehicle and locking. It also provides navigation to the sections with less frequently used functions which are described below.

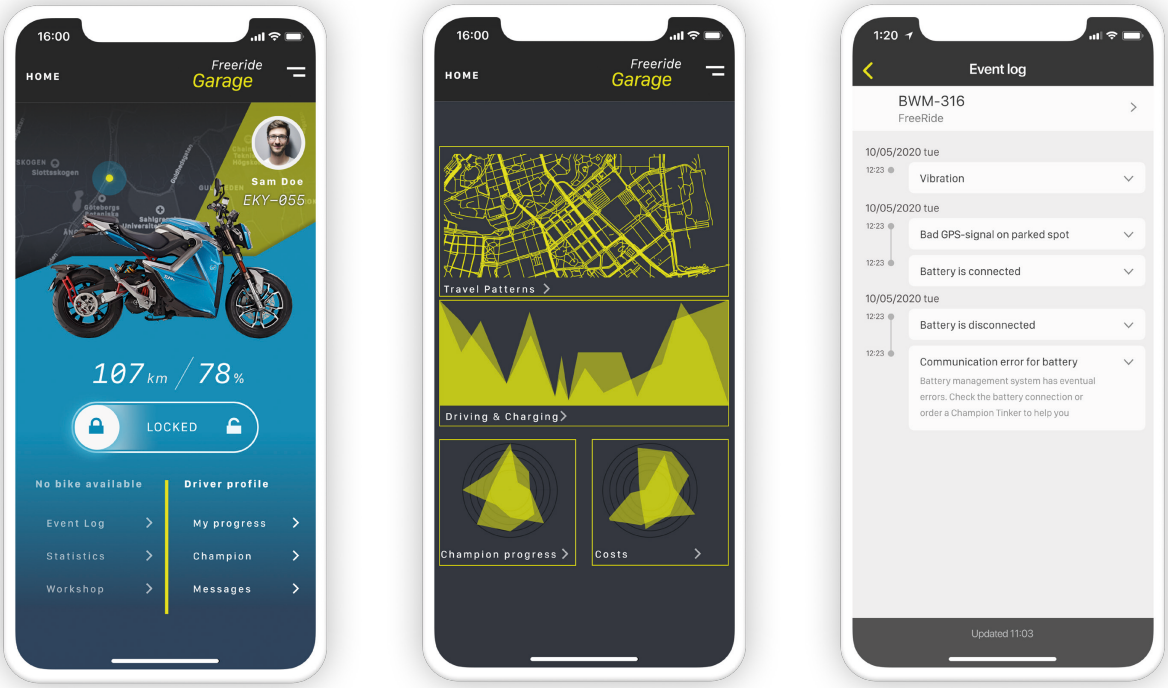

Figure 23: Illustration of homescreen, statistics menu and eventlog on app

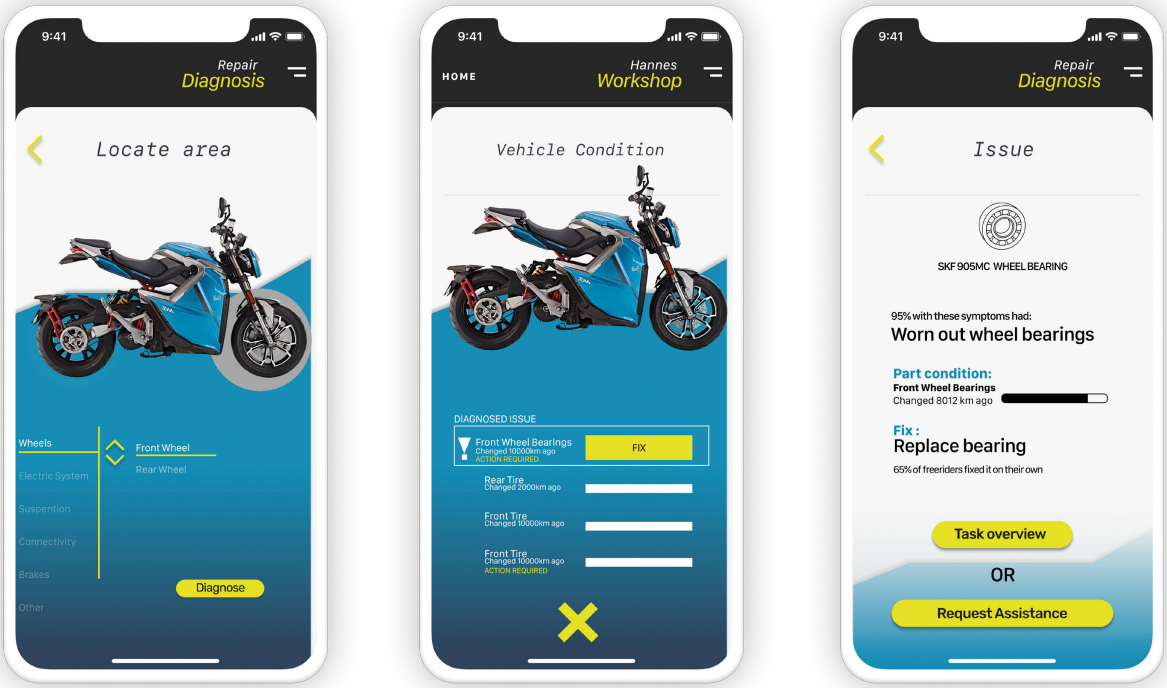

Figure 24: Illustration of diagnosing a issue on app

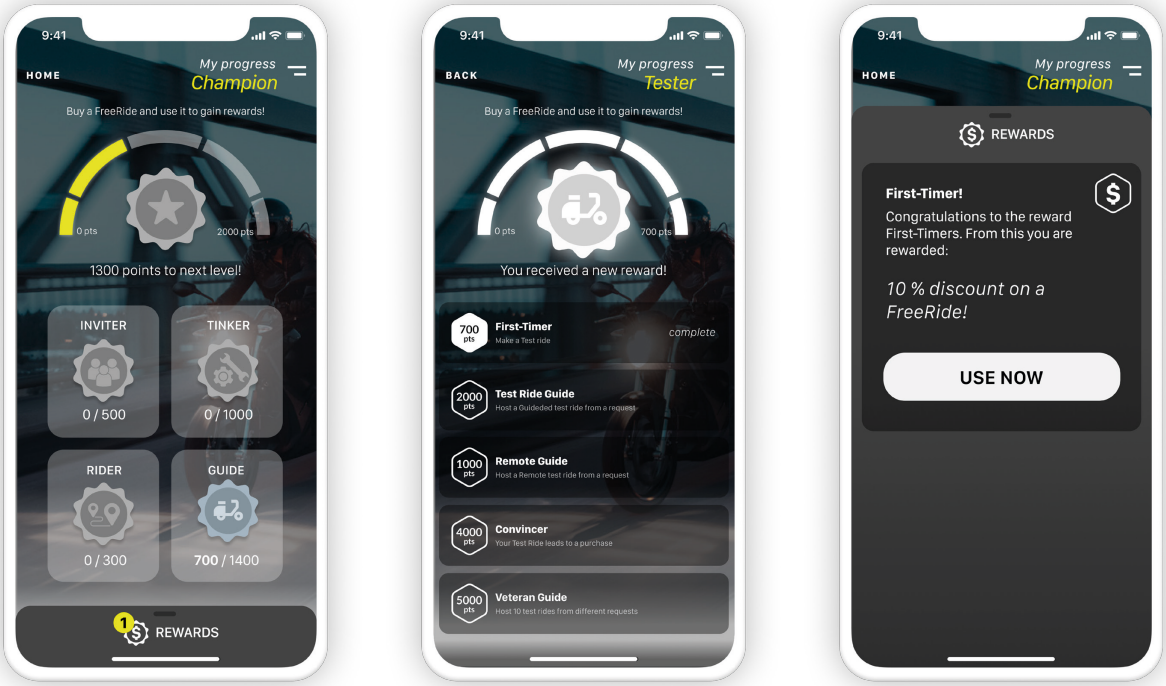

Figure 25: Illustration of the reward menu

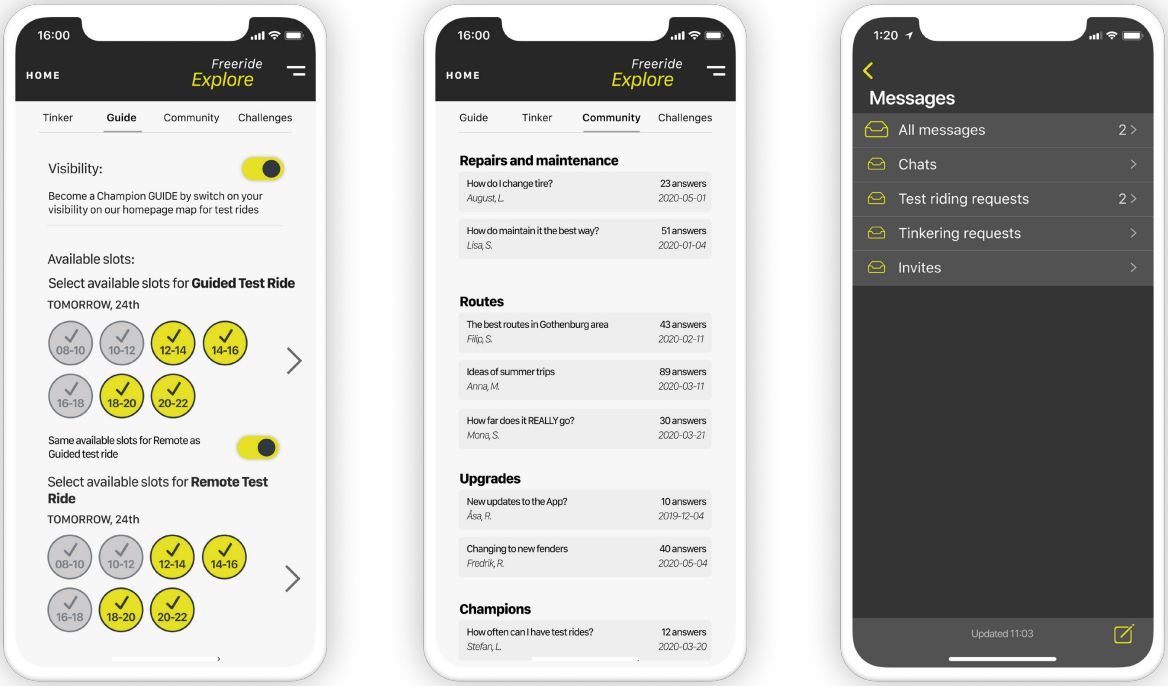

Figure 26: Illustration of the challange menu

Figure 27: Illustration of wireframes before test ride

The Event Log and the Statistics sections see figure 23, contain functionality enabled by IoT that contributes to enhanced user experience by presenting information on different aspects of how the vehicle has been used. These functions have not been designed in detail since they do not core to the business model.

The Workshop sections see figure 24, provides functionality that is associated with the condition of the vehicle. Vehicle condition and logbook contains an overview of when components last were changed when they are recommended to be maintained or replaced and a log of previous maintenance and replacements. Diagnose problem allows the user to identify issues in case of malfunction and presents available options on how to deal with it. It provides information that helps the user to make an informed decision. Proceeding either to the repair guide, or request assistance sections described below.

