The Connected Automotive Future

An innovation strategy for LeasePlan

How the connected vehicle enables acceleration in the zero emission fleet transition

Master thesis, May 2019
By Claire den Boer

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The Connected Automotive Future: An innovation strategy for LeasePlan

Combining Road Mapping and Design Thinking activities to help LeasePlan prepare for the connected automotive future

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With this thesis I finalise my Master Strategic Product Design at the faculty of Industrial Design Engineering from Delft University of Technology. A master in which I experienced great challenges, great joy and where I met great people. I had the privilege to execute this project in collaboration with LeasePlan Digital. I am honoured that LeasePlan gave me the opportunity to explore the future of mobility at the SXSW Conference and Festival in Austin Texas, by being part of the winning team of the autonomous vehicle design hackathon, one year ago. This experience greatly inspired me to start my thesis in this field of study, with the interesting point of view from a leading lease company. I am proud to present my thesis after 6 months of extensive research and design, but first I would like to show my acknowledgements for the many people that helped me throughout my thesis.

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Enjoy reading!

Yours sincerely,

Claire den Boer
Executive Summary

This thesis proposes an innovation strategy to leverage the potential of connected vehicles for the fleet of LeasePlan, the global leader in automobile leasing and fleet management. This strategy has been developed through an extensive analysis of the internal environment, customer trends, industry developments, and emerging technologies in combination with Design Thinking and Roadmapping activities. It provides a set of solutions where the connected vehicle is believed to create the biggest impact for LeasePlan’s business, its market position and in meeting its ambition to shift towards a zero emission fleet by 2030.

The automotive industry is at the beginning of a transition in response to the Paris Agreement and with ever greater demands in society for cleaner mobility. At the same time, the Internet of Things is one of the leading trends that is expected to rapidly transform the automotive industry, by introducing the connected vehicle. With LeasePlan’s total fleet of 1.8 million vehicles and soon a comparable amount of private charge points, LeasePlan has a significant influence on the development of sustainable transport systems. LeasePlan sees the growing request from its clients for expertise and guidance within fleet electrification. Clients try to find solutions to meet the rapidly increasing demand for charge infrastructure and to reach cost and footprint optimisation, while drivers deal with the inconveniences around electric driving.

This study has identified how LeasePlan can use the connected vehicle to provide clients support in the zero emission transition and to deliver a desirable electric vehicle driver experience. The resulting strategy consists of the following four main elements, recommending LeasePlan to:

- **Provide Parking Support and Priority Load Balancing** in the near term to increase efficient chargepoint occupation, to enhance efficient usage of charge capacity and to accommodate tailored advice on infrastructure expansion based on the real fleet behaviour. With Parking Support, drivers will be supported in their charge and park plan to enable fair chargepoint sharing. With Priority Load Balancing, smart capacity division increases charge flexibility for the fleet. This all results in minimum infrastructure investment for clients.

- **Introduce Smart Charging** in the second term for further reduction of the carbon footprint and energy costs for both clients and drivers by: automatically altered charging sessions and guidance for the driver to charge during the moments when the most green electricity is available and when the energy prices are low.

- **Develop a car-sharing system for a Connected & Electric Shared Pool**, in the third term to realise optimal fleet efficiency, to create cost optimisation and to contribute to livable and cleaner urban areas.

- **Utilise the lease fleet to store renewable energy** in the longer term. This realises energy self-sufficient offices and this brings profit for the customer when he plays with the fluctuations in energy prices during energy storage, while he contributes to the broader zero emission transition of its neighbourhood, region or even country.

The strategy is presented in the format of a roadmap and the short term solutions are further conceptualized. The next steps for LeasePlan within each element are: further identify the market potential and monetary value, establish a profitable revenue model, build the partnerships and start the test and pilot phase to improve the design interaction.

With this innovation strategy, LeasePlan becomes the reliable zero emission fleet accelerator, who takes the responsibility to contribute to a healthier environment and cleaner cities, while occupying a unique market position with its own expertise in fleet electrification, with the focus on its clients’ fleets and with the connected vehicle as its asset.
Abbreviations
LP   -   LeasePlan
LPD   -   LeasePlan Digital
LPNL   -   LeasePlan Nederland
LPCorp   -   LeasePlan Corporation
CV   -   Connected Vehicle
EV   -   Electric Vehicle
IoT   -   Internet of Things
CaaS   -   Car as a Service
MaaS   -   Mobility as a Service
SME   -   Small to Medium sized Enterprise
RMT   -   Repair Maintenance Tyres
OEM   -   Original Equipment Manufacturer
API   -   Application Program Interface

Text box

>> [ For the fast readers ]

Text in this blue box represents a summary with the main conclusions from that chapter.
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Introduction

Introducing the master thesis' topic and approach
This chapter gives an introduction to the thesis context, scope, problem, deliverables and approach.

In this chapter:

1.1 Project introduction
1.1.1 Project context
1.1.2 Problem introduction
1.1.3 Project deliverables
1.1.4 Project approach
The automotive industry rapidly evolves towards a future where cars are electric, autonomous and fully connected to the internet and its surroundings. Moreover, in this future new car ownership and sharing models will dominate. PWC (2018) presents ‘EASCY’, that summarises the five leading trends that will transform the automotive industry: Electrified, Autonomous, Shared, Connected and Yearly updated. Deloitte identifies another leading trend, ‘Mobility-as-a-service’ (MaaS), where the car becomes just one component of the seamless mobility experience (NRC, 2018). These developments are fuelled by the user’s increasing expectations, the change in user needs and by emerging technologies (PWC, 2018).

This thesis focuses on the connected automotive future: The Internet of Things (IoT) makes its entrance in the automotive industry, where vehicles become ‘connected devices on wheels’ (Riccardo & Morisio, 2016). This means that vehicles become remotely accessible and can be remotely monitored and controlled via a network connection (PWC, 2016). The ‘connected vehicle’ is equipped with numerous sensors, network connectivity, software and compute intelligence. In this way, the connected vehicle can exchange data over the internet with clouds, servers, other connected vehicles and other connected devices (PWC, 2016) (Riccardo & Morisio, 2016).

The connected vehicle (CV) promises to bring numerous benefits: for safety, like car crash prevention, for efficiency, like the decrease of traffic jams, for sustainability, like stimulating the ideal driving behaviour with minimum impact, and for personalisation, like infotainment and ambience adjustments by automatic driver identification. The CV can also contribute to the development of autonomous driving, because the vehicle can make better decisions based on the data it collected from its surroundings, than just relying on the sensor data. Moreover, vehicle connectivity can enable the creation of optimal charge plans for electric vehicles, by the collection and exchange of traffic data, charge infrastructure availability data and the vehicle’s data. The CV can also become an enabler for seamless mobility experiences, where optimal travel plans are created by the data exchange from the several modes of transport and traffic conditions. Additionally, the CV is crucial for car sharing to track the vehicle’s location, availability and status and to enable keyless car access. (Riccardo & Morisio, 2016)

Currently many premium car models, for example from the car manufacturers Tesla, Audi and BMW*, are connected and offer applications for driver personalisation and convenience.

This thesis is an assignment for the lease company LeasePlan (LP): the global leader in Car as a Service (CaaS), established in 32 countries from 5 continents, with a total fleet of 1.8 million cars with private, small and medium-sized enterprises (SME’s), corporates and service mobility providers as their customer segments (LeasePlan Annual Report, 2018). The connected vehicle might help LP to realise its strategy in becoming a fully digital enabled business with more customer engagement, the leader in the latest mobility trends and the leader in providing services to the ride-hailing industry, and to achieve its several sustainability targets (LeasePlan Annual Report, 2018). Which opportunities the CV exactly brings to LP’s business and product offer, are researched in this thesis.

* See the company websites of Tesla, Audi and BMW.
1.1.2 Problem introduction

Although the CV has the potential to bring opportunities for LP, also threats are on the lookout. LP’s competitive landscape might change, with the entrance of new parties that will offer new services around the CV and existing parties that might change their product and service offer (KPMG, 2017). All these players are looking for new services, business models and positions. Since the CV is one of the leading trends which rapidly evolves the automotive industry, it is important for LP to create a clear view on: The benefits the CV will bring to LP’s competitors, stakeholders and other players in the industry; How the roles of the industry players will change; How LP’s position in the industry might change. In this way, LP can create insight in how it can obtain a favourable position in the market to distinguish itself from competitors. Currently, a clear view for LP about the above mentioned elements is missing.

Despite of CV technology being one of the leading trends, also other factors are transforming the automotive industry. What can be concluded from the previous paragraph, is that the CV is also the enabler for other trends and can greatly collaborate with other technologies. The CV will probably not be a stand-alone concept in the automotive future. All trends and technologies influences the future of mobility and the CV will be one of the enablers. It is important for LP to also incorporate other factors when envisioning the impact of the CV. These are other emerging technologies, but also changes in needs, values and desires of the customer. Will LP’s current lease product and service offer still meet the future needs of their customers? How can the CV bring value to the customer to meet their current and future needs? Currently, a clear view on how LP will create value for the customer, with the use of the CV, is lacking. How can LP make use of the CV? What product and services can LP offer with the CV to create value to its customers and business?

For LP to explore promising opportunities, it is important to take into account what comes across with the development of new products and services with the use of the CV. What internal steps does LP need to take and what needs to be acquired? How can LP acquire these resources, capabilities or knowledge? In what way can LP create valuable partnerships and valuable interactions with their stakeholders and suppliers to acquire what is needed?

The problem addressed in thesis is about the fact that for most of these questions, LP is missing a clear view on the answers. Because the CV will play a dominant role in the automotive and mobility future, these answers are becoming more and more relevant for LP. Therefore, this thesis will provide answers to the following research questions:

- What opportunities and threats are there for LP within the connected automotive future?
- What new products and services could LP offer to create value for the customer within the connected automotive future?
- What favourable position could LP take in the connected automotive future to create competitive advantage?
- How can LP realise this innovation strategy where they obtain a new market position and offer new products and services?

1.1.3 Project deliverables

In this thesis an innovation strategy is designed for LP, where LP delivers value for their customers and business and obtains a favourable competitive position in the connected automotive future, with a new product and service offer. The delivered innovation strategy consists of the following:

1) A vision, a preferable future state of LP within the connected automotive future, where LP delivers value to its customer and business and obtains a favourable position in the industry. 2) Valuable product and service solutions LP should offer to its customers to realise the vision, mapped over several innovation horizons. 3) Process and business model solutions for LP mapped over time. This also consists of internal steps like design, research and development. Besides, it consists of the external steps where LP establishes valuable collaborations with parties to acquire the needed knowledge, resources and capabilities.

The innovation strategy is summarised in a visualised strategic and tactical roadmap. The tactical roadmap provides more detailed information for internal usage. The strategic roadmap provides more visualisation of the service solutions and can be used for the communication to stakeholders.

To ensure the start of the implementation of this strategy within LP, the short term service solutions are further conceptualised and validated. The closest possible steps for the implementation of the service solutions are further determined, so it can be picked up by any of the LP digital tribes to build a Proof of Concept.
1.1.4 Project approach

The project’s approach is based on the Double Diamond Design Process (Design Council, 2015), the Design Roadmapping process by L.W.L. Simonse (2018) and several Design Thinking activities [Vianna et al., 2012]. It is a designerly approach with user-centered research and design, co-creation with the problem owner LeasePlan, visualisation, diverging and converging phases and with several iteration loops.

The first design phase of this thesis is the diverging ‘Discover’ phase (based on the Double Diamond Design Process). During this phase, LP’s external and internal environment were researched and insights were created. First, the CV’s definition, benefits, technology and development were discovered by literature and desktop research. Second, LP’s business, organisation, products and strategy were analyzed. Besides LP’s needs within the connected automotive future were determined. These insights were created by observations, informal interviews with LP employees and desktop research. Third, the current and future customer needs were researched by desktop trend research, qualitative interviews and a focus group session. Fourth, other emerging technologies were discovered and analyzed by their impact on LP’s future and were executed by desktop and literature research. Last, LP’s competitors and stakeholders were analyzed and other developments in the industry were discovered. This was done by expert qualitative interviews, literature research and desktop research.

The second design phase is the converging ‘Define’ phase. Here the main insights from the discover phase were brought together for analysis and synthesis. Opportunity areas for LP within the connected automotive future were mapped, during a SWOT analysis and a facilitated co-creative session with LPD employees. From there, four opportunity directions were designed and only the most promising direction was chosen to continue the design process with. Finally, a future vision and a clear design direction were created, that served as a base for ideation, concept development and concept evaluation.

The third design phase is the diverging ‘Develop’ phase. In this phase, ideas for new product, service, business or process solutions were generated. This was done in an iterative manner, by the facilitation of a co-creative brainstorm session, individual brainstorming and doing additional research like informal interviews, desktop and literature research. The chosen ideas were shaped into concepts and the business model solutions were designed per concept. The final concepts were roughly put in time horizons, to already establish a base for the roadmapping activity in the final phase.

The fourth and final design phase is the converging ‘Deliver’ phase. In this phase the final innovation strategy was created by the use of the Design Roadmapping methodology. The concepts were placed into innovation horizons and

![Figure 1: The project’s process based on the Double Diamond Design Process](image-url)
1.1 Project introduction

timeframes. This roadmapping activity was based on individual iteration loops with the discovered insights and additional research like informal interviews and desktop and literature research. Then, the short term concepts in the innovation strategy were further conceptualised: the service interaction, the service blueprint and the service implementation were further determined. Finally, the short term concepts and the innovation strategy were validated with users and internally with LP employees.

See figure 1 for an overview of the project’s approach. The chapters of this thesis are divided in the several phases of the Double Diamond Design Process were the project’s approach is based on: Discover, Define, Develop and Deliver. Each chapter shows the results of that phase.

>> Project Introduction

>> Context

This thesis focuses on the connected vehicle (CV), that is one of the leading trends that will transform the automotive industry. The CV can exchange data over the internet with cloud servers, connected devices and other connected vehicles. Besides, the CV is remotely accessible and can be remotely monitored or controlled. The CV promises to bring several benefits from safety to convenience and it contributes to the development of other leading trends like autonomous vehicles, electric vehicles, car sharing and mobility-as-a-service.

>> Assignment

This thesis is an assignment for the lease company LeasePlan (LP), the global leader in Car as a Service that is established in 32 countries and that has a total fleet of 1.8 million vehicles. This thesis will provide the answers to the following research questions: 1) What opportunities and threats are there for LP within the connected automotive future? 2) What new products and services could LP offer to create value for the customer within the connected automotive future? 3) What favourable position could LP take in the connected automotive future to create competitive advantage? 4) How can LP realise this innovation strategy where they obtain a new market position and offer new products and services? The deliverables of this thesis are: 1) an innovation strategy for LP which consists of a future vision and product, service, process and business model solutions in the short and long term, 2) detailed short term concepts with its service interaction, blueprint and implementation.

>> Approach

This thesis has a designerly approach and is based on the Double Diamond Design Process, the Design Roadmapping Process and Design Thinking activities. The chapters of this thesis are divided in the phases of the Double diamond, where the project’s approach was based on: Discover, Define, Develop and Deliver: 1) the Discover chapter presents the research and analysis phase, 2) the Define chapter presents the synthesis phase where the design direction is determined, 3) the Develop phase presents the concept generation and 4) the deliver phase presents the final innovation strategy and the detailed concepts.
Discover
Discovering the developments in LP’s internal and external environment
This chapter gives an overview of the internal and external developments that will play an important role in LP’s future. It describes the definition, benefits, technology and developments of the CV. Besides, it gives an extensive introduction to LP’s internal landscape. Lastly, it identifies important trends and developments within the target market, technology landscape and industry.

In this chapter:

2.1 The connected vehicle
2.2 LeasePlan
2.3 The customer
2.4 Emerging technologies
2.5 The industry
2.1 The connected vehicle

This subchapter presents the CV with its features, general benefits, technology and its development, to be able to explore the opportunities of the CV for LP.

2.1.1 The definition

The connected vehicle (CV) is able to make an internet connection and can be equipped to connect with wireless local area networks (WLAN), to exchange data (Kim et al., 2017).

With vehicle-to-internet communication (V2I), the vehicle can communicate with:
- smart devices (Vehicle-to-device, V2D), to exchange data with the smartphone, iPad etc. other connected vehicles (vehicle-to-vehicle, V2V), to exchange data about the vehicle’s location, speed, status and driver behaviour etc.
- smart infrastructure (vehicle-to-road-infrastructure, V2R), to exchange data with traffic lights, bridges, roadside sensors, toll checkers etc.
- clouds and servers (vehicle-to-cloud, V2C), to for example send data about the vehicle or to receive information from external databases (like weather conditions and traffic information).

This means that the Internet of Things is reaching the automotive industry (Riccardo, & Morisio, 2016). Though, with WLAN’s the vehicle is also able to create a direct data exchange with nearby devices, vehicles and infrastructure, which are mostly used for time critical safety situations (SFB Consulting LLC, 2018).

The collective name of the whole set of communication is called vehicle-to-everything communication (V2X) (Riccardo, & Morisio, 2016).

The basic functionality of the CV is that it can send data about the vehicles status. See figure 2 to get an idea about the data that can be collected. A second functionality of the CV is that the vehicle can be remotely controlled. This entails that from a distance car settings can be changed, like unlocking a door or turn on the air conditioner, and maybe in a future stage more controlling can be possible. A third functionality is that it can receive data from devices, servers, clouds, vehicles, infrastructure and more. The vehicle can communicate this information (via the car’s dashboard) to the driver, to inform him. In case the vehicle has a certain level of autonomy and intelligence, it can intervene in the driving behaviour by helping with braking or steering. (Riccardo, & Morisio, 2016) (KPMG, 2017).

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[Figure 2: Vehicle-to-everything communication visualised]

*Van Wijnen, 2019 [Informal interview with LP’s Digital telematics Lead Evandro Patricio, January 2019] [KPMG, 2017]
2.1 The connected vehicle

The CV promises to bring a lot of benefits. See here a glimpse of several use cases, to give an idea of the impact of this development in general.