My progress see figure 25, contains the gamification aspect of the platform, displaying progress towards gaining rewards and available activities that lead to further advancement. This should encourage the champions to stay active and complete challenges connected to the use of the vehicle.

The Champion section, see figure 26, is where the users are able to adjust settings regarding their championship. Here, the user can decide what type of requests for champion activities to receive, and also access to a forum where knowledge and experiences related to being a champion are shared. The Messages section is simply an inbox where all user-to-user communication is gathered, see figure 26.

Test Ride sequence

After a test has been booked, the testers have downloaded and signed in to the app. A rough location of where the test ride will take place and the time of the test ride is displayed in the app. The tester may also access a set of instructional videos that describes how the test will be done in detail and a chat function that enables the communication between the owner and the tester, see figure 27.

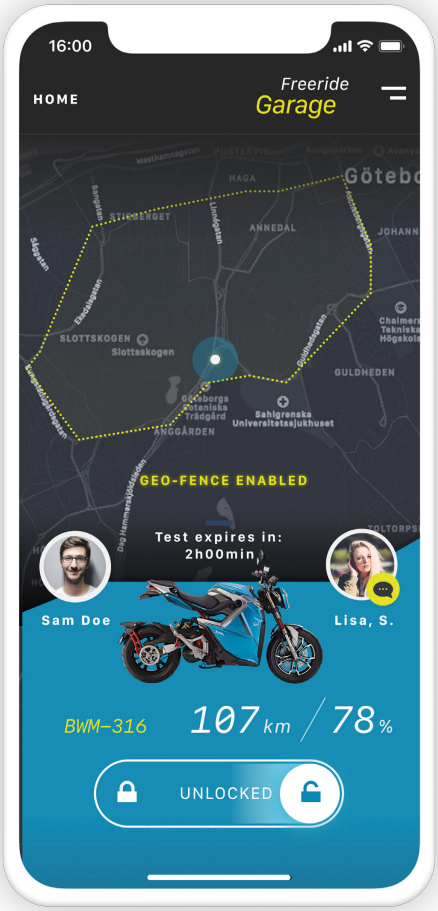

Figure 28: Illustration of app when test ride

Shortly before the test ride is scheduled to begin, the tester gets access to the exact location of the vehicle, see figure 27. When the tester has arrived at the vehicle, the owner sends a temporary digital key which grants the tester access to the vehicle for a limited time and within the boundaries of the geofence. The owner has decided the area where the test person is allowed to drive, by setting up the geofence, see figure 28.

Repair Guide

The Repair guide displays a summary of the task, including a description of needed tools, spare parts, an estimation of how long it will take to complete and the difficulty of the task. Then the user is guided through the procedure stepwise where each step is described with instructional videos and texts until the task is completed, see figure 29.

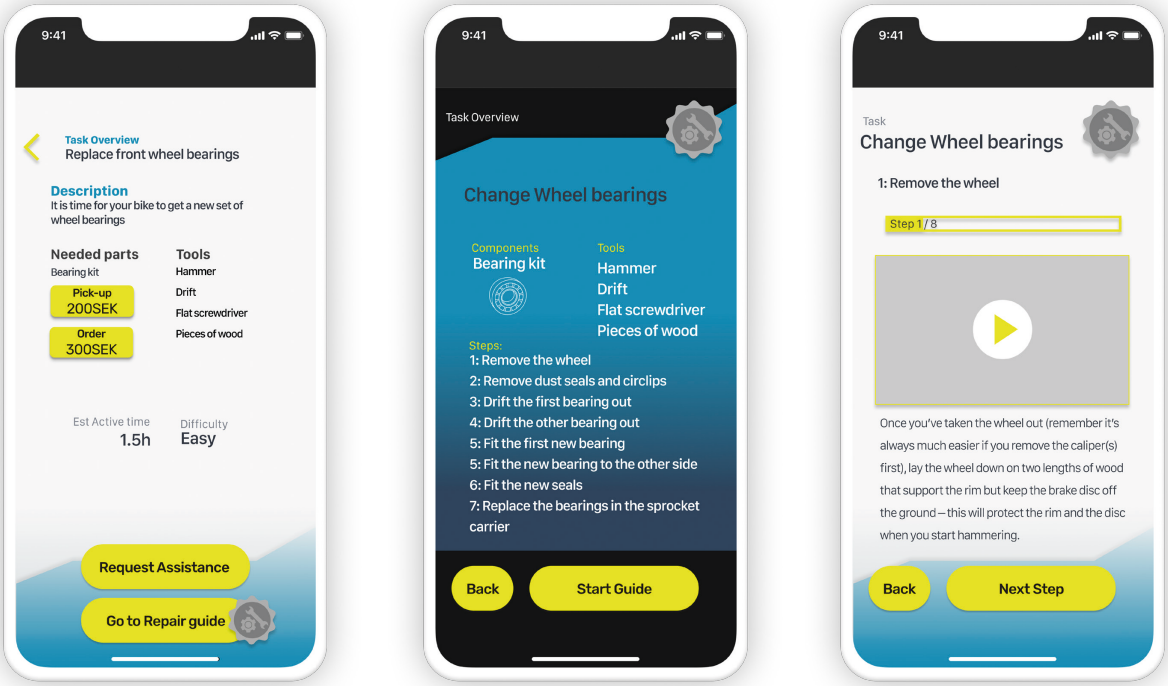

Figure 29: Illustration of repairing sequence on app

Tinkering request

After identifying an issue using the diagnosis function, the user can choose to request assistance. An overview of the request will be sent to the Tinker. The user can also select whenever to prioritize Tinkers that have high availability, are geographically close or the tinkers with the most experience. It is possible to attach a message to the request, see figure 30. The Tinkers that receive the request are then able to reply with a suggestion of time and price. In the request, it is stated whether the Tinker can repair at the location, if the Tinker should pick up the broken vehicle or if the owner should drop it off at the Tinker's place. The owner of the broken vehicle then receives different offers from Tinkers and accepts the preferred one.

4.1.4 The FreeRide bike

The FreeRide bike is an L2W-EV manufactured by an independent company that purchases the service and needed hardware from The Techno Creatives. The model should be adaptable to match different L2W-EVs to allow business with different companies. However, the following are some requirements or suggestions to take into consideration when implementing the service.

This study has considered L2W-EVs, that is two-wheeled vehicles with a motor effect up to 11 kW. This is, however, not a requirement, other classifications of vehicles might work as well. The vehicle needs to have a battery with a capacity large enough to keep the IoT active at the time it is parked. Preferably there is an HMI displayed to integrate function from the digital platform and an output channel to charge the smartphone, since the smartphone are used for fundamental functions, e.g. starting the vehicle. However, the L2W-EV has to suit the targeted customer group and be considered appealing enough to be bought. If the vehicle does not live up the expectations, the business model or strategy will not work. Further, the brand needs to target the right customer group since the service of Champions will not be applicable to any brand.

4.2 The strategy

From a strategic point of view, it is desired to consider and influence all steps a customer can take in