Safety
By collecting data about the driver’s behaviour, unsafe driving behaviour can be detected, like hard braking, fast acceleration or crossing a red light. In this case, the vehicle can confront the driver with the behaviour and can coach him to drive more safely (Riccardo, & Morisio, 2016). By collecting data about the vehicle’s performance, an in-vehicle error can be detected earlier and an accident due to for example a malfunctioning brake can be prevented, by on time maintenance. If the vehicle allows more levels of autonomy, the vehicle can also actively assist with driving, with several advanced driving assistance systems (ADAS) like collision warning, night vision and blind spot warning and more (SFB Consulting LLC, 2018). With V2V and V2R, vehicles can immediately be informed about the situation on the road and act upon it, to prevent car crashes. For example, when the vehicle in front is suddenly braking or when you are heading towards a red traffic light or road obstacle, your own vehicle will directly adjust its speed and direction. Besides, the CV can bring several solutions for aftercare services, where based on the information gathered of the situation, the right emergency services can be directly informed after an accident (Riccardo, & Morisio, 2016). Furthermore, car manufacturers can learn from the data about the car performance in several situations, to make the newest models even safer. Moreover, the governmental road authority can also improve the road infrastructure based on the data gathered from the driver behaviour in that specific road area.

Efficiency
With V2I, V2D and V2C, an optimal travel plan can be created, based on for example real time traffic information, road and weather conditions, the driver’s agenda and the condition of the car, like the need for a fuel stop. With V2V and V2R connectivity, the vehicle and driver can be directly informed about obstacles on the road, construction sites and accidents, based on the road side infrastructure sensors or the sensors of driving behaviour of other vehicles (Riccardo, & Morisio, 2016). Besides, with V2V, the amount of traffic jams can be reduced, because cars can adopt the same speed. Moreover, with V2R communication, the vehicles can for example adapt to traffic light loops or an open bridge for an optimal traffic flow, or find the nearest and most efficient parking spot. Again the car manufacturer and the government can improve either the car’s or infrastructure performance to reach optimal efficiency. Also cost efficiency can be reached, by for example real time recommendations for the cheapest fuel station on the way, or with a usage based insurance, where the driver’s insurance is based on the actual driver’s behaviour. More efficient driving contributes to a more convenient travel but also to a more sustainable one, with the least amount of energy used. (Riccardo, & Morisio, 2016)

Personalisation & convenience
The CV can also bring several benefits for driver personalisation. The vehicle can personalise the car ambience with for example the driver’s preferred car climate, the infotainment system like music and seat position. A personalised travel plan can be created for example based on the driver’s agenda by integrating Google agenda services and Social Media networks, the user’s driving style and preference, and the mood and medical status of the driver based on the data available at the driver’s wearable devices. Also services like smart home integration and car theft prevention will be possible. (Riccardo, & Morisio, 2016)

Contribution to leading trends
With connectivity, autonomous vehicles can make better decisions, based on real time V2V and V2R communication (for example, during bad weather conditions). The CV can also contribute to a better experience with electric vehicles [EV’s], by the creation of an optimal charge plan based on the traffic, vehicle and infrastructure data and smart home integration. Besides, the CV can also enhance seamless connected travels for mobility-as-a-service: with real time traffic information and the connection to databases of other transportation systems, the optimal travel plan can be created. Furthermore, connectivity is crucial for car sharing, for keyless car access and to track the vehicle’s location, availability and status. (Riccardo, & Morisio, 2016)

Figure 3: The benefits of the CV
2.1 The connected vehicle

2.1.3 Involved technology

To enable the beneficial use cases, both connectivity technologies and data intelligence technologies are involved.

Connectivity technologies

Internet connection

Although V2I communication can be enabled by WiFi, where the WiFi hotspot is built within the vehicle or brought-in by a smart device, or where the vehicle uses WiFi hotspots on the road. However, it is mainly enabled by a cellular network (Riccardo, & Morisio, 2016) (Lu et al., 2014). Cellular networks like 3G and 4G-LTE can create a reliable internet connection. The cellular connection can either be embedded in the vehicle or brought in by the integration of certain hardware devices. With the embedded solution, the connectivity is embedded in the vehicle, by the installation of a GSM SIM during manufacturing (Riccardo, & Morisio, 2016). With the brought-in solution, a hardware device that is equipped with a SIM, is installed after the manufacturing process and it is therefore called an aftermarket device. This device connects with the CAN-Bus (Controller Area Network), which is called a CAN link, or physically connect with the On Board Diagnostics port, which is called OBD Dongle. All cars manufactured after 1996 have an On Board Diagnostic port and new models are equipped with a CAN Bus (Interview with Niels Vos, Manager Connected Car TomTom*) (Informal interview with LP’s Digital telematics Lead Evandro Patricio).

Wireless local area networks

Some of the beneficial use cases explained earlier, like car crash prevention or solving traffic jams, require a reliable and short range data exchange with a very low latency. Internet connection might not be reliable enough for this situation. Therefore, a WLAN between the vehicle and the other vehicle or roadside infrastructure, is the solution. Dedicated Short Range Communication, a WiFi based technology can be used for these time critical situations. The software and compute capability that comes with short range communication, must be embedded in the vehicle during the manufacturing process (SFB Consulting LLC, 2018) (Narla, 2013).

However, the time critical use cases are mainly important for the car manufacturers. It is likely that LP will not play a role in ADAS, to prevent car crashes or solve traffic jams. For that reason, the focus in this thesis lies in the V2I communication.

Data intelligence technologies

Data intelligence technologies are required to gather, process, analyse and act upon the vehicle’s data. Online cloud servers will be able to process and analyze big data sets with data intelligence technologies. The amount of data that comes along with the CV is already tremendous, but will probably be combined with weather, traffic, device, infrastructure and much more external data. To analyse these big data sets, big data analytics can be used. These can be: 1) descriptive analytics, where it shows what is happening, 2) diagnostic analytics, where it also shows the reason for what is happening, 3) predictive analytics, where future events are predicted with algorithms, or 4) prescriptive analytics, where the systems give advice on how to act upon the situation (Datamation, 2017).

The CV is also able to receive information. The data can be analyzed first, on an online server or in an intelligent system in the roadside infrastructure, and translated into information and send back to the vehicle. Another option is that the data is sent to the vehicle and the vehicle’s intelligent system is able to make the data analysis. Mark de Reuver** stressed the importance of both cloud computing and edge computing. With cloud computing the data is transferred to a centralised server to be analyzed, whereas edge computing systems analyze the data close to the data’s source. With edge-computing less information needs to be transmitted over the network, which brings many benefits. These edge computing system can either be placed in the vehicle or in the roadside infrastructure. Edge computing will play an important role in time critical communication (Mark de Reuver**). Since time critical communication is not interesting for LP and because LP will not be the party who will install intelligent system in the vehicle or roadside infrastructure, only cloud computing by the use of data science, algorithms and big data analytics is interesting for LP.

* See Appendix A.
** In-depth interview with Mark de Reuver, Associate Professor Faculty TPM, TU Delft, Section information and Communication Technology. See Appendix A.
2.1.4 The development

Connectivity is currently already embedded in the newest car models, which means that these technologies have already reached the maturing state. Only for time critical situations the connectivity needs to be further developed and this will mainly happen with the development of the newest cellular network 5G (Huawei, 2016). For time critical communication, more use cases are expected for ADAS, autonomous vehicles and smart cities (where traffic is highly manageable with Internet of Things) in the coming years (Huawei, 2016).

Until now, vehicle connectivity is mainly used for in-car infotainment systems, like Apple CarPlay, and Telematics, which refers to the gathering and processing of information transmitted over a network provided by telecommunication (Informal interview with LP’s Digital telematics Lead Evandro Patricio). Telematics is very important for LP and more is explained in the LeasePlan subchapter.

Although the technology for telematics is in its maturing state, not all vehicles are connected yet. Just the latest premium models are able to connect with the internet, where the embedded connectivity is installed during manufacturing. For older car models hardware needs to be installed in the car. It is very dependable on the car manufacturers whether they install the connectivity upfront. What accelerates the development of internet connected cars is the E-call. All new cars built need to be able to send their data to emergency services in order to act upon the situation (Informal interview with LP’s Digital telematics Lead Evandro Patricio) (KPMG, 2017). An interesting insight by Business Insider (2015) is that they expect that in 2020 75% of the cars built globally will be able to connect with the internet. Besides, McKinsey (2013) expects that by 2020 one out of five cars on the road will be connected to the internet. Furthermore, cars will become more smart, equipped with more and more sensors. Over the coming years, more data from these sensors can be gathered.

>> Definition

The CV is able to make an internet connection to exchange information with cloud servers, connected devices, other connected vehicles and connected roadside infrastructure. The basic functionality of the CV is collection of vehicle data. This can be real time data about the car functionality status, driving behaviour and car settings, or historical data. A second functionality is the ability for remotely controlling, where the car’s settings can be adjusted from a distance. A third functionality is that the CV can also receive data and communicates this to the driver or, when the vehicle has a certain level of autonomy, the CV can intervene in the driving activity.

>> Benefits

The CV can enable more safety by steering the driver to drive more safely, intervene in the driving activity or to directly call for the right emergency services. Besides, the CV contributes to efficiency, cost efficiency and sustainability by the reduction of traffic jams and optimal travel, fuel and parking planning. Furthermore, the CV allows the automatic personalisation of car settings, like pre-heating, pre-unlocking etc. Moreover, the CV is crucial for car sharing, for keyless access and status and location tracking. The CV also contributes to a better EV charge experience, a connected seamless travel with different modes of transport and to better decision making for autonomous vehicles.

>> Technology & development

Connectivity, by the use of cellular network via a SIM, can be embedded in the car during the manufacturing process or needs to be brought in by a device. The CV generates big data sets, dat can be analysed by the use of big data analytics. Currently, only the premium car models have embedded connectivity and older models need to make use of a brought in device. All new manufactured vehicles are expected to be connected.
2.2 LeasePlan

To create a successful innovation strategy for LP, let’s first further understand the company. This subchapter introduces LP’s products, business, strategy and current ideas and needs around the CV.

2.2.1 Introduction to LeasePlan

The lease company LeasePlan (LP) was founded in 1963 in the Netherlands and is currently operating in 32 countries in 5 continents, with a total of more than 7,000 employees. LP is the global leader in Car-as-a-Service (CaaS) with a total fleet of 1.8 million cars with private, SME’s, corporates and service mobility providers as their customer segments. Besides LP’s CaaS market for new cars, LP’s other core business is the market of CarNext.com, a marketplace for used car solutions. Additionally, there is the LeasePlan Bank to finance the investment of all the vehicles. [LeasePlan Annual Report, 2017] In this thesis the focus does not lie on the LP Bank, where customers could also open a bank account, and not on CarNext.com, because the main interest for the CV lies in the core CaaS business.

Car-as-a-Service

LP offers several leasing products from financial lease, operational lease, shortlease, occasion lease to personal lease. Financial and operational are leasing forms for companies or organisations and personal is the leasing form for private individuals. LP’s shortlease and occasion lease can be combined with the several leasing products. Financial leasing is LP’s most popular product in the US, but in the Netherlands they only offer operational lease to companies. With financial lease the client is the owner of the car, but the lease company is helping with the investment. The car will be paid off over several years and after that, the client owns the car. With operational Lease, LP owns the car and is therefore responsible for the economic risk of the car and is responsible for maintenance, repair, insurance, road-tax and more operational costs. The client can make use of the car for an agreed period and has the choice to have other operational costs (like fuel) covered, against a monthly payment. Operational lease brings several benefits for the clients: they don’t have to make a big investment at once to drive a new car, there is no financial risk since unpredictable high costs for maintenance and repair are covered in the monthly payment, they don’t have to make a financial risk for the residual value of the car, the car is not on the balance sheet and since there is a fixed price per month, the client knows what to expect. 80% of LP’s customers are corporates and 17% are SME’s.

Personal lease (also called private lease) is focused on the private individual who can use a new car for an agreed period (mostly 2-3 years) with repair maintenance and tyres (RMT), insurance and road tax, replacement vehicle, damage and glass repair, roadside assistance, deliver and pick-up services, against a monthly payment. This means that all costs can be covered except for fuel expenses. The monthly price is based on the amount of kilometers that will be driven per year, the car model, the duration of the leasing period, the services included and the expected residual value of the car after the leasing period. This also counts for operational lease. Again, the lessee is not the owner of the car and has to return the car after the renting period. Only 3% of LP’s customers are private individuals.

With Shortlease a car or van can be leased for a very short period of minimum one month. With occasion lease a used car (that’s younger than 3 years) can be leased. Besides the leasing products in the CaaS domain, LP also offers fleet management, consultancy services, fuel and mileage management and (short) car rental services. [LeasePlan Annual Report, 2017] [LeasePlan, 2019] [LeasePlan Nederland N.V., 2019]

LP’s business

LP’s core CaaS business can be seen as being a financial service provider: it is all about taking the economic risk for the residual value of the car after usage for reselling, where the residual value of the car can either be profitable or disappointing, compared to the fixed monthly subscription revenue. LP has to predict, based on the car model expected performance and the driver behaviour over a period of time, what the end status and thus residual value of the car will be after usage. Cars that have low mileage and had good maintenance and no worn out car components due to careful driving behaviour, will have a higher residual value. The monthly price of short lease is more expensive because the depreciation of the car is the highest in the first months. The depreciation rate becomes more stable towards the end. LP always aims for having the lowest operational cost for the car in usage and have the highest price for the car after usage to resell. That is were LP’s business is about. LP makes use of several calculation models to determine which monthly subscription price is mostly financial attractive [Interview with Julian Alkemade, Fleet Manager of LPNL]. The second element of LP’s business is that LP profits from repair, maintenance and...
tyre service due to their big car fleet and their big garage and dealer network.
LP is a B2B business, where their stakeholders exist of the car manufacturers, insurance companies, financial companies, garages and dealers and their main customers are companies: corporates, SME’s and mobility providers. They have little contact with their end-customer, the driver, since the end interaction is mainly done by their garage and dealer partners or by the mobility department or fleet manager of their clients. This all makes LP a big middleman, but until now with a very profitable business.

LP’s mission and strategy

LP’s overall mission is to provide what’s next in mobility via ‘any car, anywhere, anytime’ services to their customer.
LP’s vision ‘any car, anywhere, anytime’ seems to be way broader than their current lease product and can be interpreted even in the form of offering ride-hailing and car sharing services. ‘What’s next in mobility’ also refers to playing a role in the many developments in the mobility industry.

Figure 4: LP in a nutshell
LP wants to continue offering products and services that increase sustainability and reduce the CO2 footprint, that reduces the cost of fleet ownership and that increases the driver’s satisfaction and safety. By 2030, LP wants to achieve net zero emission from their total fleet by making it fully electric, which support the Paris Agreement. LP’s own employee fleet will be fully electric by 2021. Moreover, they want to become the leader in the latest mobility trends and the number one in providing services to the ride-hailing industry. Currently, they have a partnership with Uber where they offer them car, repair, maintenance and insurance services and they envision helping more mobility providers to accelerate their business.

Besides, LP is catching up with the sharing economy trend. LP just launched ‘Tess’, where drivers can share the private lease car with friends and family, by the use of the voice assistant Tess. In some countries LP offers more car sharing products. Furthermore, since LP is a multi-local organisation, with in each country a different company that is operating under the LP brand, they want to join forces and profit from spreading the best practices and benefits of scale. With this ‘Power of One LeasePlan’, they are striving for operational excellence. (LeasePlan Annual Report, 2017), **

**LP’s digital strategy**

To achieve the ‘any car, anywhere, anytime’ vision, LeasePlan Digital (LPD) is established in 2017 to create digital services and products to become a fully digital enabled business, to leverage the latest digital technologies (like artificial intelligence, deep learning and blockchain), to switch from being car centric to customer centric and to create more customer engagement (LeasePlan Annual Report, 2017). By offering digital products, the LeasePlan website and the MyLeaseplan app, they want to come closer to their customer and strengthen the customer relationship.

### 2.2.2 The CV benefits for LP’s business*

Within LPD, they already have a view on the benefits that the car data from the CV can bring to LP’s business.
2.2 LeasePlan’s needs for the CV

Until now, LP has mainly explored these use cases, described in the previous paragraph.

These use cases are expected to create the biggest positive impact for LP’s business. Though, LP is facing some challenges in gathering the data from the connected vehicle and being allowed to make use of this data in terms of privacy.*

Gathering the car data**

Currently, a lot of cars aren’t connected and that means a hardware device needs to be installed in the vehicle. The implementation of these devices into the car, where the device is produced and installed by third party suppliers, is some investment for LP: installation costs and a monthly fee for the data harmonisation. It is the question whether the benefits outweigh the costs of the hardware and installation. Furthermore, connecting with and reading the information from the OBD II port or CAN Bus was only meant for the garage. An aftermarket device is actually a ‘hack’. This ‘hack’ can bring some risk for LP’s collaboration with the OEM’s. Though the risks seems to be very low since a lot of third parties are making use of these devices.

When connectivity is already embedded in the vehicle by the OEM’s, LP can directly cooperate with the OEM’s. LP is starting to establish collaborations with OEM groups to receive the car data, against a monthly payment. With this collaboration, LP will pay a much lower price for the car data. However, it is the question to what extent all
LeasePlan is the global and Dutch market leader in car leasing, with business lease as their biggest segment. LP's main strengths are reflected in having powerful multinationals as clients, having a big stakeholder and supplier network (preferred dealers and garages), having a big fleet where they can profit from economies of scale, being internationally oriented and in their growing electric car offer. LP's main weaknesses are reflected in being a big, slow and conservative organisation, being a middleman, having little to no end-customer relation, being a car and business centered organisation and not fully realising its promise in providing what's next in mobility.

CV benefits for LP
The CV brings huge advantages to LP's business,

LP needs for the CV
Though, for LP to receive the CV data, it either needs to invest money in aftermarket devices or establish a valuable collaboration with OEM's. Besides, LP needs to offer the client and customer benefits to receive a consent to use the data. LP needs to take a customer centric perspective and needs to discover what will make the customer experience better. Besides, LP is now mainly focused on the incremental impact of the CV on their business, but the CV might entail a very promising innovation strategy for LP where they can disruptively innovate their product offer and customer experience.