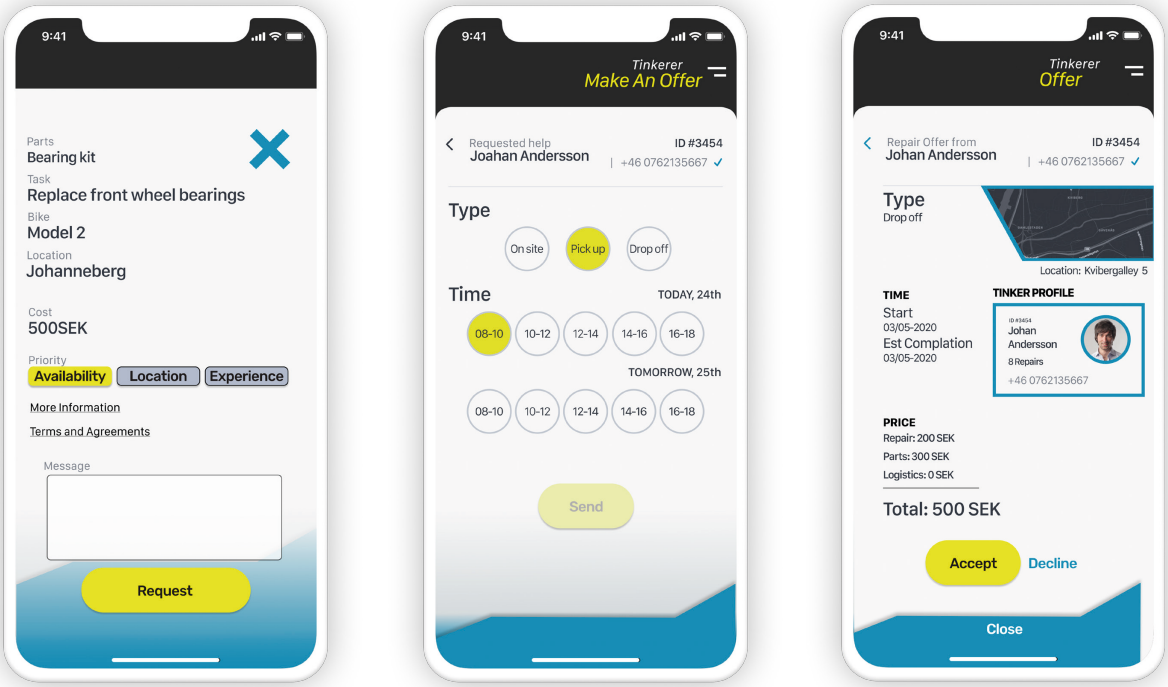

Figure 30: Illustration of recieve and respond a Champion Tinker task

the purchase process. To achieve this, one can use models to define the different steps and determine what actions should be taken to make the customer take the most favourable course of action. The strategy of the concept FreeRide is presented in two models, the ordinary user funnel and the Champion funnel. As in previous concepts, the funnel goal is to identify and manage key activities in order to have the highest conversion rate possible.

4.2.1 The ordinary user funnel

The ordinary user funnel, illustrated in figure 31, defines the steps taken from being a potential customer to the owner of the vehicle, referring to new customers and becoming a Champion. The touchpoints are by which channel the company intends to affect the customer, and strategies are the suggested ways to affect the customer most efficiently.

The two first steps, Awareness and Get information about the vehicle are directly related to the company and its vehicles. Different companies have their marketing strategies, and the same goes for brand strategy. Therefore will this model only mention the importance of this step, but do not, specify how it should be performed.
By having clear explanations on the website of how the test drive will be performed, the user should feel confident to book a test drive. During events, the company representative should be able to quickly and convincingly speak about the test drive as a good way to get a better understanding of the vehicle.

When the customer decides to book a test drive through the website, the booking system should be simple to understand and offer flexibility in time and distance. The booking system should be convenient to use, and if any questions arise, the customer should be able to chat with the Champion.

A way to tie the customer to the company is by downloading the smartphone app and creating an account, i.e. converting from using the website to the app. These steps should be as simple as possible and encouraged by the system. The customer will receive an email that a Champion has responded and to read it, the system strongly recommends to open it in the app. In the email, there is a link to the app and an activation code. With the code, all the

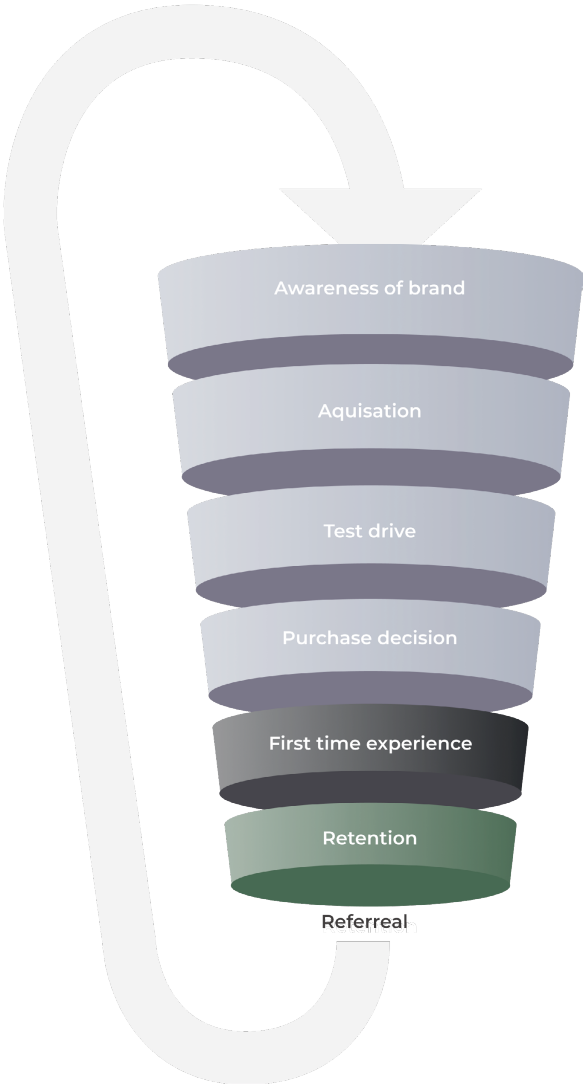

Figure 31: Illustration of the ordinary funnel

credentials will be transferred to the creation of the account from the booking request. The user only has to sign it with ID verification.

The test drive's function is to convince the user to purchase the vehicle. The test should, therefore, consist of the benefits of the vehicle, so it appears to be the right choice. However, this sets the requirement that the vehicle is appealing to the tester. The Champion will further bring positive experiences since the Champion has incentives that the customer buys a vehicle. The Champion is placed in the position to affect the test by hosting the test drive.

After the test drive, when the customer decides whether to make a purchase or not, an incentive in terms of discount will be presented, via the app. The discount will have a time limitation, to create a sense of urgency, triggering the customer to make a purchase. The Champion will be encouraged to ask if the customer has any questions or reflections from the test drive, making sure that all good arguments to purchase is presented.

After a purchase is made and the vehicle is delivered, the first time experience of the vehicle will take place. The customer is presented via the app a simple guide to set up the vehicle and make any necessary adjustments to ensure that the customer has the prerequisites to have a successful first time experience. The system will notice the delivery and offer the customer to chat with other owners or to seek information in the community section to enhance the sense of back up if needed.

A satisfied customer will be more likely to spread a positive message to new potential customers than a dissatisfied one. Therefore the previous step is essential to the referral step. This step focuses on the fundamentals of the viral loop to encourage owners to invite new customers to the company. By offering personalized accessories, rewards in terms of merchandise for using the product and adding a layer of gamification, the owner should be more inclined to speak about the brand. The gamification element consists of challenges that give the owner status-driven benefits after completion, leading them to be more prone to share their personal experience with others. The referral system shares the reward structure of test drives where invites that lead to purchase will reward the owner who sent the invite.

In this model, the last step Retention refers to converting owners into active Champion. This step is the final for the ordinary owners model and contains the next model, the Champion funnel.

4.2.2 The Champion funnel

The Champion funnel, illustrated in figure 32, defines the main steps taken from awareness of becoming a Champion until one repeatedly carries out Champion tasks. In the very beginning, there will probably not be enough Champions to match the demand for them. The strategy is to dope the system by implementing the concepts The Hub and

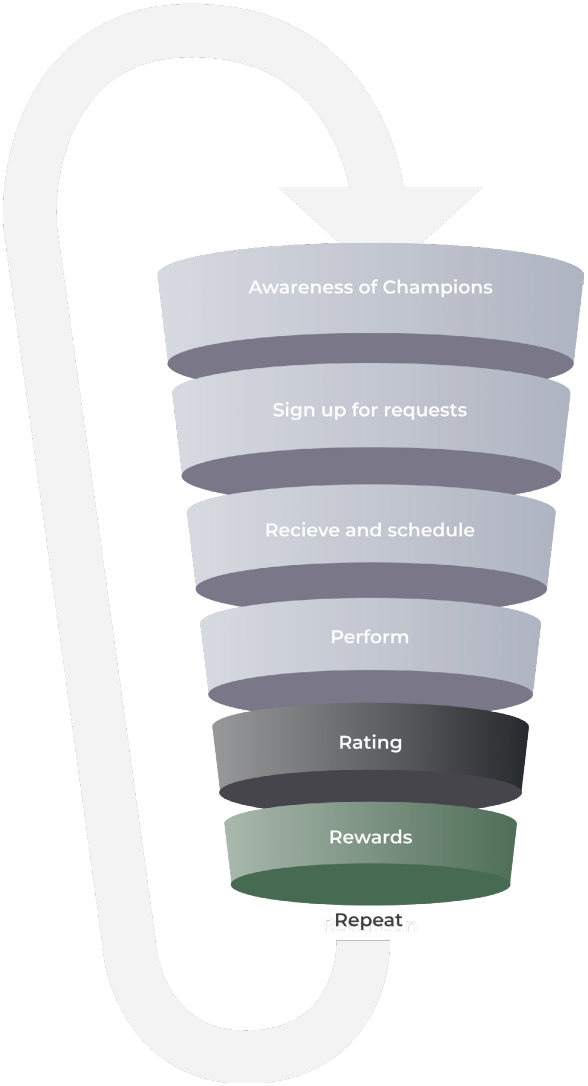

Figure 32: Illustration of the Champion funnel

The Van, described in section 3.X.X. As soon as The Hub and the Van are no longer essential for the system to work, they will be removed.

The first step, Awareness of Champions, does necessarily have to happen after the customer has purchased a vehicle and start referring to others. It happened earlier in the funnel, but for structural reasons, it was placed in this order. The information is spread both via the app and website as marketing, but also by other Champions. Once again, this is affected by how the company decides to market the service. It is essential to communicate a clear vision of what the user will receive for each task and why one should do it.

When the user receives requests, it is clearly defined what the task is, since the customer has used the issue detection in the app. There is a list of what tools and spare parts that are required to ensure that the Champions have everything they need.

During the performance of the service, there are clear instructions either by videos or a step-by-step guide to ensure that the Champion performs it correctly. This should help the Champion to feel confident that he or she has carried out the task correctly. After the service, there will be an easy digital protocol to fill in with texts and pictures for eventual unclarities. The Champion will be able to call the company in case there are any uncertainties.

After the service, both the customer and the Champion will rate the service. Based on this, the company will be able to make improvements to the guide and whether the service was carried out correctly. When this is done, the reward will be sent. The rewards will be stored automatically in the app, so the user easily can access them when wanted.

Notifications through email and the app will be sent to the Champion to make the Champions stay active. This should encourage the Champion to remain active, invite new people to the service.

4.3 Concept fulfillment

This chapter presents how the concept fulfils the context specification by comparing the concept description and the results from the user test with the context specification.

The user wanted a vehicle that is the grey zone of class AM and class A, since they considered class AM to be too slow and silly at the same time, class A was considered too dangerous. Therefore the designation light two-wheeled electric vehicle is used, where the vehicle can be registered as both. This allows the business to fit the global market as well since countries all over the world have different classifications and different regulations of driving the vehicles. Since the system is mainly digital, it allows user feedback and data from the system to continuously improve the service. The company can keep the quality by analyzing the data from the rating the function performed by the champions and act from it.

It is efficient usage of the resources, since the fixed cost of having retailers, dealerships and showrooms is reduced into a model where the Champions only are paid after they have generated value for the company. The idea is that the Champions will have this as a side income or hobby, compared to the retailers that have this as their primary income. Therefore it removes the cost for overcapacity and uses the resources more efficiently. According to the user study, people are open and willing to tinker, which can be seen as an unused resource. By easily accessed repairment guides and online courses, they can be converted into a resource to the service. As a Tinker or Guide, the participants of the user study and user test argued that they would be interested in not only money as rewards, but also accessories, discounts in the webshop, tools or other benefits. Even if this is a cost to the company, it is lower since they receive either revenue from the purchase in the shop or increase the knowledge and ability to perform services with tools. The business model provides a scalable proposition; it can be earlier profitable compared to other business models when entering a new market. There is only a need for one Champion, which can if required to be doped.

The business model is value-adding for the users by providing a community to be part of. It would market the next generation of mobility, both in terms of technology and sustainability to increase the emotional desire for the vehicle type. The website will inform in a clear way the comparison between L2W-EVs and alternative means of transportation, to reduce the uncertainty in the purchase decision, whether it is lesser or greater than the current alternative. The focus should lie on the long term usage, rather than the short. It is marketed as a choice for commuting in suburban and urban areas, and not as an all-around vehicle such as the car.

Discussion

This chapter a discussion of the project is presented, divided into five areas, user test, financial aspects, sustainability, regulations and societal events.

5

User test

As the results from the user testing indicate, a well functioning system seems to be desirable for the involved stakeholders. Although, the user test only simulated ideal situations where the system succeeded to deliver the intended value without delay. Therefore, its results were unable to evaluate how waiting time and conditions where no champions are available may affect the overall experience of the system. These situations have been considered, and measures to deal with them have been developed. Such as the measures to dope the system but also through system features for example the remote test ride and the influence from the viral loop The measures need to be further refined and tested from the perspective of the user and the business. It is especially relevant since there are companies currently attempting to provide similar test drive experiences and have no issue recruiting their version of champions, but still struggle to have available persons to host test rides.

Another aspect that is needed to discuss is the lack of clear separation between usability and system performance. The experience of actually doing a test ride would be very different from interacting with a prototype on a computer. The digital platform is arguably a key component in the system. Still, even if it requires substantial investments and efforts, it would be beneficial to conduct additional tests with a working prototype of the vehicle as well.