Having the consent for using the data
With the new General Data Protection Regulation (GDPR), which became enforceable last May in the EU, the customer’s privacy is more protected (EU GDPR.ORG, 2019). This means that the user becomes the owner of the data he generates. If others want to make use of this data, the customer have to give his consent and the party needs to be transparent with what they will use the data for. For a lease car it gets more vague: the driver, the car manufacturer and the car owner (LP) are all partly owners of the data. What is clear, is that LP needs a consent to the driver’s driving behaviour and to track his location. The customer will not share all his details just like that, but he wants to know where his data is used for. If it doesn’t give a direct benefit for the customer to share the data, he is likely to not share his data. LP could think of a system to lower the monthly subscription price for the customer to receive the data. However, in case of business lease, the employer already covers almost all the costs for the driver. By lowering the price, it will be beneficial for the client, but not per se for the driver. For business lease also the client becomes partly the owner of the data and LP also need a consent from the client.

The need for LP is about exploring how likely it is that they can receive the data from the OEM’s and how they can create a valuable interaction to realise this. But mainly, it is about exploring what benefits they can bring to the driver and client to receive the consent. LP needs to take a customer centric perspective and needs to discover what will make the customer experience better. Besides, LP is now mainly focused on the incremental impact of the CV on their business, but the CV might entail a very promising innovation strategy for LP where they can disruptively innovate their product offer and customer experience.

OEM’s are willing to share the car’s data to a party like LP, instead of using it for their own purposes. Though, LP is purchasing a lot of vehicles from the OEM’s per year and they might have a certain power position here.
2.3 The customer

To improve the customer experience, to explore the market for new opportunities for LP’s offer and to identify threats for LP’s current offer, customer research is conducted to empathise with the customer’s current and future needs.

In order to understand the customers’ needs, the customer research process is inspired by the Jobs-to-be-done Methodology by Anthony Ulwick (2016). Qualitative interviews are conducted with current lease drivers. The purpose of these interviews were to understand the customer needs when using and experiencing the lease product. Besides, to create insight in the needs from the employer’s point of view, a fleet management coordinator at LPNL was interviewed, who is and has been in contact with numerous drivers and clients. Please see Appendix B for a detailed explanation of the qualitative interview study. Additionally, a focus group session was held to empathise with the needs and values of LP’s potential new target market: the Millennials. During the session, also the attitudes and expectations towards future mobility solutions were observed. This session was held with 5 participants: Millennials who are currently not owning a car or using the lease product. Please see Appendix C for the detailed explanation of the focus group study.

2.3.1 The underlying customer needs

**Underlying job to be done: getting from A to B**

Why the end customer chooses to use the products or services from LP or from its competitors, is in the core about having the ability to move: ‘getting from A to B’. The second underlying job is about ‘choosing the best route’, where the customer has to choose between the very wide offer of modes of transport, products and services and which route to take. Making the best choice is always about finding the best compromise in what the customer needs and what the offer is. For example, finding a compromise in the fastest, cheapest, comfortable, reliable and hassle free route which also meet the moment related needs like: not walking too much, having privacy, entertainment, place to sit etc. The customer can experience several pains while getting the jobs done: experiencing a mental load by putting the pressure on himself to find the best route possible, experiencing chaos within the overload of options and experiencing frustration in wanting to spend the least effort and time.

**Underlying motivation: choice for the lease product**

The customer chooses to have a car to fulfill the job to get from A to B, because he values: a private environment, flexibility, always access, comfort, a status symbol, control, joy, and no last mile hurdles. Why an employer chooses to provide his employees with cars, can be because of the need of cars for daily operations, but also to attract and satisfy employees, to enable employees to reach their meetings and having a status symbol which serves as a good company image. The customer’s motivation to choose for the lease product is mainly cost related: it can be cheaper, there is no high investment, no economic risk, no cost risks and the customer has a predictive cost overview. However, it depends on the customer’s usage behaviour if the total costs of the lease product are cheaper than purchasing a car or using other modes of transport. In case of business lease, the employer offers his employees a lease car and this can make leasing for the customer even more financially attractive. Furthermore, the customer might value that he isn’t anchored to a long term agreement and that he has to arrange way less in everything that comes across when purchasing and maintaining a car. In this way, the customer can drive the newest car models, which financially attractive, without being stuck with the car for years. The employer’s motivation to choose for the lease product is also mainly financial, with in addition that the car is not on the company’s balance sheet. Besides, the employer also benefit from arranging less around the procurement and maintenance of the cars and he benefits from fleet management advice. However, not every employer is willing to choose for the lease product, since he is letting go of certain control of the costs.

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* These insights are based on the conducted customer research and the ‘Future Mobility Needs’ report by the In House Design Team of SPD student at LPD in 2018/2019.

** These insights are based on the conducted customer research
2.3.2 The current customer needs in leasing

Based on the results of the qualitative interviews with lease drivers, 5 main needs within leasing are formulated. For more insight in the customers pains, gains and needs while using the lease product, please see appendix B.

**Anything can be found and fixed online**
The customer desires or even expects that he has insight in everything online. He expects transparency in everything related to the car. “An app with all services in there. Where you can find all information and what to do in certain situations in there. That you can see your mileage.” “An app with all services in there. […] Or not even that. You just take a picture, of for example the broken car window and it will all be arranged and fixed.” “It would be nice for me to see my car’s history.”

**Proactive support**
The customer expects that LP is proactive in helping him with the lease service. So informing the customer upfront and not that the customer needs to arrange it himself in the moment. “Reminder! it is time to change your tyres”. I called LeasePlan where the previous driver of this car changed the tyres. Because there the tyres must be stored then. So I was like: I need to change the tyres, so where do I need to go? I don’t know. Would be nice if they told me upfront.”

**Aftercare**
The customer expects a catch up moment from LP, so there is room to ask questions or give comments. “The message ‘there is your car, here is the key, good luck’. And then not even a phone call from LeasePlan like ‘Hey, everything went well, do you have any questions? Totally nothing.’” “Actually, I have never heard anything from the lease company after I got my car. Nothing like ‘is the car all right’ and ‘is everything fine and are you enjoying until now? Sort of expected something, but not that it matters.”

**Not planning & arranging anything**
The customer is not willing to put effort and time in dealing with the car’s RMT. “[What would be nice is] Not bringing your car for maintenance and waiting at the garage.” “Would be nice that when you have damage and can’t drive further, they or something picks you up so you can just continue your day. That you are not busy the whole day with fixing stuff or being at the garage.” “Would be ideal if everything is fixed for you, like changing tyres or repair, when you are just working at the office and they just pick it up and deliver it back.”

**Not thinking about anything**
Ideally, the customer would not think about anything of the lease service, except for driving. “The most ideal would be if you don’t have to think about anything anymore. When your car needs maintenance, the car knows when he needs it and send a message to LeasePlan. And that the system is connected with my agenda. And then knows where the car is and then plans a meeting at a garage and the car will be picked up, there’s maintenance and delivered back. And then I can just go home after the day with my car and I haven’t been interfering at all, not even noticed something happened.”

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Customer interviews with lease drivers

Focus group session with Generation Y
A change in needs of LP's customer can be encountered by the rise of megatrends and with a new generation: the Millennials.

Megatrends
Urbanisation
The cities are growing faster than the rest of the Netherlands and for the coming 25 years even more growth difference is expected by the Dutch Interdisciplinary Demographic Institute NIDI [De Beer et. al., 2017]. Cities will become more crowded and there will be less space for transport facilities and parking spots. The counter movement towards this megatrend is 'free the space, improve livability', where people aim for less cars in crowded areas to increase the traffic and park flow. One of the solutions might be answered by the sharing economy trend, where cars are used more efficiently and less streets and parking lots are filled with cars [PWC, 2014].

Towards a Healthier environment
More interest is shown for lowering the CO2 footprint and doing something good for the world as a response to climate change. More people demand for environmentally friendly products. Within mobility they choose for sustainable transport solutions, like an electric vehicle. In this way, people can do something good for the world and feel less guilty. People are becoming more aware of their footprint and ask for more transparency. [Deloitte, 2017]

Individualism
More people want to distinguishing themselves from others and being an individual, with everything tailored, customized or personalised to their specific need. There is more social isolation within the digitized world and there is less room for solidarity. However, we also see a counter movement where people are willing to care more about each other and share on a local level. [Connected World Staff, 2018]

The Millennials
The Generation Y, also called the Millennials, is maturing and will soon be a potential target market for LP’s lease product. Though, Millennials have some differences in needs and values than the current target market. The insight in this paragraph are based on the focus group session held with Millennials, see Appendix C for more information.

Always Connected
Already LP’s current target market expects to have insight and arrange everything online [which became clear during the lease driver interviews]. Millennials will experience this need even stronger and desire to be always connected. They expect that the IoT will rapidly take over and that everything in their daily life becomes smart and connected.

Systems that think for them
Millennials become more and more used to smart applications and system that helps to solve their problems. In this way, the least effort and time is spend to think for themselves and more efficiency is reached. These applications must be highly personalized and proactive, so the system can almost think for them.

A better tomorrow: lower CO2 footprint
Millennials are more motivated to do good for the world. They are more willing to put effort to create a better tomorrow, so they can feel less guilty for their actions. They actively want to choose for more sustainable options to lower their CO2 footprint: a sustainable mode of transport comes above the car. The Millenial is very willing to choose for the EV instead of a fossil fuel vehicle.

Access over ownership
Millennials are less attached to owning a car. They have grown up with other ideas around vehicle ownership, before they were spoiled by the luxury of owning a car. The status symbol of the car and the private car space is of less value. The Millennial shows more interest in sharing, also because the costs can be shared. For them, car ownership has its drawbacks: inefficient use of the vehicle, parking spot is taken unnecessary and more crowded cities and roads. Besides, Millennials also show less value to receive a lease car from their employer, but might be more interested in other facilitations like sports, lunch, relax moments etc. Furthermore, more youngster are moving towards cities, where they don’t see a need for owning a car in the overcrowded city streets. Current and older generations, really value the flexibility of owning a car and show more resistance towards sharing: more planning is required, less privacy, less personal space and not being sure whether the service is trustful, reliable and if it is always accessible.

Efficiency
Millenials highly value efficiency. For mobility, they would choose the route and mode of transport that is the most efficient for that moment. They might choose for efficiency more often than for comfort. Although Millennials experience more and more stress by wanting to be always efficient, they are aware of this and also choose to arrange time for personal life and enjoyment. Although a delay during travelling might recall frustrations, millennials also enjoy the moments when they are out of control for a short moment to escape from their efficient life.

Flexibility
Millenials strongly value flexibility as well, which is enabled by being always connected and the many applications that help them. A sharing service can be very flexible, because then you’re not attached to car where you made...
a big investment for. Though, when the sharing service is not always accessible or not nearby, the Millennials would choose for an other option. The Millennials doesn’t require to own or lease a car, but value more flexibility in mobility and whatever modes of transport or services that brings during that moment. For electric vehicles, the Millennials still face some problems: mostly the charging time, hassle around finding a charge sport and the short range reduce their flexibility.

**Transparency & control**
The Millennials desire more insight and control in the applications, services and systems they use. They are aware of the privacy risk and want insight what data is gathered for what purpose. Besides, when they choose for a sustainable option, they want to know how sustainable it really is, before they spend more effort. For EV’s they want to how it works and what extra hassle it might bring them.

Furthermore, Millennials highly trust technology development and they expect an electric, shared and autonomous future sooner.

**Interest switch of the employer**
Employers, LP’s clients, are aware of the trends and the switch of needs and values of their employees and are slowly adapting to these developments. Clients become more interested in: electrifying the lease fleet, offer more mobility solutions for the employee, reducing the fleet for financial and sustainable purposes by the use of carpooling, stimulating flexworking and enabling a good public transport connection to the office. Employers will be looking more for all-in-one mobility providers and partners to help them in electrifying the fleet.

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**2.3 The customer**

**Current needs in leasing**
Some opportunities for LP lies in improving their current lease product by better meeting the current needs in leasing: anything can be found and fixed online, there is proactive support, aftercare and no planning, arranging or even thinking is required.

**Change in needs**
LP’s might face threats for their current product and lease offer by the change in customer needs of rising mega trends or by the entrance of a newer generation. Millennials are less attached to car ownership, a status symbol and private car space, and show more interest in car sharing. Other modes of transport or mobility services might earlier fulfill their needs than the car. Besides, the car takes a lot space in the streets and in crowded urban areas there is less need for car, due to urbanisation. Millennials are also willing to actively reduce their CO2 footprint, as a response to climate change, by choosing more sustainable modes of transports. LP’s customer, both the driver and the client, show more interest towards electric vehicles. Though, they still highly value flexibility and efficiency, something that EV doesn’t always bring with the extra hassle around charging. This might cause a delay in the adoption of the EV, something that might threaten LP’s strategy. Furthermore, employers act upon these trends and become more interested in all-in-one mobility providers, reducing the fleet with carpooling solutions and in partners to help them in electrifying the fleet.
2.4 Emerging technologies

This subchapter presents other emerging technologies, besides the Internet of Things (IoT), that have impact on the automotive industry and on LP’s business.

Artificial intelligence
Artificial intelligence (AI); software algorithms that are capable of performing human’s intelligence in learning, speech recognition, visual perceptions and more [PWC, 2016]. For cars, AI can be used to recognize situations, like traffic situations or accidents, and act upon it. The driver can be identified with his face or voice, he can interact with a voice assistant and the in-car environment can automatically be changed to the customer needs.

Autonomous vehicles
Although premium car models are already equipped of some levels of autonomy, like lane keeping, it will take some time when the self-driving car is realised and broadly accepted. The autonomy of vehicles are divided in five levels: from supportive features to full control of the vehicle. The development of autonomous vehicles (AV’s) is enabled by artificial intelligence. Equipped with highly smart sensors. [PWC, 2018]. LP expect no massive acceptance of the autonomous vehicle before 2030. Therefore, LP does not run projects or pilots to explore the options for its portfolio at this moment. (LeasePlan Annual Report, 2017)

Hydrogen vehicles
With hydrogen fuel cell electric vehicles, compressed hydrogen is converted into electricity to power the electric vehicle’s battery. The hydrogen car only emits water vapour and heat and is thus a zero emission vehicle. This vehicle has similar performance as diesel and petrol vehicles and can range up to 700 km [Shell, 2019]. Some models are on the market, with the Hyundai Nexo as the latest model. LP focusses until now only on the EV and it not exploring the field for the hydrogen cars. Although this vehicle is still in development and charge spots for this battery needs to be implemented, it seems to be a promising technology. Despite that LP is now fully betting on the EV, in their sustainable targets they refer to zero emission vehicles, so the question of type should be still left open. Probably, LP waits for the demand from their customers, for massive implementation of the charge infrastructure and for acceptable prices of this special battery, where the normal EV is already a step ahead.

Blockchain
Currently, LP uses blockchain technology to connect directly with investors to finance the vehicle’s purchasing activities and by removing the middleman from this loop. This is still in an explorative phase.* Despite the fact that LP uses blockchain internally, LP is also a big middleman in the car financing loop and might have to fear its position as well. LP aims to come closer to the customer by offering more car-related services. In this way, they might shift their middleman position towards being a valuable service provider for the end-customer. For the CV, blockchain could possibly play a role within the risk for cybersecurity, where cars can be monitored from a distance. Besides, blockchain enables use cases as peer-to-peer transactions, identity management and trade finance [PWC, 2016]. Blockchain might play an interesting role in the transaction for charging session of EV’s, or for the energy trading markets.

Electric vehicles
Electric vehicles (EV’s) aren’t emerging anymore, but technologies like smart charging and vehicle-to-grid are. Though, the battery of the EV is still in further development to increase the battery’s capacity for a bigger range and to enable faster charging sessions. Currently, the average range is 205 km. However, 91% of the trips by car in the Netherlands are below 100 km [Milieu Centraal, 2019]. Range anxiety is still an issue for long trips, but already newer premium models have a range up to 500 km [Tesla]. It is expected that in 2030, 100 km range could be charged with a fast charger in just 6 minutes [Ensoc, 2016].

Although the full EV is referred to as being a zero emission vehicle, during the production it emits more CO2 than a fossil fuel vehicle, because of the production of the battery. However, when looking at the full life cycle (production and usage), the EV has ~50% less CO2 emission than fossil fuel cars, according to Milieu Centraal [2019]. During the usage of the EV, the CO2 emission really depends on the energy mix where the vehicle is charged with, because it is always a mix of fossil energy (generated by gas and coal plants) and renewable energy (e.g. generated by solar panels and wind turbines), even when you chose for renewable energy from your energy provider. According to Milieu

* Information collected from internal LPD communication channel
Centraal (2019), on average 63% is gray electricity (from fossil energy) and 37% is green electricity (from renewable energy) in the Netherlands. According to CBS (2019), the share of renewable electricity in the total electricity consumption was 15% in 2018 in the Netherlands. With the energy mix indication by Milieu Centraal (2019), an EV has on average on yearly basis still a CO2 emission of 850 kilo [and a fossil fuel car 2900 kilo] [Milieu Centraal, 2019]. To realise net zero emission, the best way is to charge the EV with self-generated electricity from solar panels. However, even when enough solar panels are installed, it is still dependent on the weather, whether the household can still run and whether the vehicle can be charged enough. In case of over production of renewable electricity from the solar panels, it is quite a challenge to store this for later usage. In some cases, it is possible to give this renewable electricity back to energy grid, for money in return [in dutch this is called ‘salderen’ (N.V. Nuon Energy, 2019)], but not for 100% renewable electricity in return.