Considering how to communicate the value of L2W-EVs to customers, there is arguable extensive work to be done. The relatively high initial costs of L2W-EVs have shown to harm the perception of the vehicle type as a cost-saving alternative. And its lower top speed compared to a car also contributes to the opinion that a car is a more time-efficient means of transportation. These aspects make it essential for businesses that sell L2W-EVs to communicate the potential for cost and time-saving to attract customers. One measure to do this would be to develop an interactive tool on the website that allows people to calculate how much time and money they would save by purchasing an L2W-EV. It would also enable the company to collect data about the potential customers' current travel patterns and transportation costs which could be used to better understand the needs of the customer segment but also enable more efficient marketing efforts.

Financial aspects

The financial aspects have been considered throughout the project. Yet, it has not been done any specific calculations or projections since there were too significant uncertainties, for example, the price of the vehicle and development costs of different functions but also because the area of economics was outside the domain of available resources. Although a potential, fast and cost-effective method for additional testing of the economic sustainability of the system would be to make a statistical simulation of the system. This would allow to test different strategies regarding spendings on champion rewards and doping the system without significant investments. Such a model could also be used with more reliable metrics from the system after the business has been launched to support strategic decisions.

A share of profits generated by the cost-effective tinkerer strategy would likely need to be dedicated to warranty issues resulting from repairs performed with lacking quality. If the tinkerers are held responsible for covering the costs of such situations, it would arguably be less appealing for persons to become tinkers. Therefore, the company would most likely need to cover such costs. The frequency of such warranty issues might also be increased since the tinkerers will have less certification and formal training compared to traditional maintenance providers. The repair guides need to be designed in a way that decreases the risk of misinterpretation or faulty execution of the instructions and also incorporates elements of quality control into the procedure. Another measure would be to use an internal system that directs requests for complex and demanding tasks to the most experienced tinkers with a good track record of successful repairs.

Sustainability

Using vehicles that are designed for distances where walking is not a viable alternative will arguably decrease the negative sustainability effects providers of electric scooter services are causing by replacing walking rather than the use of other less sustainable vehicles. Also, MaaS is often promoted as a more sustainable alternative to private vehicle ownership, although the electric scooter services show that this is not necessarily true since their vehicles break down frequently. A well maintained

and privately owned vehicle may very well be favourable from a sustainability perspective, but it is needed to conduct further studies to be able to draw any conclusions. Having a business model that is competitive by using resources more efficiently than its competitors will also facilitate improved sustainability since efforts to improve sustainability have been aligned with the business mission.

The Tinkerer component may facilitate a more sustainable attitude towards consumption since it encourages, and to some extent, educates users in the practice of maintaining one's possessions. The assistance from the problem diagnosis protocol and the repair guides lower the barriers for the owner to take better care of the vehicle and prolong its product lifetime. It also communicates that maintenance and taking care of one's possession are practices that anyone can do which is positive from a sustainability perspective. Considering potential backlashes of this would be that the total number of tools would be increased since more people will own their own set although that effect could be decreased by implementing a system for sharing tools between vehicle owners through the digital platform. Another aspect is that less experienced persons will do a larger part of the repairs, which potentially could lead to that repairs are needed more often.

When it comes to the working condition of the persons who provide test rides and repair services, there are a number of ethical aspects that need to be considered. First, the salespersons and mechanics that may be affected by this particular business is not an isolated occurrence. The job market is constantly changing, and new technology continuously makes some professions obsolete while creating new types of jobs. Policies to deal with this rapidly changing job market needs to be decided by the democratically elected politicians and not companies. With that being said, it is crucial to emphasize that being a champion is having a hobby that allows you to earn some extra cash from time to time. It is not intended to be a person's profession or main source of income. The system is not designed or able to provide the champion with the same benefits as an employer would, such as paid sick leave, vacations, retirement savings to name some.

Regulations

As mentioned earlier, the plan is to be able to launch this business in different countries. Since the hosting of test drives and assisting in repairing broken vehicles in exchange for some payment could arguably be considered as work, there is a need to comply with regulatory frameworks regarding employment and taxes.

Acquiring new customers is expensive, and by offering a partnership with insurance providers, they can enable safer test rides in exchange for direct access to potential new customers. If the vehicle is purchased after the test drive, contact with a potentially high-value customer has already been established. The ability to collect data from the vehicles arguably also allows better predictability and lowered risks for the insurance provider. Existing regulations regarding insurance in different countries will most likely have a significant impact on which countries are suitable to launch the service.

Societal events

The mobility trends are continually changing and may be heavily influenced by isolated events that could not have been foreseen before they occurred. The subjects discussed below might be rather speculative and are included in the discussion due to their potential impact on electromobility. During the period of the thesis, Covid-19 pandemic had a tremendous impact on societies all over the world. It may accelerate the transition to new attitudes towards mobility.

Forced behaviour changes in personal transportation have been shown to have an impact on behaviour after the forcing factor has been removed (Moser, 2018). When a mode of transportation becomes available after a period of it being shut down or undesirable, fewer people tend to transfer back to it compared to before it became unavailable. The realization of the possibility that public transportation may suddenly be shut down or become unsafe to use, due to events such as the Covid-19 pandemic may lead to an increased number of people that do not want to be entirely dependent on public transportation. Compared to a car, public transport has many advantages such as the cost, environmental aspects, avoiding congestion, and no need to find parking. Some of these advantages are also pres-

ent when comparing the car to a light two-wheeled electric vehicle. It can be argued that a share of the persons that use public transportation today may want to keep one or several of these advantages if considering to replace or complement public transit as a means of transportation.

In general, the battery of a light two-wheeled electric vehicle has significantly larger capacity compared to an electric bicycle, allowing the vehicle to cover daily uses without charging. This may become a more critical advantage since a series of fires being caused by electric bicycle batteries that ignite when being loaded inside the buildings (Locum, 2020; SVT, 2018). This may lead to workplaces banning the employees from charging their bicycle batteries during the workdays. This is an issue mainly related to the low-quality batteries which are allowed to be used in electric bicycles since they do not require as strict certification as more powerful vehicles to be approved on the market.

Conclusions

6

Conclusions

Different means of transportation suits better in some situations than others. No alternative is better than all other options in all conditions. Still, for a suburban and urban commuter, the L2W-EV is an excellent choice. As urban transport, it is as fast as the car and is more cost-efficient. It can be used for several days before needing to be charged, in normal commuting conditions of 40 kilometres per day. It goes faster than E-bikes and does not require physical effort. The drivers for the L2W-EVs are many, increased flexibility, cost-efficient, environmental benefits.