**Smart charging**
The electricity production from renewable energy sources is very dependable on the weather; solar and wind power. The renewable electricity offer is not matching the energy demand, which has mainly a peak in the morning and in the early evening [Enpuls, 2019], see figure 7. On average, a car is plugged into the charge point for 11 hours. Though, 2.5 hours can already be enough to charge the car [Newmotion, 2018]. With smart charging, the charging session is altered to charge during the moments when the most renewable energy is available. During the 11 hours of plug in time, the actual 2.5 hours of charging can happen during the best moments: so the actual charging session can be delayed, stopped or can go faster or slower dependent on the renewable energy supply. Normally, most of the cars plug in around the early evening and charge for the first 2.5 hours.** With this big energy demand peak, gas and coal plants need to generate extra electricity to meet this peak demand [Enpuls, 2019]. Enpuls (2019) expects that with smart charging, 19% less CO2 emission can be reached. Smart charging can also be very beneficial for balancing the energy grid [Hu et al., 2016] [Enpuls, 2019]. With the rise of more and more EV’s, that will mainly charge during the peak hours, the energy grid needs to have big refurbishments and reinforcements to meet the energy demand, which is very costly for grid operators and governmental institutions [Enpuls, 2019]. With smart charging, the charge session can also be altered to avoid the peak hours and charge during other moments to create a better match between supply and demand. If smart charging is applied on a big scale, the grid can be even balanced more, which require less grid reinforcements, thus less investments from the government, which enable earlier readiness of the grid to meet the huge amount of expected EV’s in 2030. Besides, also less grid reinforcements are needed on a local level, on the level of an office energy system. Smart charging is comparable with Kobus’ (2013) ‘washing when the sun is shining’ research, where the development of smart grids and energy management systems realises a better match between supply and demand, which saves grid and generation investments and facilitates more sustainable energy systems. For smart charging, it is about ‘charging when it’s sunny and windy’.

Smart charging can also be financial attractive for companies that will electrify their fleet and for the driver himself. Because the energy prices are fluctuating, due to fluctuations in supply and demand, the charging session can be altered to save energy costs [Movares, 2016]. On average around 45 euro can be saved on a yearly basis per vehicle [Enpuls, 2019]. However, this is really dependent on the energy trading markets.

Presently, already some parties offer smart charging services [see next chapter].

**Vehicle-to-grid**
Vehicle-to-grid (V2G) enables bidirectional charging, where the EV can charge with the electricity from the grid, but can also uncharge by giving electricity back to the [micro local, local, regional or national] grid [Hu et al., 2016] [Amsterdam Smart City, 2018]. With V2G, EV’s can store renewable energy and can serve as an energy buffer. The EV can store the energy generated locally by the solar panels of a household or office. During a moment when not enough energy is generated by the solar panels, the EV can give energy back to household or office so the demand for energy there can still be reached [Amsterdam Smart City, 2018]. In this way, zero emission can be brought a step further, since less energy needs to be tapped from the energy grid, with its green and gray electricity mixture [Milieu Centraal, 2019]. On average, a household can run for one week on the electricity stored in one EV’s battery [VNG, 2018]. With this, LP can maintain 1.8 million households for one week, with its total electric fleet in 2030, when all cars are used to store energy. Furthermore, with V2G, the energy grid can be even balanced further, since also the vehicle can give back to the grid during peak moments [Hu et al., 2016] [Amsterdam Smart City, 2018]. If V2G is broadly applied and balances the supply and demand of renewable energy, the production of electricity by gas and coal

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**Insights based on informal interview with Faraday Keys,**

**Based on the insights from the LPD employee Lisette de Haas,**

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plants (to meet the extra demand in energy) can become unnecessary. Additionally, with V2G, more cost savings can be made, since the driver can play more with the fluctuations in energy prices and charge when the energy prices are low and sell his stored energy when the prices are high [Amsterdam Smart City, 2018] (Living Lab Smart Charging, 2019). However, V2G is still in development: the vehicles, charge point and energy systems, that allow bi-directional charging, are still prototypes and only just a few pilots are running (see next chapter).

With Artificial Intelligence, vehicles can be capable of speech recognition and visual perceptions to for example interact with the driver with voice assistance and recognize traffic and accident situations. LP expects massive acceptance of the Autonomous Vehicle not before 2030 and is therefore not active in this field with explorative projects and pilots.

The hydrogen vehicle has zero emissions and can range up to 700 km, similar to fossil fuel vehicles, and seems to be more beneficial than a normal EV. Though, this vehicle is still in development and LP probably waits for the demand from their customers, for massive implementation of charge infrastructure and for acceptable purchase prices.

Blockchain seems to be an interesting development for transaction system around the EV.

The EV’s batteries and charge points are further developed to realise a bigger range and faster charging sessions. To further reduce the CO2 footprint by the usage of more renewable electricity and to enable earlier readiness of the electricity grid to facilitate energy for the expected growth of EV’s, smart charging solutions and the vehicle-to-grid (V2G) technology are in development. During smart charging, the charge sessions is altered and steered to charge when the most renewable energy is available and when the energy prices are the lowest. With V2G, the EV can store renewable energy its battery and can give this energy back to household, office or energy grid.
2.5
The industry

This subchapter entails the competitor, stakeholder and industry analysis, in order to scout threats and opportunities for LP’s product and service offer and market position.

2.5.1 Competitors

It is important to look at LP’s competitive landscape, to identify threats for LP’s business and opportunities for a unique market position for LP. By the use of the four levels of competition by Lehmann & Winer (2008), LP’s competitors are scouted within several market definitions, to create a full overview of the competitive landscape.

1. Product form competition: The lease product
Within this first level we look at LP’s core lease product. LP’s direct competitors are other lease companies. In the dutch lease market LP mainly competes with Pon Financial Services, Alphabet, Dutchlease, ICLH, Mercedes Benz financial services, Business Lease, Arval.* LP competitors differ per country, but also differ on an international level. LP is the market leader in the dutch business lease market, but is not that big within the private lease market. LP main competitive advantage is price related, because of LP’s size, LP can earlier profit from economies of scale. Furthermore, big multinationals choose for LP, because LP is internationally represented. Besides, more companies are becoming interested in having EV’s in their fleet and LP has good position in the EV top 100.** It is interesting to see that also OEM groups offer lease products, while they are also LP’s stakeholders. Most of these competitors offer also mobility services. For example, with the use of a mobility card, where the customer can make use of several modes of transport. Furthermore, they offer several smartphone applications like: closest location finder for garages, charging stations, parking spots, cheapest gas stations, meeting locations and more. Additionally, some competitors offer leasing products for micro modes of transport like a scooter or bike, like Pon. Other competitive moves are within EV’s, where competitors offer extra services in providing information or trainings for electric driving, installing charging stations and smartphone apps for an overview of charging stations locations. Besides, direct competitors are also taking action in car sharing. They offer smartphone applications where the driver can share his lease car with colleagues for work commutes, or with friends and family in private, or where pool cars can easily be managed. Some competitors offer coaching and monitoring services for safe and sustainable driving and fleet management services by telematics.*

2. Product category competition: Car related & financial services
When looking at the bigger product category, LP competes with parties that offer car related services or financial services. These car related services ranges from procurement, distribution, maintenance, roadside assistance, fueling services, driving experience services etc. For the financial services, insurance service providers or even banks, who provide loan services for the car investment, can be seen as competitors. Some insurance companies already become more active in providing

* Company websites from several lease companies operating in the dutch market.
** In-depth interview Julian Alkemade, Fleet Management Coordinator LeasePlan Nederland. See appendix B.
*** Company website of the several named car rental, sharing and MaaS providers.

Figure 9: LP’s four levels of competition
insurances that are based on the driver behaviour, by making use of data from the car or the smartphone. For car related services, LP competes with OEM’s, dealers, garages, roadside assistance providers and distributors, like for example SchadeNet, ANWB, Autoschade Herstel Groep in the Netherlands. Although LP indirectly competes with these parties, they are also part of LP’s stakeholder network (see the next paragraph). Car related service providers also offer smartphone applications to plan meetings, to help the customer quickly on the road based on his location and to support the customer in parking, fueling and charging (like Google Maps, NS reisplanner, Whimapp, Yellowbrick, NewMotion, FastNed, Smoov, Chargemap, Social Charging etc.).

3. Generic competition: From A to B, assurance and ease
In the third competition level, we look at other parties that fulfill the same customer needs. The needs that makes LP’s customer pull the product in his life is about: having a mode of transport to get from A to B, not having the financial risk of the car and not arranging everything themselves what comes with owning a car [like arranging an insurance and road tax etc.]. Ride-hailing services, like Uber, also meet these needs in once as well: you have a mean of transport, you know what to expect financially and you don’t have to deal with maintaining the car or having the insurance. This also counts for rental services and car sharing services like RentalCars, SnappCar, Car2Go, IONIQ Car Sharing, Blabla Car, Fetch Car Sharing, GreenWheels and more ***. SnappCar also offers a private lease product in combination with a sharing service. When you just look at the first need ‘having a mode of transport to get from A to B’, also public transport providers and micro mobility providers (bikes and scooters) are competing with LP, but also OEM’s and Pon’s MaaS product ‘Shuttel’.*

4. Budget competition:
On budget level, LP mainly competes with parties that take away the need for mobility: parties that offer flex work places, advanced video calling (with virtual reality feature) and the housing market, to move to live closer to work.

2.5.2 Stakeholders

The stakeholders of LP’s CaaS product are mapped here.* Please consider that LP stakeholders widely differ among the countries.

** Insurance providers:** LP is partly collaborating with insurance providers, but LP also have insurance products in house, to cover the car insurance for the customer. The insurance providers have no direct relation to the customer, because LP is handling everything in between.

**Financial providers:** For keeping control over LP’s financial status while doing big investment in vehicles, they are in need of a financial providers. LP does this with private equity parties, but also internally with the LeasePlan Bank.

**Original Equipment Manufacturers:** LP purchases the cars from the car manufacturers, the OEM’s, directly via the OEM or with a dealer party in between. The OEM is the most important stakeholder, when having in mind the amount of cars LP has currently in their fleet and that these cars are only in there for 3-4 years. LP purchases yearly hundred thousands of cars from different OEM’s. This means that LP has a certain power position towards the OEM’s. The OEM has a direct relationship with the customer via the car and its related smartphone app, and play a big role in the customer’s lease experience. OEM’s offer a lot of connected services for the premium car model segment. Look at BMW connected, Audi Connect, Tesla’s premium connectivity package and more.** Their connected services, via the car’s interface and the smartphone app, ranges from real time traffic and weather information, Apple CarPlay, personal voice assistants, remotely car unlocking with smartphone, parking and payment assistance, over the air updates, time to leave notifications, live trip sharing, climate management and many more.**

**Dealers** take care of the procurement of the cars, from the OEM’s, and the distribution towards the customer. The customer can either pick up his car from the dealer, or the car will be distributed by the dealer’s distribution service towards the client, the employer. The dealer plays an important role in the car’s by explaining the cars features and know-how’s to the customer.

**Garages:** For maintenance, repair and tyre services, LP collaborates with various garages, via local garages, garage network providers, garage/dealer/distributor network providers, specific damage or tyre service providers or OEM’s. In case of RMT, the customer can either set via LP’s channels an appointment with the garage of he can just directly drop by. The end-customer interacts with the

* The insights of this paragraph are gathered during the employee introduction day at LPD and during informal interviews with Daan Ostveen, Head of Product at LPD and William Janssen, Senior Product Owner at LPD.

** Company website from these OEM’s.
garage’s service. LP has a big dealer and garage partner network, where they profit from economies of scale.

Roadside assistance providers: LP collaborates with several roadside assistance providers, like an ANWB, to provide the customer support when he is stuck next to road and has a need for repair.

Charge point operators: LP offers extra services with their EV’s, like the installation of charging points at their client’s parking lot or the driver’s home. To enable this, LP partners with charge point operators. LP also collaborates with a party that enables external charging sessions with automatic transaction by the use of a charge card.

Future stakeholders: For the CV, LP has to collaborate with a CV service provider that installs a telematics devices in the car and gathers, harmonizes and processes the data. LP also needs to collaborate more closely with the OEM’s to receive the data.*** Since LP is rapidly expanding EV’s in its fleet, LP will collaborate more with charge point operations, charge infrastructure technicians and, maybe further in time, with energy providers to set the lowest energy prices for LP’s EV fleet.

**2.5.3 Industry developments**

CV’s impact on the industry
The rise of the CV has definitely impact on the automotive industry. From two expert interviews with Mark de Reuver (Associate professor TUdelft) and Niels Vos (Product Manager Connected Car TomTom Amsterdam) following can be concluded:
1) More start-ups and tech giants will take over the end-client journey by offering services around the vehicle enabled by the CV.
2) Collaboration in the industry is required for development of the CV and for making the CV’s data accessible for third parties. For example, the data from all OEM’s needs to be harmonised by parties to create services for CV’s from different OEM’s for third parties.
3) The car as open platform with an open API is not expected in the near future, but an API for the dashboard might happen in the coming years.
4) Regulations around the driver’s privacy need to be established.
5) Cyber security needs to be further developed for the CV.

Micro Mobility
Offering micro mobility solutions (like bikes, scooters etc.) is becoming more trending [McKinsey, 2019]. As we saw in the competitor paragraph, PON already operates in this field with its Gazelle included in the mobility solution. Besides, a lot of micromobility-startups are rising, where their offer has also a sharing, short rental and/or a electric solution. Examples are Mobike, a smart bike share solution (mobike.com/nl), and Felyx, an e-scooter sharing solution (felyx.nl), in the Netherlands.

Private lease is growing
The government, regional governmental institutions and municipalities are highly involved in the developments in the automotive and mobility industry. For example, the municipality of Amsterdam is exploring the field for AV’s, MaaS, EV’s and more (Gemeente Amsterdam, 2019). Furthermore, the government plays a highly active role
The industry

Competitors
Although LP is the global market leader in leasing, LP’s direct competitors are making smart moves towards the latest mobility trends. They offer car sharing solutions, more modes of transport for leasing, mobility solutions and support in fleet electrification. More A to B service providers, like ride hailing services or pay per use mobility services, make their entrance in the industry. LP faces here the threat for substitution, by the offer of direct and indirect competitors.

Stakeholders
LP is a big middleman with several stakeholders: financial providers, OEM’s, distribution providers, dealers, insurance providers, garages, roadside assistance providers and charge point operators. Dealers and garages are doing mainly the end-customer interaction. Though, LP is aware that via new smartphone applications, they can better engage with the customer and establish a relationship. LP’s most important stakeholder, the OEM’s, has a big influence on the development and implementation of the CV. Besides, OEM’s are also a competitor for LP, since they offer lease products as well. With the CV, LP should collaborate more closely with the OEM’s and with CV service providers.

Industry developments
More service providers, startups and tech giants might enter the industry and take over the end-customer journey with CV related services. However, besides the CV, also other developments influence LP’s future landscape: micro mobility becomes more trending, private lease is growing, the government plays a highly active role in mobility and sustainable transport solutions, more parties are preparing for smart charge solutions with the EV and more parties prepare for the autonomous vehicle. EV’s as lease cars are more stimulated by the government by only 4% tax addition, several subsidies and by zero emission zones.

Preparing for the EV
Already some parties in the industry offer smart charging services: Allego, Nuon, van de Bron, Mountox and more.* Currently, Engie, Aliander, Innovation platform Amsterdam Smart City, Hogeschool van Amsterdam and Mitsubishi Motors are collaborating to explore the field of V2G [Amsterdam Smart City, 2018]. Besides, a V2G pilot is running in Lombox, a neighbourhood in Utrecht [LomboxNet, 2019]. V2G is only running on a pilot level and only prototypes of these EV’s, charge points and energy management systems are available. Also the regulations aren’t ready yet, for the acceptance of V2G. Furthermore, the real financial benefits and the sustainable impact needs to be proven. [Amsterdam Smart City, 2018]

Preparing for the autonomous vehicle
Some players in the industry are preparing for the self driving car: Waymo, Uber and Tesla have self driving car projects running**. Tesla is preparing their self driving car by the huge data gathered from their CV’s. Additionally, TomTom will focus their business on maps for the self driving car (Interview with Niels Vos, See appendix A). However, since LP clearly stated that they expect massive acceptance of the AV not before 2030, the AV will be left out of the thesis’ scope.
Define

Defining the design direction for LP’s connected future
This chapter presents the development of the design direction that will serve as a base for ideation in the develop phase. The insights from the discover phase were the starting point for the generation of opportunity areas. The most interesting opportunities were clustered and put into four opportunity directions. One opportunity direction was chosen and rephrased into the final design direction.

In this chapter:

3.1 Opportunity mapping
  3.1.1 SWOT analysis
  3.1.2 Creative session

3.2 Opportunity directions
  3.2.1 Opportunity directions
  3.2.2 Choice opportunity direction

3.3 Design Direction
A SWOT analysis (Ansoff, 1987) is conducted to find opportunity areas for LP. First the main strengths, weaknesses, opportunities and threats for LP were listed, which are based on the main insights from the discover phase. Then, the list was placed in a matrix, where opportunity areas were created based on the combination of strengths or weaknesses with opportunities or threats. The SWOT analysis is illustrated in figure 11.

### 3.1 Opportunity mapping

Opportunity areas were generated by the use of a SWOT analysis and during a creative session. The main insights from the discover chapter were used as a starting point for the opportunity mapping activities.

#### 3.1.1. SWOT analysis

A SWOT analysis (Ansoff, 1987) is conducted to find opportunity areas for LP. First the main strengths, weaknesses, opportunities and threats for LP were listed, which are based on the main insights from the discover phase. Then, the list was placed in a matrix, where opportunity areas were created based on the combination of strengths or weaknesses with opportunities or threats. The SWOT analysis is illustrated in figure 11.
3.1.2. Creative session

Parallel to the SWOT analysis, a creative session was facilitated with LP. Digital employees to brainstorm together on opportunity areas for LP. In preparation to the session, the main insights from the discover phase were presented in three external environment scenarios. These scenarios consisted of a customer, technology and industry component which represents the main insights from the research components in the discover phase. With the use of brainstorm techniques, the participants generated opportunity areas for each external scenario, by answering the questions: a) What (unique) position could LP take in this scenario? b) What value can LP bring to the (potential) customers in this scenario?. The definition of a value was here described as the following: “... a novel value fulfills an unmet need or resolves a present dilemma or feeling of frustration experienced by a user target group.” (Simonse, 2018).

Figure 12 shows the external scenarios and the opportunity areas generated during the creative session. For more information about the set-up of the creative session, see Appendix D.
3.2 Opportunity directions

The most interesting opportunity areas, mapped in the previous chapter, were clustered into opportunity directions. Only the most promising opportunity direction was chosen to continue the design process with, to ensure the outcome of fruitful and in-depth design solutions.

3.2.1. Opportunity directions

The opportunity areas from the SWOT analysis and the creative sessions were compared. During the creative session, the participants were asked to cluster the opportunity areas and to show their preference for the most interesting ones. With this insight and the insight of the overlap between the areas, combined with the insights from the discover phase, the most interesting areas could be determined. The most interesting areas, both from the SWOT and the creative session, were combined and clustered into four opportunity directions. The opportunity directions show promising use cases LP could offer with the use of the CV. See figure 14 for the description of the opportunity directions.

3.2.2. Choice opportunity direction

To ensure the outcome of a well considered and promising innovation strategy, with in-depth product and service concepts, and to avoid outcomes on a very generic level, only one opportunity direction had to be chosen to continue the design process with. The choice was made for the opportunity direction 'The full electric vehicle package' and was based on the most important external and internal developments, the internal preference and the opportunity directions time frame.

LP aims for a total zero emission fleet by 2030 (LeasePlan Annual Report, 2018). This is in line with the Paris Climate Agreement: In 2025 15%, and in 2030 35% of new cars are zero- and low emission vehicles, to meet the overall emission reduction target of 31% in 2030 (European Council, 2019). Besides, it is in line with the Dutch Cabinet targets: in 2030 all new sold vehicles are zero emission (Rijksoverheid, 2019) and the mission to have fully zero emission mobility in 2050 (Klimaatakkoord.nl, 2019).

Currently only around 3-4% of LP’s fleet is electric*: plug in hybrid and full electric. Within 11 years, LP needs to replace almost 96% of its total fleet of 1.8 million vehicles worldwide (and 180.000 in the Netherlands), for zero emission vehicles. This change has currently the biggest impact on LP’s business. Where only one of the many questions is: how is the residual value estimation different for the EV, where a big part of LP’s business is about? It will also have a big impact on LP’s product portfolio, because of a different driver experience with EV’s and a turning point for the client’s fleet management.

During an internal discussion **, the four opportunity directions were presented and the internal preference went to the ‘the full electric vehicle package’. First, because the first opportunity direction has quite an overlap

Though, with the CV, the lease service could even further improve. However, to ensure continuous innovation, the innovation strategy should cover the three innovation

Figure 13: The opportunity directions put in a time frame

* Insight from Daan Oostveen, Head of Product at LPD
** A discussion with the Head of Product and Senior Product Owner of MyLeasePlan, Willem Janssen, at LPD.
horizons with a natural overlap (Simonse & Hultink, 2017). While this only covers the first horizon in the Three Horizons Model (Baghai et. al, 1999) by incremental innovation. See figure 13 for a rough indication of the horizons for each opportunity direction.

Third, because the fourth opportunity direction tends to lie more in the second and third innovation horizon and because the switch towards a mobility provider is quite a sensitive topic within LP (since LP’s core business lies within cars and not within mobility). Last, because the third opportunity direction is in line with what creates the biggest impact for LP’s business, it provides room for innovation over each horizon and because this direction isn’t widely explored within LP yet.

### 3.2 Opportunity directions

1. **Seamless, proactive & only thinking of driving experience**
   Drivers desire a service that thinks for them. LP will take away any effort from the driver. The driver doesn’t have to think about what to do when maintenance is needed, when an accident happened or in case of theft. LP proactively supports the driver, contacts him, plans automatically a meeting which perfectly fits his agenda, steers him to the right garage or makes sure the maintenance services comes to him. Moreover, LP ensures a careful and efficient accident and theft handling and always delivers the option for the driver to continue his journey with replacement mobility.

2. **Improve livability by sharing**
   To help the customer to free the space in his neighbourhood, city or office parking lot, LP offers various sharing services to make leasing among friends, employees, neighbourhoods and companies possible. Clients can create fleet efficiency by optimal fleet management. Drivers can experience a reliable, transparent and flexible service by: easy keyless car access, insight in the car status (interior and exterior), managing damage, insight in the cars location and insight in car availability. In this way, the drivers can do something good and share the costs.

3. **Full EV package**
   LP delivers here not just the EV, but the whole package by providing help over the full EV journey. LP offers the driver help in the parking and charging hassle the EV brings. LP helps the client in the fleet electrification, by giving advice on charge infrastructure expansion based on the real needs of the fleet. Moreover, LP delivers the option to charge during the best moments when it is the cheapest and most sustainable, and the option to store energy in the car.

4. **All in one mobility, getting from A to B to C**
   LP will help the customer to find the mobility solution which is exactly tailored to their travel plan and which makes sure they can move around in the crowded urban areas. LP delivers several modes of transport or makes sure the driver’s car is perfectly connected with other mobility services. LP provides the client with leasing any mode of transport that fits exactly the needs of the employees. The driver can, with the service of LP, experience a seamless travel from A to B to C perfectly connected to any mode of transport.
>> Opportunity mapping

The main insight from the discover phase were listed into internal strengths and weaknesses and external threats and opportunities. This list was used for a SWOT analysis where, during a individual brainstorm, opportunity areas were created based on the combinations of the several elements. In parallel, the list was used as input for a creative session, where LPD employees generated together various opportunity areas. (The picture above is taken during the creative opportunity mapping session).

>> Opportunity directions

The main opportunity directions were clustered into four opportunity directions:
1. ‘Seamless, proactive & only thinking of driving experience’, where with the CV any effort from the customer can be taken away in the core lease service.
2. ‘Improve livability by sharing’, where the CV enables reliable, transparent and flexible sharing for lease drivers, offices and neighbourhoods.
3. ‘Full EV package’, where the CV provides the driver help with charging and the client advice based on the real fleet behaviour.
4. ‘All in one mobility, getting from A to B to C’, where CV realises a seamless and perfectly connected travel to any mode of transport.

The choice was made to continue the design process with only one opportunity direction, to avoid outcomes on a too generic level. The third opportunity direction ‘Full EV package’ was chosen, because it promises to bring the biggest impact for LP’s business, it leverages the full potential in successfully realizing LP’s sustainable targets, it provides room for innovation over short and long term horizons and it isn’t widely explored within LP yet.
3.3 Design direction

The chosen opportunity direction ‘the full EV package’ will now be formulated into a strategic design direction that will serve as the base for the idea generation and concept validation.

3.3.1 Context & additional research

The discover chapter provided information on a generic level and not all collected information throughout the research was presented. This paragraph goes deeper into the context of the opportunity direction ‘the full EV package’.

In this direction, LP will focus on the clients that want to start with or further continue electrifying their fleet. These clients want in this way to either meet the demand of their employees for electric vehicles, meet the sustainable targets, follow their sustainable ambition or create a ‘greener’ company image.* As described in the discover chapter, these clients are looking for or could use support in their transition towards zero emission vehicles. They want to know what the transition will mean for their financials, operations, employee satisfaction and sustainable ambitions. They want to have the knowledge and insight to make well considered choices for their fleet which result in the most gains. They desire the lowest costs, lowest investment and lowest time investment, to create the charge infrastructure that exactly fits the needs of the fleet and which satisfies the employees. Some of LP’s clients might like to see more opportunities for their sustainable ambitions and are willing to explore the options in further reducing the CO2 footprint, with for example the installation of solar panels to charge the fleet.*

Besides, LP will focus on drivers who have an electric business lease car or who would like to switch to one. Leasing full electric vehicles becomes more attractive with the lower addition tax and the subsidies, as described in the discover chapter. Although LP’s current target market is willing to do good, they are not always willing to give up comfort. Compared to a regular car, EV drivers can experience less flexibility, more hassle, more uncertainty and more frustrations **:

- They might not leave spontaneous, because the car still has to charge.
- They have to put extra effort in finding a parking spot and stop on the go to charge.
- They are not sure whether they make the trip with the battery, also called ‘range anxiety’ and if they can get a spot to charge at the destination.
- They might experience frustrations with neighbours or colleagues who occupy the charge spot for the whole day (NOS, Jan 2018). In the Netherlands, ‘laadpaalkleven’ became the new word of the year in 2018 and refers to an EV driver that unnecessarily occupies the charge point for a long time (NOS, Dec 2018).

Though, as explained in the customer subchapter, newer generations are more willing to spend time and extra effort to actively reduce their CO2 footprint, but they still want to reach optimal efficiency and flexibility for mobility. Besides, they expect services that proactively support them, think for them and that are highly personalised.

LP currently offers clients and drivers the installation of charge points at the office and at the employees’ households, a charge badge to charge at external charge points with automatic transactions, an smartphone application that shows the location of charge points where drivers can charge with the charge badge and the option for a replacement car for holidays. Although LP helps the client with the installation of the charge points, LP could still expand this support. LP is aiming to provide a hassle free EV package [LeasePlan Annual Report, 2018], while even some of LP’s own employees who are driving an EV are not experiencing the hassle freeness yet.

From the industry perspective, a lot needs to happen in the charge infrastructure and electricity grid to meet the growing amount of EV’s. Currently, EV charging sessions cause a lot of peak load on the energy grid. If EV drivers doesn’t change their charge behaviour by charging during other moments, the environmental profit of EV’s will have a drawback since a lot of gas and coal plants needs to generate extra electricity, above the renewable energy sources, to still meet the demand and the grid needs extra reinforcements (NOS, July 2018) (see emerging technologies subchapter). Also energy providers and charge point operators are looking for solutions to create more charge point sharing with fine rates [NOS, Nov 2018].

* These insight are gained during the informal interviews and during the co-creative sessions with LPD employees and with Guido Ripken, project manager EV Desk at LPNL.

** These insight are gained during the qualitative interviews with lease drivers, during informal interviews with LPD employees, during the co-creative session from LPD employees and during the internal EV brainstorm facilitated by LPD employees.
### 3.3 Design direction

#### 3.3.2 Design brief

**The future vision**

During the co-creative opportunity mapping session, the participants also brainstormed about possible ingredients for a future vision, based on the insights from the discover phase. These ingredients were used within several iterations loops, in preparation for the final vision creation. The vision is for internal usage and represents LP’s desirable future end-state (SimONSE, 2018) for LP within this project scope and serves as a strategic reference point throughout the ideation phase. The vision tries to catch the ideal position of LP within in the imagined future external scenario: A world where more cars and cities are connected, urban areas are crowded and where a healthy and livable environment becomes more important. This future external scenario was imagined during the co-creative session. Besides, the vision entails the ideal value delivery to the customer. The vision, and thus design direction, is focused on the business lease segment and not on the private lease segment. This choice was made because business lease is 97% of LP’s segments and therefore the biggest impact can be achieved here, also because LP’s main strengths and expertise lies here. The vision is formulated as the following: “LeasePlan, the reliable zero emission fleet accelerator, provides clients optimal support in the transition and delivers a desirable EV driver experience.”

**Objectives**

To further specify the design direction, three objectives are formulated that makes clear what the design solutions should deliver. See figure 15 for the objectives. The first objective specifies what LP will deliver to the client to provide them the optimal support, which is aligned with the needs clients have, explained in the context paragraph. The second objective focuses on an interesting strategy to help both the client and the driver throughout their journey, to create better customer experiences but also to establish customer relationships for LP. In this way, LP can prevent the threat of substitute by a competitor, since LP fully serves the client and driver and becomes the partner in the zero emission transition. The third objective entails an important starting point for the design solutions, where also LP can obtain a profitable position.

**Values**

To further frame the conditions for a desirable EV driver experience, five customer values should be deeply considered throughout the ideation phase. See figure 15. These values are build upon insights from the customer research in the discover phase and specify what the customer finds most important in general and within the EV experience.

- In the customer subchapter, it becomes clear that lease drivers desire to spend the least time and effort required around the lease service and that the newer generation highly value efficiency. During conversations with several participants and designers they all stated that the hassle this service brings is the biggest pain point. Therefore, the value refers to hassle freeness.
- Both current lease drivers and newer generation expects the seamless execution of services and smartphone applications. Lease driver desire proactive help and after care, thus touchpoints with the service runs smoothly and that the service lives up it promise any time.

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*Figure 15: The elements of the design direction. House construction inspired by the strategic framework of Cascade Strategy (2019).*
Design direction

The context & additional research

Clients want insight in what fleet electrification would mean for their financials, operations, employee satisfaction and sustainable ambitions. They desire the lowest costs, lowest cost and to create the charge infrastructure that exactly fits the needs of the fleet. Drivers can experience more hassle, uncertainty, frustrations and less flexibility with the EV. The industry looks for solutions on how the growing amount of EV’s can be charged efficiently to avoid big grid investments and extra electricity generation by gas and coal plants.

Newer generations highly value flexibility. This became clear during customer research. With EV’s, drivers have to give up some flexibility. Though, the CV might play an important role here.

Another insight from the customer research that is taken into account here, is that the new generation expect systems to think for them, in an highly proactive and personalised way.

Also current lease drivers expect to have online insight in everything around the lease service. The newer generation shows more interest in having transparency in the data usage and what the real impact is of their actions in terms of sustainability and financials.

Requirements

The requirements presented in figure 15 are the conditions that the design solutions should meet. The GDPR is unavoidable and a highly involved topic within the CV, what is explained in the discover chapter. The right conditions should be created for the customer to give a consent for sharing the data. As discussed earlier, the driver desires benefits for this in return. Though, when the EV driver experience becomes more desirable, it is likely that these benefits are reached. Moreover, the design solution should meet LP’s internal capabilities, resources or the capabilities for acquisitions and outsourcing. Besides, it should be technical feasible and should have a fit with LP’s strategy and market position. Moreover, the service should be reliable by meeting the customer values any time.

Considerations

The main starting point for the design solutions is of course the CV. The CV is seen as the main enabler for LP’s value promise in this design direction, since it provides automation for hassle freeness and seamlessness, personalisation for tailoring and flexibility and transparency for insight and control. Besides, the smart charging and V2G technology, that are discussed in the discover phase, could be taken into consideration in ideation phase. These technologies mainly deliver extra value to the newer generations, who desire to take their sustainable ambitions a step further. Furthermore, the value delivery of smart charging to the driver isn’t clear, the driver desires a smarter system with less hassle involved, the driver desired insight, control and feedback in/from the system and the driver is curious about the real sustainable impact of smart charging instead of the employee score.

Ideation

All the elements of the design direction combined with the considerations serves as the starting point for the ideation phase, the develop phase, but also later for idea and concept validation. To have a clear reference point without an information overload, the ideation could be started by answering the following questions:

How can the connected vehicle enable a hassle free zero emission travel?
How can the connected vehicle enable support for the client in the zero emission transition?
Developing ideas for the zero emission connected fleet
This chapter presents the design phase. Design solutions have been generated within the scope of the design direction. First, the ideation approach is briefly described. Second, the design solutions are presented per expected term. Third, the design solutions are supported with the building blocks of the Business Model Canvas.

In this chapter:

4.1 Concept generation set up
4.1.1 Ideation approach
4.1.2 Overview final design solutions

4.2 Short term design solutions
4.2.1 Parking support
4.2.2 Priority load balancing
4.2.3 Short term business model

4.3 Middle term design solutions
4.3.1 Smart Charging
4.3.2 The connected & electric shared pool
4.3.3 Middle term business model

4.4 Long term design solutions
4.4.1 Local energy storage
4.4.2 Energy shares
4.4.3 Long term business model
4.1 Concept generation set up

This subchapter provides insight in the ideation approach and gives an overview of the final design solutions, before they are described more extensively in the next subchapters.

4.1.1 Ideation approach

Co-creative session: idea mapping
An co-creative idea mapping session was organised with 8 employees from LPD with different backgrounds (design and technical), to brainstorm together about ideas within the scope of the design direction. See appendix E for information about the set-up of the session and the results. During the session, there was made use of the ideation questions. As in L. Simonse (2018) here roadmapping process, the insights in the technology developments and the customer values were combined to map valuable ideas. The outcomes of the session mainly served as an inspiration source throughout the ideation process.

Individual concept generation
Several individual ideation loops has taken place, but also small validations in between with LPD employees and the consultant Faraday Keys. The final design solutions that will be presented in this chapter are thus mainly based on the co-creative session, individual brainstorming, small validations and individual concept generation. Appendix E provides also the information about the ideas that were finally not chosen to continue with in this thesis.
This thesis proposes not one final design solution, but 6 final design solutions that all have a significant role in realizing the vision and all leverage the full potential of the CV within the zero emission fleet transition. All design solutions take their part in accelerating the zero emission fleet transition, but all in a different way, meeting different specific customer needs. The design solutions are roughly divided in time frames, based on the customer needs, the technology developments and LP’s capabilities. The actual time frames and innovation horizons are further detailed in the deliver chapter. The first and second design solution, contribute to the same goal, though, they have different approaches and solve different client’s and driver’s needs. The same counts for the fifth and sixth design solution. The 6 final design solutions can be seen separately, but they do have overlap and can build on each other to strengthen each solution. Each new design solution can be integrated with the previous design solution. For example, Parking Support can combined with Priority Load Balancing. This combination can be used for Smart Charging. The combination of the first 3 design solutions can be used for the fourth one, and so on. In this way, all 6 design solution are part of one innovation strategy. The final design solutions are explained in detail in the next subchapters, divided per expected term. The innovation strategy is presented in deliver chapter.