However, the barriers are that they are perceived to be expensive since the customer fails to see the whole picture. Another obstacle is that they consider class AM mopeds to be uncool while class A motorcycles are perceived to be inherently dangerous. Its emotional appeal and symbolic values will likely drive the adoption of L2W-EVs. Therefore there is a need to rebrand the vehicle. By reducing the focus on the classification and naming it a light two-wheeled electric vehicle, the focus should be shifted from its classifications to a new means of transportation. Another barrier is the perceived risk for oneself and lousy weather. Therefore an implementation of international markets where the legislation and culture of two-wheeled vehicles are different would be preferred. This is possible since the business model is scalable to enter new markets.

The market of L2W-EVs is growing, and many companies are trying to or have already entered the market. Yet, there is no established market division between dominating companies. The Techno Creative made the decision to abandon the initial plan to manufacture and sell an L2W-EV and instead offer already existing manufacturers to purchase the business model, become a supplier of IoT hardware and software, as a service. It was a logical step since it is more in line with their existing competence and capabilities.

Even if existing bikers are the most open for the L2W-EV, they might not be the best to target. For the company to reach the new customer, they need them to try the vehicle. The vehicle must be sufficiently good enough to reach the customer expectations. Since most individuals will not adopt new technology without being able to try it first, this means that removing the professional salesperson from the purchase experience and instead use the test drives, is the way to go for brands to reach new customers. The system with Champions is a system based on facilitating ad hoc value exchanges. Mechanisms are needed to reduce the imbalance between the demand for service and the desire to provide such services. Therefore it should be doped by a catalysator, e.g. the Van or the Hub and hire persons to do Champion activities for a limited period.

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Appendix

A

Appendix I - Interview template

General information

1. Age?
2. Gender?
3. Occupation?
4. B license?
5. A license?
6. Number of vehicles in the household
7. What type of vehicles? Model, year, size
8. Number of persons in the household
9. Age of them

Transportations

1. A regular working day, where do you move around? (pin or draglines)
2. Where do you live?
3. What kind of accommodation? apartment /house
4. Where do you work?
5. Do you stop anywhere else? (friends, groceries, exercise)
6. How did you get there? (consider all four seasons)
7. Do any problems occur during the transportation?
8. Why do you think you use that transportation?
9. On spare time, holidays and weekends, what do you do?
10. How do you transport yourself to that hobby?
11. Why do you use that transportation?
12. How much do you perceive to spend on transportation today
13. Time and Money
14. Is there any "problems" along the way? (I thinking waiting lines, parking, missed buss, rainy when biking, costly)
15. Would you consider another means of transportation? (if yes, what kind of transportation?)
16. If you would come up with a new way of transportation, what would that look like?

Motorcycles

1. If the person is driving the MC to work
2. How do you think of driving MC to work? Why do you choose it?
3. Do you use it for daily affairs? Why do you choose it?
4. There are people who drive the MC to work, how do you look at it?
5. Would you be able to see yourself riding a motorcycle for your daily business?
6. Why / why not?
7. There are also people who go moped to work,
8. Why do you think the person chooses to drive a moped for daily affairs?
9. Why do you think other people choose not to ride a moped for their daily affairs?
10. Now I will give you some general pros and cons for motorcycles as well as mopeds. So I wonder how you think about these if they are right if that is what makes you want to ride a motorcycle or not. This applies mainly to the use of daily commuting and matters.
11. How do you look at the following benefits of MC, (or moped?)?
12. Lower cost
13. No congestion tax (shit in it)
14. Can park in more places
15. Can get past queues
16. Would you say there is some more benefit? Which and why?
17. How do you see the following disadvantages of MC?

18. Must get MC card
19. Limited packaging possibilities
20. Can only go two
21. Weather Resistance
22. Security
23. Would you say that there is some more disadvantage? Which and why?
24. In your case, what would have been most likely for you to start riding a moped or motorcycle
25. Why / why not?

Electric vehicles

1. Have you been in contact with electric vehicles before?
2. If so, how?
3. What is your opinion about electric vehicles?
4. Cool, environmentally conscious, future,
5. Would you be able to see yourself owning an electric vehicle?
6. If you already own one, why do you own one?
7. Would you like to own an electric motorcycle? Show picture of MC
8. Why / why not?
9. What would be needed if you wanted to own an electric motorcycle?
10. Feedback on how many cars are in the household.
11. Would you imagine that instead of having two cars in the household, having an electric motorcycle and a car?
12. Why / why not?
13. What would you need to say yes?
14. If so, what would you use the motorcycle for?

Internet of things (IoT)

IoT is all things that we today call "smart", e.g. Phones, refrigerators, cars. With the help of IoT, we can connect different products, in this case, an electric motorcycle. In our project, we will look at how to get people to choose an electric motorcycle instead of driving, using an IoT platform. To get the most out of this, we want you to think freely and openly.

1. Among other things, IoT enables new ways of owning or accessing products, for example. Shared ownership in e.g. neighbouring area, subscriptions, pay-and-go (for example, as a controller and Voi / Tires). (Assuming you have an MC card :) I will now present three different ways to own a Connected Electric Motorcycle and ask follow-up questions for each.
2. How do you look at paying to subscribe to the service to access a motorcycle? E.g. MC pool like Sunfleet, control and rack or Voi,
3. What do you see the advantages/disadvantages of it?
4. Full-year / part-time?
5. Fixed price or pay to use or intermediate?
6. What makes you / does not make you want to use it?
7. How do you see that you would eg get deductions or points for recruiting new people to join the "Pool"?
8. What do you think should be included in such a subscription? (Prior arrangement, ability to terminate at any time, insurance etc)
9. How do you see that you would have common ownership of the motorcycle?
10. What do you see the advantages/disadvantages of it?
11. Who would you like to share ownership with?
12. Geographical boundaries or relationships? (type brf)
13. What makes you / does not make you want to use it?
14. How do you see having conventional ownership of an MC, i.e. you have sole ownership of that particu-

lar MC?

15. Would you like to lease or pay right away?
16. Why / why not?
17. What do you see the advantages/disadvantages of it?
18. Let's say you own or have access to a connected Mc. Which of the following things would you like to be able to do yourself, and which ones would you like to pay for? Why not why?
19. Minor repairs, such as replacing a broken lamp.
20. Replace mechanical components when worn/broken.
21. Upgrade or modify the motorcycle, e.g. Other lamps, packing possibilities, larger / smaller battery, extra battery, charging station
22. Maintenance of the vehicle, e.g. Laundry,
23. One more question if it feels okay: Now we have gone through some things that IoT can help with current electric motorcycles. Are there any additional features that you think should exist or would like to see?
24. Is there anything you would like to add to this interview?

Appendix II - Survey template

This survey is a part of a master thesis project in industrial design engineering at Chalmers University of Technology. The survey is short and is completely anonymous.