### Figure 16: Overview of the final design solutions

<table>
<thead>
<tr>
<th>Short term</th>
<th>Middle term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficient charge infrastructure usage</strong></td>
<td><strong>Cost &amp; footprint optimisation</strong></td>
<td><strong>Efficient fleet operations</strong></td>
</tr>
<tr>
<td>Accelerate charge infrastructure readiness with minimum investments, by efficient charge point occupation, smart load division and by tailored advice based on the real fleet behaviour.</td>
<td>Enable energy cost optimisation and carbon footprint reduction, by altered charging sessions and charge behaviour.</td>
<td>Achieve cost and footprint reduction and increase livability by electric car sharing with optimal fleet management.</td>
</tr>
<tr>
<td>1. Parking Support</td>
<td>3. Smart charging</td>
<td>4. The connected &amp; electric shared pool</td>
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<tr>
<td>2. Priority Load Balancing</td>
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<td>5. Local energy storage</td>
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<td>6. Energy shares</td>
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</table>

Figure 16: Overview of the final design solutions
4.2 Short term design solutions

This subchapter presents the short term design solutions, that solve presently existing unmet needs and are close to feasibility, in detail.

4.2.1. Parking support

The context: The trade off between EV driver satisfaction and financials.

As mentioned before, installing charge points can be become quite an investment, with the price ranging from 900 euro to a few thousand euros for only one charge point, depending on the type and the required electricity infrastructure in the building and parking lot. Companies that are not able to meet the demand of charge points, because they are not capable or willing to make an extra investment, they are not the property owner or the charge infrastructure installation takes its time, have to disappoint their EV drivers. Finding a parking spot at the office even without EV’s could already be a problem in some cases. With the extra must-have of charging, to have enough battery to continue the travel plans for the day, finding a parking spot with a charge point can even result in more hassle. Drivers can experience stress, by not being sure whether they will be able to park and charge their car enough, to get home or get to a meeting safely. Besides, drivers can experience frustrations with their colleagues, when charge points are not fairly shared and when some occupy a charge point for the whole day without having the need for it. Currently, colleagues can manage charge spots sharing with whatsapp groups or with specific sharing applications, to agree who will replace the car when. At some offices, like the LPNL office in Almere, a park assistant rotate the cars for the EV drivers during the day. However, with the CV, a smarter and more personalised system is introduced here.

Anna gets a notification in the morning, when she is still at home: it will be a busy day at the parking lot and the system calculated a personal charge & park plan for her. A time slot for charging is given to her. Based on her agenda, the system found a good moment for her to replace the car during the work hours. Though, she has the option to choose for another time slot, in case that better fits her scheme. However, she chooses the initial option and now she knows exactly when and where she can park and charge. She feels at ease that she only occupies the charge point for just the amount of battery that she needs.

Thomas has no need for charging, but maybe a last minute meeting is scheduled in the afternoon, where he needs extra battery for. He sets his preferences in the system on the ‘confidence mode’, so he is sure that if a meeting will come up, his car is charged enough. During a quiet day, the system would give him a place to park and sets him at rest that he is not claiming a spot while some else needs it. However, it is a busy day and the moment when Thomas adds the new meeting to the agenda, he is first in line and he can replace his car to a charge spot.

Peter has no need for charging, but he is very flexible in time during the day, which means he has some time to replace the car for someone else. He turns on the ‘flexible mode’. During the day, one of his colleagues needs to charge, because of a last minute meeting. Peter is asked to replace his car to make room for the other colleague and place it back later during the day. The system makes sure he will still be charged enough and in this way he can help out a colleague.
The idea: The parking support system
The parking support system delivers optimal efficiency in charge point occupation. The system generates a prioritisation engine, where the EV drivers are fairly ranked in who may occupy a charge point and when. The system gathers the real time battery levels and charging status of each vehicle in the EV fleet, provided by the CV. Besides, with the agendas of the drivers the system has insight in the travel plans. The system can precisely indicate what battery level is desired for which driver, to exactly realise the travel plans for the day. With the data of the specific route and its speed limits combined with the real time and expected traffic conditions, the desired battery level can be indicated even more precisely. Moreover, with more data from the CV about the driving behaviour, like that a more aggressive driving style results in more electricity consumption, the indication will also become more accurate. With the combination of the desired battery level and the real time battery level, the system knows how much the car needs to be charged. The system uses this input together with the location of the car, the agenda of the driver and if needed general information of the employee’s car type (a Nissan Leaf 10% battery is not the same as a Tesla’s 10% battery in terms of range) and function priority (like the CEO has maybe more priority in charging then someone else). In this way, a prioritisation engine creates a parking lot planning and waiting list. The system provides the driver with a personalised park & charge planning. From there, several options are available: the driver is given the suggestion to charge elsewhere, the employee’s car type (a Nissan Leaf 10% battery is not the same as a Tesla’s 10% battery in terms of range) and function priority (like the CEO has maybe more priority in charging then someone else). In this way, a prioritisation engine creates a parking lot planning and waiting list. The system provides the driver with a personalised park & charge planning. From there, several options are available: the driver is given the suggestion to charge elsewhere, the driver is given a time slot when the driver may charge, the driver is asked to replace its car after some time. When arriving at the office’s parking lot, the driver is guided to where he is allowed to park.

The added value: Efficient usage of resources, while meeting the drivers needs.

Driver
With the parking support system, the driver can be confident that he is able to charge his battery enough to realise his travel plans. The charge points are shared among the colleagues in a fair way, which lead to less frustrations. Besides, the driver has insight in how the charge & park plan and the prioritisation list is build up. The system saves the driver time and effort, by calculating the desired battery level and a by creating a personalised charge & park plan. The flexibility for the driver for last minute departures is increased, because the system enables better shuffling of the parking spots. Furthermore, the driver can still intervene in the system and set preferences, for being more in control.

Client
With the parking support system, the office’s charge points are optimal occupied, which minimises the need for investments for clients. Moreover, the parking support system also collects and generates a lot of data about the EV fleet behaviour and performance. With this data, tailored advice about charge infrastructure expansion can be created with its expected impact, based on the real fleet data.

4.2.2. Priority load balancing

The Context: The trade off between EV driver satisfaction and financials
Some companies are able and willing to invest in more charge points, though it depends on the building’s and parking lot’s electricity infrastructure whether enough capacity is available to give each charge point the right amount of capacity to charge a car in a desirable time frame. To then expand the electricity infrastructure to do so, the investments can become way higher than just a few thousands euros [Funda in Business, 2019]. Currently, some charge points operators provide load balancing, where the the load, the capacity, is divided over the charge points by making each charge point stop for a small moment, so other can charge the cars faster [Nuon, 2019]. With the CV, load balancing can be used even smarter, not just for efficient usage of the available capacity to exactly meet the needs of the fleet, but also to increase flexibility.

The idea: The priority load balancing system
The priority load balancing system delivers optimal capacity usage to charge the fleet in the most efficient way. This system works the same like the parking support system and also generates a prioritisation list, based on the combined data streams described there. Though, in this system an extra data stream comes in: the information from the energy management system and the charge points, about the capacity availability and division. Besides, there is an extra output towards the energy management system and the charge points on how the capacity should divide. In this way, the driver who is first in line receives the most capacity, so his car is charged faster. In case not enough capacity can be delivered to charge each vehicle according to its travel plan, drivers could be advised to charge elsewhere (for example at the destination of their meetings). With more information about the fleet’s
behaviour, so the expected energy demand of the EV drivers, combined with the predicted capacity needed for the building, the system can become more advanced. In this way, efficient capacity usage can be taken to the next level, by also steering the capacity usage in the building. Priority Load Balancing can be combined with Parking Support as one system and one application.

**The added value: Efficient capacity usage to increase flexibility in the fleet.**

**Driver**

With priority load balancing, the driver can be more confident that his car is charged enough for his travel plan. Even when last minute changes in the travel plan occurs, the system makes sure his car is charged enough. Additionally, the driver has insight in the prioritisation list, so he can understand why his car is charged faster or slower.

**Clients**

With priority load balancing, clients can make efficient use of the available capacity and therefore the need for more investment in electricity infrastructure can be minimised. Moreover, the flexibility of the fleet can be increased, which lead to more satisfied employees. Furthermore, also for this design solution, a lot of insight is created in the fleet behaviour and the charge infrastructure performance. LP can provide the client with tailored advice, based on this data, for optimal expansion which perfectly fits the fleet’s needs.

**Scenario: the priority load balancing system**

**Anna**’s car is parked at the office parking lot and is being charged. A last minute meeting is added to her agenda and her car needs to be charged even more. She is now **first in line** in the prioritisation list and she will receive **more capacity** than others, but also just enough capacity, so her car is charged enough before she needs to depart to her meeting. All the time she has insight in the charge session and the battery level of her car, but also in the charge plan. She felt at ease, because she knew her car would be **charged enough** for her to get to her meeting.

**Thomas**’ car is also parked and charged at the office. He parked the car there an hour ago, but he sees that the battery level didn’t increase that much as he expected. However, he has **insight** in the prioritisation list and his **personalised charge plan**, so he is **confident** his car is charged enough at the end of the day to get home.
4.2.3. Short term business model

By the use of the 9 building blocks from the Business Model Canvas (BMC) [Osterwalder & Pigneur, 2010], the relevance and the values of the short term design solutions, for the customer, for LP and for stakeholders, are further explained. Figure 17 gives an overview of the BMC. In case a specific element in the BMC only refers to one design solution, then it is highlighted.

Customer segments

The customer segments described in figure 17 are based on the insights about the client’s and driver’s needs and problem discussed in the design direction subchapter. These are short term unmet needs.

Value propositions

With the value propositions formulated in figure 17, LP meets the needs of the customer segments. In this way, LP can tackle the threat of substitute, because LP differentiate from its competitors. If we look at LP’s direct competitors, that currently offer trainings and advice for their clients in the EV transition, LP can create competitive advantage: because LP takes also the driver experience into account and LP offers tailored advice based on the real fleet behaviour. If we look at the parties that already offer similar services (like some charge point operators, charge service providers, energy providers, grid operators etc.), LP distinguishes itself with the CV as its asset: because the CV brings optimal efficiency, more flexibility, less hassle, personalisation, support throughout the customer journey and advice based on the real fleet behaviour.

Customer relationships

With these services, LP establishes personal relations with the client and the driver. LP as the zero emission accelerator, becomes the client’s partner in the transition and offers the client a tailored EV package, exactly based on the client needs. By helping the driver with the struggles the EV brings, LP establishes a valuable relationship with the driver.

Channels

The driver will interact with LeasePlan Charging application and the client can monitor and have insight in the service feedback and advice via the MyLeasePlan Fleet Manager application.

Key partners

- OEM’s: CV data
- Charge point operator: charge point installation and management control system over the energy & load division.
- Cloud & software parties: harmonizing the OEM’s data stream. Developing and monitoring first versions of the intelligent back-end system.
- External API’s: parties: Route & traffic conditions data. External charge point location and availability data.

Key activities

Development:
- Establishing partnerships
- Back-end intelligent system
- Front-end application
Operations:
- Gather, process and analyze data.
- Customer service and interim feedback and advice moments.

Key resources

- CV & EV fleet, data access
- Charge infrastructure & energy management system (EMS)
- Plug in of driver agenda.
- Intelligent software, cloud servers, data science.
- Data scientist, processors, back-end & front-end developers, ux designers.

Cost structure

- (Smart) charge point & infrastructure installation
- Data access: CV data, external API’s, charge points & EMS
- Control: charge points & EMS
- Development: Intelligent system & front-end application
- Intelligent system running
- Customer service & fleet management client advice

Value propositions

The services deliver the client:
- Efficient usage of charge infrastructure, to minimize investments, for earlier facilitation readiness for the fleet demand.
- Tailored advice for optimal charge expansion infrastructure, that exactly meet the facilitation demand, based on the fleet behaviour.
- Support in the stress and hassle around charging and parking at the office.
- Support in thinking about the need for charging, by generating a personalized charge plan.
- Increased flexibility of departure, by smart load division.

Customer relationships

- Tailored advice and personal support throughout the service usage
- Stimulation for further usage

Driver:
- Help throughout his electric driving journey

Channels

- For promotion: regular LP channels
- During usage: LeasePlan Charging app & MyLeasePlan Fleet Manager

Customer segments

- Clients who want to [further] electrify their lease fleet and who want:
  - Knowledge and insight in the financial, operations and sustainable impact
  - To keep the investments down
  - To meet the EV drivers needs in facilitations
- Business lease drivers, current or future EV drivers who want:
  - To do good, but who are not willing to spend extra effort and give up comfort and flexibility

Revenue streams

- Regular: Charge point and infrastructure installation at offices and at homes & energy costs
- Monthly or one time in contract revenue stream from the clients for services. Indirect:
  - Fleet data: insight in battery life performance & residual value estimations.
  - Charging session steering to maintain battery life longer.
  - Data for other purposes: predictive maintenance, steering and control.

* See newmotion.com/NL/slim-laden-wat-houdt-dat-in & allego.eu/nl-nl/zakelijk/slim-laden
Revenue streams
It is not needed for LP to ask a high price for the services and the tailored package, since the indirect revenue streams are of great advantage for LP. As explained before, LP’s business is mainly about making good estimations for the residual value at the end of the lease period, so LP can make profit when reselling the car. With the EV, the residual value is mainly based on the battery life. Since LP has not a lot of experience yet with EV’s and the residual value, this becomes quite an uncertainty for LP’s business. With the data from the connected fleet, LP can learn how the driver behaviour and other factors are in correlation with the battery life. With big data streams, LP can optimize the estimation models for the residual value. Moreover, since the battery life is of great influence of the residual value, it is favorable for LP to maintain the battery life the best way possible. With the introduced services, LP has control over the charging session plan and can steer the sessions to charging strategies to better maintain the battery life. Slower charging session and not till 100% charging can have a positive influence on the battery life, but with the big data streams from LP connected EV fleet, LP can investigate the best charging strategies per car model, to maintain the battery life in the best way. Furthermore, in the discover chapter attention is paid to the benefits of the CV for LP’s business. With these service, LP can indirectly profit from the insight in the battery life. Since LP has not a lot of experience yet with EV’s and the EV, the residual value is mainly based on the battery life. Though, LP needs to set the price that LP will ask the client for these services, doesn’t have to be that high, since both New Motion and Allego already offer load balancing services.

Key partners
The key partners for LP to realise the services are the OEM’s and a charge point operator. With some OEM’s, LP could outsource this in the first phases of the implementation and dependency on the grid. The high electricity consumption in the evening, combined with the low electricity consumption in the morning, is a challenge for the electricity grid. To minimize the investments for electricity and charge infrastructure, the fee for data access and control over the charge points and energy management system.

> Key resources & Key activities
In figure 17, the key resources and key activities are described on a generic level.

> Short term design solutions

> Parking support
For clients that cannot meet the demand for charge points for their fleet or want to minimize charge point investments, they can use the Parking Support service to enhance charge point occupation. The drivers are guided, by a given time slot or suggestions, in when and where they might park at the office’s parking lot to charge and if they want to replace their car to make room for a colleague. The given park & charge plan to the driver is personalized, by being based on the driver’s real time battery level, the travel plan and the charge point availability. Parking Support results in fair sharing of the charge points and thus in less frustrations and uncertainty for the driver.

> Priority load balancing
To minimize the investments for electricity and charge infrastructure, Priority Load Balancing enables smart electricity capacity division over the charge points, by taking the battery levels and the drivers’ travel plan into account. In this way, the cars that have to leave earlier or need more battery level, are charged earlier. This service also enables a little bit more flexibility in the driver’s travel plan.

> Short term business model
It is most important for LP to collaborate with OEM’s to receive the CV data stream by the installation of a telematics box, in collaboration with a telematics service provider. However, OEM connectivity is more preferred, as explained in the discover chapter. Since the OEM connected data structure will be different per OEM, LP could consider a collaboration with a cloud & software party to harmonize the OEM data streams, or LPD could realise this internally. LPNL is currently collaborates with the charge point operator NewMotion, while LPCorp will start to collaborate with Allego to cover the international market. Both parties could be a potential partner to realise the services, because both New Motion and Allego already offer load balancing services.

To develop and manage the intelligent back-end system for the services, LP could outsource this in the first phases to a cloud and software party. When LD developed the capabilities and resources internally, LP could realise this internally.

Lastly, LP needs to collaborate with parties to gain the APIs for route and traffic information.

Cost structure
Here the cost structure of the services are described on a very generic level. The main costs will go to the system development, front-end application development, running the system and getting access to the several data streams.

The key partners for LP to realise the services are the OEM’s and a charge point operator. With some OEM’s, LP could outsource this in the first phases of the implementation and dependency on the grid. The high electricity consumption in the evening, combined with the low electricity consumption in the morning, is a challenge for the electricity grid. To minimize the investments for electricity and charge infrastructure, the fee for data access and control over the charge points and energy management system.
4.3 Middle term design solutions

This subschapter presents the middle term design solutions, that response to the megatrends in further carbon footprint reduction and car sharing.

4.3.1 Smart charging

The Context: The trade off between hassle free and renewable energy charging
As explained before, charging at the moments when the energy prices are the cheapest, when the most renewable energy is available and when you can contribute to a balanced energy grid, is called smart charging. LP in clear: smart charging brings extra hassle, the driver has to fill in the information himself and spend more time and effort on thinking about his travel and charging plans. The expectations of smart charging were expected to more be ‘smart’, as what the name indicates. Besides, the driver experiences a bit more stress, he sees in the OEM’s connected vehicle app that his car stopped charging, without knowing the reason or knowing if the car will be charged enough at the end of the session. Furthermore, the driver is not totally aware of why he is doing smart charging and is curious about the impact it has on his financials or footprint. The CV can decrease the hassle in smart charging and stimulate the driver to use smart charging in more situations with the impact pictured.

The idea: The smart charging system
The smart charging system 2.0 delivers less hassle and more insight for the driver. The system is comparable to the priority load balancing system: with the data about the real time battery level of the car combined with the driver’s agenda, the desired battery level can be determined. Though, an extra data stream comes in: the real time and expected energy prices and type [ratio green or gray energy]. The charge session is automatically altered depending on the energy prices, the peak load, the availability of renewable energy and the desired charge plan. In this system, a personalized desired charge plan

Scenario: Smart charging

Anna arrives at the office and just regularly plugs in her car in a charge point. In the afternoon she has a meeting where her car is now charging for. In the morning, she checks the car’s charging status. However she sees that her car isn’t that much charged as she expected. Though, the system tells her why it isn’t charged that much yet, because the energy prices are high at the moment. The system shows her her charge plan: later in the morning the prices are lower, then the car will be charged and it makes sure the desired battery level is achieved. Just before she wants to leave for her meeting, she checks again and she sees that her desired battery level is achieved and that system saved some energy costs for her.