Thank you for your contribution!

How old are you?
- 17 years or younger
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 - 54 years
- 55 - 64 years
- 65 years or older

Which country do you live in?

In which city to do you live?

What is your monthly income before tax? (10 SEK = 1 Euro)
- 15’000 SEK or lower
- 15’000 - 20’000 SEK
- 20’000 - 25’000 SEK
- 25’000 - 30’000 SEK
- 30’000 - 35’000 SEK
- 35’000 - 40’000 SEK
- 40’000 - 45’000 SEK
- 45’000 - 50’000 SEK
- 50’000 - 55’000 SEK
- 55’000 - 60’000 SEK
- 60’000 SEK or higher

Gender
- Male
- Female

How many people are there in your household?
- Only me
- 2
- 3
- 4
- 5

How many vehicles are there in your household?
- Cars
- Motorcycles
- Mopeds
- E-bikes

What is your occupation?

How much time do you spend commuting in total on an average day?
- up to 20 minutes in total
- 20 to 40 minutes in total
- 40 to 60 minutes in total
- 60 to 90 minutes in total
- over 90 minutes in total

What type of driving licence do you have?
- A (heavy motorcycle)

- A1 (Light motorcycle)
- A2 (middle weight motorcycle)
- AM (moped)
- B (car)

What is your highest degree of education?

- High school / Gymnasium
- Post secondary (College / University)
- Vocational education (sv. Yrkeshögskola)

How interested are you in technology?

- 1 - Not at all
- 2
- 3
- 4
- 5 - Very much

How interested are you in new vehicles? Such as cars, motorcycles and mopeds

- 1 - Not at all
- 2
- 3
- 4
- 5 - Very much

What is your most common mean of transportation in daily commuting?

- Car
- Motorcycle
- E-bike
- Bike
- Buss/tram

Would you be interested in driving an electric motorcycle to work?

- Yes
- No

Why / why not? (please elaborate)

If you answer no, what would make you change your mind?

Would you be interested in driving an electric moped to work?

- Yes
- No

Why / why not? (please elaborate)

If you answer no, what would make you change your mind?

Would you be interested in accessing an electric moped from a station placed at your workplace?

- Yes
- No

Why / why not? (please elaborate)

Appendix III - User test template

Nice that you wanted to come and do our test. What you should do today is to help us evaluate a concept of an alternative business model for a connected two-wheeled electric vehicle, from the perspective of first-time users. What you will primarily value are the business models themselves and the service, not the design or user-friendliness of the app. There will be some problems with the prototype. But dare to be critical. We do this because we want the most true experience possible.

The plan will be that we give you a scenario, you will then get to interact with our prototype, do some information and then I will ask some questions. I might even stop you during the test to ask you questions.

But first, you have to answer some general questions about yourself

General questions
- Age
- Sex
- Profession
- Driving license

How handy the person is:
1 to 5

Have you tested a vehicle before making a purchase?

Technical skills, looking up information online, using new apps etc.
1 to 5

Choice of theme / vehicle
Then you have to look at these pictures and choose the vehicle that appeals to you most, in order to make it as realistic as possible. Most importantly, what you think, we would like you to say straight. That's Thinking out Loud.

Test number 1 - New users
Scenario
You are stuck in a car queue on the way home from work in town. It is the third time this week and you are starting to get a little less tired. Suddenly, it passes a FreeRide on the street and easily passes the queue. You think, could this be something to me maybe?

After a few days you will hear from your colleague at work about a new brand in electric two-wheeled vehicles, it is electric and is perfect for a commuter, just like you. You ask the colleague a little about the mark and he / she tells that he / she was on a test run at a so-called. Champion, apparently a person working for the brand. The colleague encourages you to check it out. Once back home, you decide to have a look at the FreeRide website.Your first task is to look around a little on the website and look for some information about the motorcycle and test driving of the vehicle.

When the test is complete
Have you bought a moped / motorcycle?
Why / why not?
How would you easily explain that the system works?
What do you think about the arrangement?
Do you understand the Champions program?
Do you think it is a good, bad or indifferent way compared to conventional ways?

What makes you think so?
Did you understand the instructions before booking a test drive?
What did you think of the arrangement?
When you chose Champion, what did you choose from the outside?
What would you like to be able to choose by which order?
Availability, length, gender, number of test rides, image, remote / guided test
What would you prefer for testing and why? (Remote and Guided)
What made you choose one or the other?
Iom remote test ride, you got to "watch videos" as instructions.
Assuming there are enough well-made videos: Did this feel good or bad?
When you did your test ride:
Are there any features missing?
Any other opinions?
When you were inside My Progress
Did you get the taste of buying a vehicle or did it feel like an unnecessary hurt?
Other opinions about the program?

Test Number 2 - Champion Guide
Scenario
You have now bought a FreeRide, used it for a couple of months and have some thoughts on becoming a Champion and want to know more about it. You open the app.

How did you experience the Champions function?
Did you understand how the Champions system worked?
Do you like it? Why not why?
What parts of the Champions section are you interested in continuing with?
Would you like to test drive?
Remote or Guided?
What is the least you could think of to do it for?
Does the system feel secure enough to hold a remote test?
What is needed to make you feel even safer?
Does it give you the taste to do more tests by using the scoring system?

Test number 3 - Troubleshooting and repair of own vehicle
Scenario
You have had the motorcycle for a while, and you begin to notice that it is not as "easy" to turn, sometimes you hear a rattling sound in the front wheel. You decide to do something about it and open the app.

What do you think about being able to troubleshoot and get digital repair instructions?
What do you need to feel comfortable doing it yourself?
Do you see any benefits in repairing your vehicle yourself?
Do you see any benefits of following an official guide to repair your vehicle?
Do you see any disadvantages of doing it yourself?
How do they prefer to get instructions? For example, Text, images, video, audio
How was the experience in general?
Did you think you received enough information to make an informed decision?
Why / why not?
Did you think you received enough information to trust the tinker who answered?
Why / why not?

Test number 4 - Get the inquiry and fix someone else's vehicle
Scenario
You have signed up to receive requests when there is an opportunity to perform repairs nearby, and you have received a note from FreeRide when you open your phone. You open the app:

Has this been something that you would like to do for real?
Why? Why not?
What was the driving force?
Would you prefer to be able to perform repairs once in a while and get paid a lot or would you prefer to make repairs more continuous and less compensation?
Would you be more comfortable performing a repair by following official instructions?
Would you like to make a repair for someone else you have previously done on your own vehicle?
If you still needed to repair your own vehicle, would you be more inclined to fix someone else's at the same time for compensation?
Want the community piece at the same time.