Peter’s charging costs are covered by his employer. Today he has extensive travel plans for work, however he is flexible in when and where to charge is willing to do smart charging on the go to do something good, so he chooses for the “go green mode”. The system generates a personalized smart charge plan for him and suggest when and where he can charge the greenest while it fits his travel plans. While he is on his way, the system gives a charge plan update, the most renewable energy is available now based on a weather change. The system suggest him to charge at the location of his first meeting. After charging, he can see directly the impact of his go green mode, in terms of the renewable energy ratio consumption.
is automatically generated, based on the desired battery level and departure time. In this way, the system makes sure the car is charged the greenest and cheapest, whilst the driver can still realise his travel plans. The driver experiences less hassle, since the system creates the travel plan automatically. The system then communicates back to the driver how the charging session is going and what it saves for the driver. Smart charging doesn’t have to happen only when the car is plugged in to the charge point, but the system can also steer the driver up front. With insight in the driver’s travel plan, the system creates a personalized charge plan and suggest when the driver can best charge his car: at home, at the office, at an external location or on the way.

The added value: Cheap & renewable charging sessions with least effort required.

**Driver**
With smart charging 2.0, the driver can save energy costs and reduces it carbon footprint with the least effort required, because the system saves costs automatically without any acts from the driver. Additionally, The driver has direct insight in the energy costs savings and the renewable energy usage contribution. In case the driver is not interested in energy cost savings (when the employer covers the energy bill) or reducing his CO2 footprint, the system can still realise this without the fact that the driver has to spend a lot of effort. The driver only needs to keep his agenda updated (also with tentative meetings) and needs to sometimes check the system to trust that the system will does his work and achieves the desired battery level. Furthermore, the system gives the driver suggestions or options and he can still intervene in the system and change his settings or preferences to keep optimal control and increase flexibility when needed. In case the driver is more interested in reducing his footprint, the system provides him the option to generate smart charging plans on the go.

**Client**
In case the driver isn’t interesting in smart charging, probably his employer is. With smart charging, the client can save energy costs. In case the energy costs for the fleet are included in the contract with LP, then LP can give the client a cheaper offer. Besides, smart charging reduces the client’s CO2 footprint and in that way the client can achieve the sustainable targets and create a better company image. The system shows the client how much impact smart charging is really making with his fleet. The client can create an honest sustainable image claim, based on real facts. Additionally, the client can change his preferences in the smart charging system and steer more towards costs savings, sustainability, or driver satisfaction.

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### 4.3.2. The connected & electric shared

**Context: the tradeoff between hassle free and electric sharing**
As explained before, sharing seems to be an unavoidable trend in the future of mobility. Sharing is also an answer to sustainability. By reaching optimal efficiency of the fleet, less cars will be used, which contributes to a healthier environment and to freeing the space in crowded urban areas. Presently, LP runs a pilot for a shared pool at the client’s workspace with the use of CV’s. Some of the key features of these connected shared cars are: having access to the car without a key, trip planning and checking available cars nearby. Soon LP needs to realise this shared pool service with EV’s to achieve its zero emission fleet target and to meet the demand of the customer. Though, as mentioned before, the EV provides less efficiency in terms of charging and parking. Insight in the real time battery level and the charging status, provided by the CV, is thus of great importance to increase efficiency.

**The idea: the connected and electric shared pool**
The connected and electric shared pool delivers a seamless experience when sharing cars across employees and delivers for clients optimal efficiency of the fleet usage.
Scenario: The connected & electric shared pool service

Anna reserved a car from the shared pool for a meeting later that day. She really needs to arrive to the meeting on time and hopes that a car is available for her and with enough battery level. Luckily, the system has given her a car and tells her that the car is reserved by someone else before, but that the driver will arrive on time since he already returned and the traffic conditions are good. Besides, she doesn’t have to spend time for charging, since the car is charged enough the moment she will use it. She also knows where the car will be parked at the office parking lot. Now she can let go of the stress, because she knows she will get to her meeting on time.

Thomas is making use of a car from the shared pool and at the end of his trip he returns back to the office parking lot. The system in connected with the car’s dashboard and tells Thomas where he can park the car and asks Thomas to plug in the car for charging.

Peter is making use of a car from the shared pool and soon he will arrive at the destination for his meeting. The system is connected with the car’s dashboard and tells Thomas that the car needs to be charged. The system kindly asks Thomas to park the car at a specific location close to his destination. Because, the system just checked the availability of the external charging spots close to his destination and found a perfect spot for Peter. The system reserved the charging spot and Peter has now a place to park and he could now charge the car, so a colleague could use the car right after him, without spending effort on thinking whether, where and when the cars needs to be charged.

The connected and electric shared pool can become more advanced in combination with parking support, priority load balancing and smart charging.

The added value: seamless electric sharing and optimal usage of the fleet

Driver
With the connected and electric shared pool management system, the driver can benefit from a more seamless, transparent and reliable sharing experience. Besides, the driver can benefit from experiencing less uncertainty, stress and effort and time spend compared to a normal sharing service, since the system proactively steers the driver and provides him with the right information at the right moment.

Client
With the connected and electric shared pool management system, the client can take fleet efficiency to the next level. The client can reduce costs by using only the amount of vehicles and infrastructure needed to meet the demand of his employees. Furthermore, the client can contribute to more livable and cleaner cities.

4.3 Middle term design solutions
4.3.3. Middle term business model

The short term business model serves as the base for the middle term business model. There are only a couple of additions and adjustments in just a few building blocks. Only these will be discussed here.

Customer segments
An addition to the customer segment is that newer generations are more willing to actively reduce their carbon footprint and to accept sharing services, as explained in the discover chapter. However, they still highly value flexibility and efficiency and are not willing to spend extra time and effort. They see sharing as great solution to solve the livability in crowded areas and to only use what you need for greater sustainability. From the client perspective, companies see this as a positive change since they can reduce the amount of cars in the fleet, which is financially more attractive. The smart charging service is meant for clients that already settled their charge infrastructure but want to gain cost and footprint optimisation.

Value propositions
The value proposition of smart charging is focused on cost optimisation, more renewable energy usage and contribution to the broader zero emission transition by a more balanced energy grid load. When the EV’s charging session is moved to another moment or adjusted, high peak moments for the grid can be prevented. In this way, less grid expansion and reinforcements are needed, that results in earlier readiness of the electricity grid for the amount of expected EV’s. The value proposition of the connected and electric shared pool is clearly described in figure 18.

Key partners
- Energy provider: energy prices and energy mix data, transaction system.
- OEM’s & CV data.
- Charge point operator: charge point installation and management control system over the energy & load division.
- Cloud & software parties: harmonizing the OEM’s data stream. Developing and monitoring first versions of the intelligent back-end system.
- External API’s: Route & traffic conditions data. External charge point location and availability data.

Key activities
- Development:
  - Establishing partnerships.
  - Back-end intelligent system.
  - Front-end application.
- Operations:
  - Gather, process and analyze data.
  - Customer service and interim feedback and advice moments.

Key resources
- Real time & expected insight in energy prices and mix.
- Access to car’s dashboard.
- Charge infrastructure & EMS.
- Plug in of driver agenda.
- Intelligent software, cloud servers, data science.
- Data scientist, processors, back-end & front-end developers, UX designers.

Value propositions
The services deliver the client:
- Energy cost & carbon footprint reduction and contribution to the acceleration of the society’s zero emission transition, by change in charging behaviour and charging sessions. Minimum fleet and charge infrastructure investments and the contribution to a livable and cleaner city, by optimal fleet efficiency and tailored advice, with the use of an electric shared fleet.
- The services deliver the driver:
  - energy costs & carbon footprint reduction, contribution to the acceleration of the society’s zero emission transition, with the least effort and hassle required. seamless, hassle free, reliable, transparent and flexible sharing experience with EV’s.

Customer relationships
- Clients: Tailored advice and personal support throughout the service usage.
- Stimulation for further usage.
  - Driver: Help throughout his electric driving journey.

Channels
- For promotion: regular LP-channels.
- During usage:
  - LeasePlan Charging app.
  - LeasePlan Shared Pool app.
  - MyLeasePlan Fleet Manager.

Cost structure
- (Smart) charge point & infrastructure installation.
- Data access: CV data, external APIs, charge points & EMS, energy prices & mix.
- Control: charge points & EMS.
- Development: Intelligent system & front-end application.
- Intelligent system running.
- Customer service & fleet management client advice.

Revenue streams
- Smart charging.
- Connected & Electric shared pool.
  - Regular: energy costs.
  - Monthly or one time in contract revenue stream from the clients for services.
  - Revenue streams from grid operators and governmental institutions.
  - Indirect:
    - Fleet data: insight in battery life performance & residual value estimations.
    - Charging session steering to maintain battery life longer.
    - Data for other purposes: predictive maintenance, steering and control.

Figure 18: Overview of the business model canvas for the middle term design solutions
Customer relationships & Channels & Key activities
For both middle term design solutions, this is not different from the short term business model.

Key resources
In addition to the short term business model, real time & expected insight in the energy prices and mix is needed to realise smart charging.

Key partners
To gain insight in the energy prices and mix, LP needs to collaborate with an energy provider. LP needs to find a energy provider who has the same ambitions in charging when the most renewable energy is available and steering the charge moments to balance the energy grid. The energy provider van de Bron, who is partnering with Allego, would be a potential partner in the Netherlands, since Van de Bron already offer smart charging services*. However, LP needs to find a partner to cover the service on an international level. All the other partnerships have the same role as described in the short term. Though, LP could explore whether a collaboration with a sharing service provider, which already have the back-end and front-end digital infrastructure of a regular sharing service, would be a profitable option.

Cost structure
The only addition to the cost structure is the costs for the collaboration with the energy provider, to receive the data about the energy prices and mix. Besides, the intelligent system and fleet management system need to be expanded.

* See https://vandebron.nl/elektrisch-rijden/slim-laden

>> Middle term design solutions

>> Smart charging
With smart charging, the charging session is automatically altered to charge during the moments when the most renewable energy is available and when the energy prices are the lowest, with the least effort required from the driver. Besides, the driver can be guided throughout the day when and where he should charge to make the biggest financial and sustainable impact. This results for clients and drivers in cost optimisation, further reduction of the CO2 footprint and the contribution to the acceleration of the society’s zero emission transition.

>> Connected & electric shared pool
For clients that want to minimize the fleet and charge infrastructure investments, a shared pool is a great solution, especially when more drivers are less attached to car ownership. With the connected & electric shared pool, drivers can experience a reliable, flexible, transparent and hassle car sharing service with an EV. The driver is guided in which car to take and if he needs to park and charge this car. By insight in the real fleet behaviour, fleet and charge efficiency can be optimized.

>> Middle term business model
LP needs to acquire the insight in the energy mix and prices by collaborating with an energy provider. Because smart charging is beneficial for grid operators and governmental institutions, LP needs to explore the possibility for sponsorships.
4.4

Long term design solutions

This subchapter presents the long term design solutions, where EV’s can store renewable energy with the vehicle-to-grid technology.

4.4.1. Local energy storage

The context: reducing gray electricity production and realising self sufficiency

As described in the discover chapter, the batteries of EV's could serve as a great resource for renewable energy storage. In this way, superfluous renewable energy can be stored and used later when there is demand again, instead of being lost and becoming a waste. Besides, if renewable energy is stored when the production is high and the demand is low and used again when the production is low and the demand is high (and where gas and coal plants have to generate electricity to meet the demand), the gray electricity production can be reduced to a minimum.

More households and buildings are stimulated to and showing more interest for generating local renewable energy with solar panels *. These buildings can increase energy self sufficiency with the batteries of EVs as space for storage, realised with bi-directional charging technology, also called vehicle-to-grid technology.

For the clients of LP who want to take their sustainable targets to a higher level by reducing the use of gray energy and by realising self-sufficiency with only self generated renewable energy, this seems to be the solution. However, the client’s fleet also needs to meet the travel demand of the employees. With the CV, both can be met.

The idea: local energy storage system

The local energy storage system steers the [shared] fleet to increase local renewable energy storage, with the least effort and hassle required from the driver. The cars will be charged, even when they don’t need it to realise the travel plans, when more renewable energy is generated from the solar panels, than used in the household or office building. The cars will be uncharged and energy will be given back to the household or office, when the demand of energy is more needed in the building and the production is lower than the demand. The system manages the charging and uncharging when the car is connected with the chargepoint automatically, with the insight in: the car’s battery level, the car’s charge status, the car’s location, the travel plans of the employees and the generated and used electricity in the building. Moreover, when the car is not plugged in the charge point, the system still has insight in the total available battery capacity and the energy flow leaving and coming to the office. The system can then be integrated with the parking support system, to efficiently manage the circulation of cars between the charge points, so the most energy can be stored, or the most energy can be uncharged from the vehicles. Besides, the system can steer the driver to charge at the office instead of an external location, when the travel plan allows this and when a lot of green energy is generated at the office. For the system to create this steered travel plans, it also includes the expected energy offer, based on weather conditions and expected energy consumption in the building, and the expected energy demand of the fleet. Besides, also here the system can communicate safely with the driver via the car’s interface. With this system, the client can also indicate whether they need to purchase extra energy from the grid and for how much they need to pre-purchase this energy from the energy provider upfront, to pay the lowest price for the energy. To bring the system to an advanced level, employees that have solar panels at their household become part of the ecosystem. The system can than steer the fleet to keep the renewable energy in the ecosystem, so in the fleet or within the office building. The system might also include a automatic transaction system with the employees, to compensate the employee using his own generated energy at home for the fleet of for the office. Furthermore, the insight in the available fleet capacity and the fleet energy flow, can also be valuable to steer energy consumption in the office efficiently.

The added value: reducing gray electricity production and realising self sufficiency

Client

The local storage energy system helps clients to increase the usage of only renewable energy and to realise self sufficiency.

Driver

This system proactively steers the driver, but also proactively helps with the driver’s travel and charge plan, so the least effort is required from the driver, while the maximum impact can be reached. The driver has always insight the battery level and the calculations of the needed battery level and charge plan. Besides, the driver sees his contribution towards the zero emission & self sufficiency transition of the office. Furthermore, the driver and the client doesn’t have to deal with the transactions, since this is automatically handled in a fair and transparent way in the system.

* Insight gathered by informal interviews with LPNL account managers
4.4.2. Energy Shares

**The context: energy storage with fluctuating energy prices**

As explained in the previous paragraph, by storing renewable energy in the batteries of EVs, gray energy production can be reduced to a minimum. As explained earlier, the energy prices are fluctuating based on the supply and demand. To keep the energy grid to be balanced in supply and demand, the fluctuation in prices helps to achieve a more balanced energy grid. When the energy prices are high, there is a high demand in energy and a low supply of energy or the energy grid is close to its maximum load. When the prices are low, the demand of energy is low and the production might be high or the energy grid is close to its minimum load. With the CV, the driver and client can optimally store the superfluous renewable energy while playing with the fluctuations in energy prices.

**The idea: energy shares system**

The energy shares system steers the driver to charge when the prices are the lowest and uncharge when the prices are the highest. In this way, the system can make profit by the difference in energy prices when purchasing and reselling the energy. Because the system has insight in the car’s battery level, the car’s location, the driver’s travel plan, the real time and expected energy prices, charge point occupation and information about external charge points, the system can automatically make profit for the driver or create a travel and charge plan where the driver can make profit. Charging can here be combined with smart charging, so the charging session is stopped for a moment, or is running at lower of higher speed, aligned with the real time energy prices.

**The added value: making profit while contributing to a balanced energy grid**

**Driver**

With the energy shares system, the driver can save energy costs with the help of the system, that calculates the optimal travel and storage plan, with the least effort required.

**Client**

With the energy shares system, the client can save energy costs by steering the fleet for smart energy storage which brings the least hassle for it employees. Besides the financial benefits, both the driver and the client can contribute to a balanced energy grid and making the electricity generation by gas and coal plants unnecessary and thus accelerate the zero emission transition for the society.
Scenario: energy shares

Anna parked her car at a charge point at the office. Later that day, just before she has to leave, she checks the status of her car and sees that her car is charged enough for her to get home, but she also sees the system saved some energy cost for her, without any effort needed from Anna. In the morning the energy prices were low and her car was charged, in the afternoon the energy prices were high and the energy she didn’t need to realise her travel plan was sold back to the energy grid.

Thomas checks in the morning his personalized travel and charge plan created by the system. The system gives him two options, one is more focussed on a convenient route and the other is more focussed on saving money by storing and reselling the energy at the right moment. He chooses for the second option and he is steered to first charge at the meeting, then uncharge back at the office and recharge again at his final meeting location. The system shows him in the morning the expected energy savings and during the day the actual energy savings.

Peter is on his way to a meeting, but is always willing to save energy costs. The system steers him to charge his car on the way to the office, somewhere at a fast charge point or somewhere where there a flex working places available. Because that moment the prices are highest and he can receives the most money for the energy he had stored.

4.4.3. Long term business model

Figure 19 provide an overview of the long term business model canvas.

The customer segments LP will focus on with these services will have more sustainable ambitions.

The value propositions LP will deliver to the drivers are mainly about ‘with the least effort required’. Though, if the driver is highly motivated to contribute the zero emission transition or to save energy costs, he can choose to spend extra effort in realizing this. For example, the driver can choose to depart later or do a little detour for more sustainable or financial impact. The service just provides the driver with this option, but will in any case take away the most effort from the driver. The sustainable impact the client and driver can strive for, are described earlier under the ‘context’ header in the long term ideas.

LP strengthen the customer relationships, by becoming the client’s and driver’s partner in helping them to contribute to the broader zero emission transition.

For the revenue streams, LP have to explore the impact of bi-directional charging and the impact on the battery life and the residual value of the car, to set a profitable price for LP’s service offer. Furthermore, as described in the discover chapter, the government will greatly benefit from massive smart charging solutions that helps to balance the energy grid. The government would probably be interested in stimulating this, so the electricity grid needs less expansion which saves them a lot of investments, so the earlier the electricity grid is ready for massively charging EV’s, LP could explore the options for a subsidies or arrangements.

LP must be capable of having access to more resources, more data streams but also a transaction system. LP has to explore whether they can manage the transaction via LP Bank, in collaboration with the blockchain technology.

More key partners are added to the building block, but could have maximum control over the energy division and prices, which allows LP to profit as well when playing around with the fluctuations in the energy prices.
**4.4 Long term idea mapping**

**Key partners**
- Energy provider: energy prices and energy mix data, Transaction system, tailored energy deal.
- OEM's: CV data & EV's capable of V2G
- Charge point operator: charge point installation and management control system over the energy & load division.
- Energy management system/energy & charge infrastructure provider: to enable smart energy management in the building and over the charge infrastructure.
- Governmental institutions: to establish subsidies or other
- Solar panels provider: to deliver solar package in the client transition package.
- Grid operator: insight in prices & peak load.

**Key activities**
- **Development:** Establishing partnerships, Back-end intelligent system, Front-end application Operations.
- **Operations:** Gather, process and analyze data, Customer service and interim feedback and advice moments.

**Key resources**
- Real time & expected energy prices and mix
- CV's, charge infrastructure & EMS capable of V2G
- Blockchain enabled transaction system
- Plug in of driver agenda.
- Intelligent software, cloud servers, data science.
- Data scientist, processors, back-end & front-end developers, ux designers.

**Value propositions**

**Customer relationships**
- Tailored advice and personal support throughout the service usage.
- Stimulation for further usage.
- Help throughout his electric driving journey.

**Customer segments**
- Clients & drivers that want: to keep the energy costs down.
- To further reduce their CO2 footprint (for a good company image or internal motivations).
- To contribute to broader zero emission transition of the society.
- To realise energy self-sufficiency.

**Channels**
- For promotion: regular LP channels.
- During usage: LeasePlan Charging app, LeasePlan Shared Pool app & MyLeasePlan Fleet Manager.

**Cost structure**
- (smart) charge point & infrastructure installation.
- Data access: CV data, external API's, charge points & EMS, energy prices & mix.
- Control: charge servers & EMS.
- Development: Intelligent system & front-end application.
- Intelligent system running.
- Customer service & fleet management client advice.

**Revenue streams**
- **Local Energy storage**
  - Regular: energy costs & solar panel installation.
  - Monthly or one time in contract revenue stream from the clients for services.
  - Revenue streams from grid operators and governmental institutions.
- **Energy Shares**
  - Fleet data: insight in battery life performance & residual value estimations.
  - Charging session steering to maintain battery life longer.
  - Data for other purposes: predictive maintenance, steering and control.

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**Long term design solutions**

**Local energy storage**

With vehicle-to-grid technology, clients can use their fleet to store locally generated renewable energy by its solar panels. Charging sessions are automatically altered and drivers can be guided in their charge & park plan, to help themselves and their employer in realising self-sufficiency, while still meeting the fleet’s travel plan.

**Energy shares**

Drivers can smartly store energy from the grid in their EV, by playing with the fluctuations in energy prices. The driver is supported in the charge and uncharge plan to store when the energy prices are low and resell when the energy prices are high. In this way, the driver can make profit or the client can make profit by steering its drivers. Drivers and clients contribute in this way to more renewable energy usage and to the society’s zero emission transition.

**Long term business model**

Besides the intelligent back-end system and the front-end applications, LP needs to develop a blockchain enabled transaction system. This can be done internally.

In this way more control over the energy prices. To stimulate clients in realising net zero emission, LP can offer beside the charge point installation also solar panels installation, by collaborating with a solar panel provider. Additionally, LP should explore the possibility for sponsorships with grid operators and governmental institutions, since LP’s fleet contribute to a balanced grid.

![Figure 19: Overview of the business model canvas for the long term design solutions](image-url)
Deliver

Delivering the innovation strategy and the service
This chapter presents the design solutions in an innovation strategy, in the format of a tactical and strategic roadmap. Only the first two horizons are further conceptualised by the determination of the customer interaction, the service blueprint and the implementation. Finally, the innovation strategy and the concepts are internally and externally validated.

In this chapter:

5.1 Roadmapping
5.1.1 The innovation horizons
5.1.2 Timepacing
5.1.3 Tactical roadmap
5.1.4 Strategic Roadmap
5.1.5 Strategic fit

5.2 Conceptualisation
5.2.1 The customer interaction
5.2.2 The service blueprint
5.2.3 The service implementation

5.3 Evaluation
5.1 Roadmapping

In this subchapter, an innovation strategy is proposed for the design solutions presented in the previous chapter.

5.1.1 The innovation horizons

The Road Mapping method of L. Simonse (2018) served as a base for the creation of the innovation strategy for LP. The three horizons model (Baghai et al., 1999) is used to enable continuous innovation in order to realise the vision. The design solutions presented in the previous chapter were already separated in the short, middle and long term, roughly based on the insights of feasibility and desirability from the discover chapter. With the use of the three horizons model, these design solutions are now translated into an innovation strategy for LP, to become the reliable zero emission fleet accelerator.

Value enhancement
The first horizon in the three horizons model aims to bring enhancement in the value the company already delivers. As mentioned earlier, LP already supports the clients in fleet electrification. However, there is still enough room for LP to enhance the value they currently deliver. By offering Parking Support and Priority Load Balancing to the customer, LP can enhance the value they bring in the following way: acceleration of the transition by earlier readiness of the infrastructure, which is reached by efficient charge infrastructure usage that resulted in less investments. Besides, the EV driver experience is enhanced by the reduction of frustration, hassle and uncertainty. In this way, LP can expand its core business within fleet management advice and LP can enhance its strategy within 'the only thinking of driving experience'. Therefore, Parking Support and Priority Load Balancing, both with their value propositions presented in the previous chapter, are a great fit for the first horizon.

User-centered value creation
The second horizon of the three horizons model aims to bring new values to new market segments which differentiate from the existing. The first horizon already created a base for LP as the zero emission fleet accelerator. In the first horizon, LP did not incorporate the changes in the market segments needs yet. With Smart Charging, LP can deliver new value to the potential new market segment: as described in the discover phase, newer generations value

Figure 20: The innovation horizons for LP to become the reliable zero emission fleet accelerator
the reduction of their own CO2 footprint more, but still value comfort, low cost, flexibility, efficiency and hassle freeness. With the Connected & Electric Shared Pool, LP can also meet the change in needs for newer generations: space-savings and reduction costs by sharing, since less value is attached to ownership, but still value is attached to flexibility, efficiency and reliability. Both concepts are within the second horizon, though both concepts deliver a slightly different value proposition. Therefore, the choice was made to split the concepts in two horizons. See the next paragraph ‘Time Pacing’ why one horizon is placed earlier in time than the other. Although the concepts are splitted in two horizons, both are kept, because they both strongly contribute in realising the vision, as both concepts are part of the zero emission transition.

The first horizon has created the base of accelerating the transition for clients and the second (and thus also the third) horizon takes the definition of zero emission to the next level.

Value proposition creation

The third horizon in the three horizons model encompasses the creation of a new value proposition, with the integration of new technologies, new markets and new businesses. In the previous horizons, the value of reducing the CO2 footprint was already brought to a next level, but in this last horizon LP delivers value to sustainable ambassadors who want to realise self-sufficiency or who want to contribute to the broader zero emission transition. LP further enhances the acceleration of the transition, by further optimizing the energy cost savings. For LP to realise this new value proposition, they have to make use of new technologies that are currently still in development: vehicle-to-grid technology and blockchain. Additionally, LP has to develop a new business, which goes way beyond its CaaS business and LP can think of starting LeasePlan Energy or expanding the service of LP Bank.
5.1 Roadmapping

5.1.2 Time Pacing

The choice for the time frames of the horizons are explained below. These time frames were shaped with the use of the time pacing strategies explained in the Road Mapping book by L. Simonse (2018). The time frames are built upon the change of customer needs and the technology developments.

**Time frame first horizon: + 1-3 year**

The first horizon brings value enhancement within the current target market situation and therefore a short implementation and market launch would be desirable. From the technology point of view, a short implementation time frame would be feasible. Almost all EV’s are connected and all the newest produced models will have Priority Load Balancing, it is the combination that makes these concepts can be seen without Parking Support and sustainably beneficial. Besides, dynamic load balancing systems and its charge infrastructure is already on the market offered by some energy providers and grid operators. Though, the services LP would offer here go a step further than the current market offer: an intelligent data driven system needs to be developed. The main challenge for LP is the monetisation of the data, since LP needs to establish partnerships with the OEM’s and charge point operators. A second challenge for LP would be the market acceptance in terms of privacy. LP needs to set up the consent structure behind the services and LP needs to explore the privacy boundaries versus acceptance of the target market. The time frame here indicates are period between 1 to 3 years from now for implementation and market launch. Please consider that this is very rough indication and that it is mostly dependent on the development of the intelligent system and the challenges explained above.

However, the services from the first horizon will be part of LP’s product portfolio for a much longer period. Firstly, because the problems the services are solving, will exist for several years. On the one hand we see that charge points are expected to become cheaper, EV’s are expected to have a higher action radius, charging is expected to go even faster and that the installation of charge infrastructure will become cheaper when more buildings and parking lots are prepared for EV’s during construction (Funda in Business, 2019). Though, on the other hand we see the expectation of more EV’s in the client fleet and more overcrowded areas within the mobility infrastructure, due to urbanisation. This means that efficient handling of the charge spots and sessions will still be needed. Besides, the demand for efficient usage of resources will exist since even the smallest charge infrastructure savings are financially and sustainably beneficial.

Secondly, the services of the first horizon serves as a base for the concepts in the next horizons. Although these concepts can be seen without Parking Support and Priority Load Balancing, it is the combination that makes the product offer the strongest. The combination of the concepts are described in the develop chapter.

**Time frame second horizon: + 2-4 years**

The second horizon brings on the one hand value enhancement by reducing the costs when driving electric (which is already desired in the current target market), but on the other hand new value by further reduction of the CO2 footprint (which newer generations of clients’ employees are more interested in). Therefore, the smart charging concept needs to be launched when the newer generations make their entrance in the leasing world, which they will soon do. From the technology point of view, the situation is comparable to the first horizon. Some energy providers and grid operators offer smart charging, but again the smart charging concept presented here is more advanced, with the extra service the CV integration brings. Smart charge points and infrastructure is available, as we see in the competitors product offer. Again the challenge would be the development of the intelligent system and the monetisation of the several data streams enabled by partnerships. Though, the main challenge within smart charging is the establishment of the business model.

The real positive environmental impact and the costs savings need to be proven. It is really dependent on LP’s partnership with the energy provider, because behind the smart charging system there are the energy trading markets, where the prices are settled for the fluctuations in energy supply and demand. Another question is how these energy trading systems will change in the future with the rise of more EV’s. So the business model needs to be further developed and financially evaluated, to establish monetary costs savings and environmental impact for the customer, but also profitable business for LP. The time frame for the second horizon is with these insights roughly indicated for 2 till 4 years from now.

Something LP should have in mind is the development of smarter charge points. Currently the industry is working on a standard where the car and charge point can communicate with each other, to exchange information on about driver and the car’s state of charge and to enable smarter transaction system (Elaad, 2012). This would mean that the CV might not be needed to communicate the battery level, charging status and location, since this data can also be collected via the connected charge point. However, it depends how the car will communicate with the chargepoint, wired or wireless via telematics (and for telematics the CV is needed). This means that other parties, like an energy provider and a charge point operator can take over parts from the concepts presented here (since the CV asset, which is not is their possession, is not needed). However, LP can still distinguish itself from these parties with the parts where the CV is needed for. Because with those extra features, LP takes the concepts

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* This insight is based on the comparison of the several OEM’s offer in their EV’s feature

** For example Nuon, Allego and Mountax. See company websites.

*** For example van de Bron, Allego, Mountax and New motion. See company websites.
to an advanced and tailored system, which helps the driver throughout the customer journey and not just when the car is attached to a charge point. See the develop chapter for all the connected features of the concepts.

**Time frame third horizon: + 2-5 years**
The third time horizon is technically already feasible, but the market acceptance would take longer. Car sharing and EV’s are more valued by the newer generations, while LP’s current customer segment might show more resistance. Currently, LP offers in several countries car sharing solutions, as well as a shared company car pool. Also, they are piloting with connected car sharing. The first version of the electric shared pool can be launched very early in the time frame, maybe even earlier than smart charging. But, for the advanced connected and electric shared pool, where parking support, priority load balancing and smart charging are integrated, the market introduction will be placed later in the time frame. LP needs to profile their customer segments to predict what the optimal timing is for the massive launch for the advanced connected and electric shared pool. We can expect more acceptance of car sharing later in the time frame, when the urge for space-savings to improve the livability in cities is growing, due to urbanisation. We might expect that at some point, sharing seems the unavoidable solution to solve these problems.

**Time frame fourth horizon: + 5-9 years**
In the fourth horizon, LP meets the sustainable ambitions of probably the youngsters within Generation Y. That is one reason why these concepts will be placed later in time. But mostly, because vehicle-to-grid technology needs to mature, the intelligent system needs to be developed with a blockchain based transaction system and the business model needs to be established. Currently, vehicle-to-grid technology is only used within pilots, with the use of bi-directional prototypes of capable cars and charge points [see discover chapter]. It is hard to predict when bi-directional charging will be ready for the masses. Mainly, because this is dependent on the business model. Several parties see the potential and that is why they are exploring the field [see discover chapter], though the real financial and sustainable impact needs to be proven. During a conversation with Faraday Keys, they spoke about a roughly indicated time frame of around 4-5 years from now. Probably, the local energy storage concept will be launched earlier than the energy shares. Because in that situation, bi-directional charging is only used to balance the local generated renewable energy within the local ecosystem of the office, the households and the fleet. It can also be realised earlier because bi-directional charge points only need to be placed at the clients parking lot and the drivers households. Within the situation of the energy shares, it is about balancing the energy grid on a much wider scale, regionally or even nationally. Bi-directional charging must be possible here at more external charge points. In this situation, LP needs to collaborate closely with the energy providers and grid operators and have to enter the energy trading markets to establish the energy shares system. Both services are enabling more flexibility on the energy grid, which result in less investments for grid reinforcements [see discover chapter] and therefore the government and grid operators can earlier meet the electricity demand of the massive rise of EV’s from now till 2030. Probably, the government is therefore willing to stimulate the launch of services that contribute to a balanced energy grid. The more EV’s, the bigger the impact on the grid and thus another reason to place the services further in the timeline, when the government is more willing to support the development of these services. Another thing LP needs to explore, is the impact of bi-directional charging on the battery’s degradation. However, we can expect an increase for better battery lifes within newer car models.

Lastly, LP needs to build up LeasePlan Energy and further develop LP Bank to manage the service internally. With all the challenges involved, the last timeframe is roughly indicated for 5 to 9 years for now, which allow on average 2 lease cars lifecycle loops for LP.

**Vision 2028**
The vision is the end-point of the last horizon and is therefore placed in 2028.
5.1.3 The tactical roadmap

The tactical roadmap shows the innovation strategy presented throughout this chapter, based on the design solutions and business models presented in the previous chapter. The tactical roadmap provides an overview of the innovation strategy, while still addressing the several components: the market, the product, the back end system and the business model. This roadmap can be used for the internal communication, for the aligned with innovation, business and R&D management in the organisation. Besides, it also brings detail for product and program management.

### Transition acceleration
Providing a tailored transition package which fits the client’s resources and the needs of its drivers:

- **Efficient charge point occupation & capacity usage**
  - Park support
  - Priority load balancing

- **Avail more assessments by managing efficient usage of resources**

- **Tailored package advice by real insight in EV fleet behaviour & performance**

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<th>Value proposition</th>
<th>Market Trends</th>
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Providing a tailored transition package which fits zero emission fleet realisation

Realising the zero emission fleet with hassle-free renewable charging sessions.

Efficient fleet operations
Achieving optimal efficiency & sustainability by the electric shared pool service.

Full zero emission realisation
Enabling self-sufficiency and contributing to the broader zero emission transition.

Efficient renewable charging sessions

- Efficient renewable charging sessions
- Electric carpooling
- Renewable energy storage

Future Vision
2028

LeasePlan as the reliable zero emission fleet accelerator, providing clients optimal support in the transition and delivering a desirable EV driver experience.

2021 2nd Horizon 2022 3rd Horizon 2023 4th Horizon

Zero emission fleet realisation
Realising the zero emission fleet with hassle-free renewable charging sessions.

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Full zero emission realisation
Enabling self-sufficiency and contributing to the broader zero emission transition.

Future Vision
2028

LeasePlan as the reliable zero emission fleet accelerator, providing clients optimal support in the transition and delivering a desirable EV driver experience.
5.1.4 The strategic roadmap

The strategic roadmap shows the innovation strategy as well, but then on a more generic level by more visualisations. This roadmap can be used for external communication with stakeholders.

1st Horizon
Transition acceleration

Providing a tailored package that fits the client’s resources and the needs of its drivers.

1. Personalised park & charge plan for drivers
2. Tailored advice charge infrastructure based on real fleet behaviour
3. Minimise investments by managing efficient usage of resources

2nd Horizon
Zero emission fleet realisation

Realising the zero emission fleet with hassle free renewable charging sessions.

1. Do good with least effort required & keeping flexibility
2. Reducing costs while charging with renewable energy
3. Insight in the real sustainable and financial impact
3rd Horizon
Efficient fleet operations
Achieving optimal efficiency & sustainability by the electric shared pool service.

1. Reliable, transparent, & flexible car pooling with personalized trip planning.
2. Optimal fleet efficiency by shared pool management system.
3. Increase self-sufficiency, by using local green energy storage.
4. Contributing with a electric shared pool system.
5. Reducing costs, by optimal planning & selling.
6. Contributing to the society’s zero emission transition.

4th Horizon
Full zero emission realisation
Enabling self-sufficiency and contributing to the broader zero emission transition.

Vision 2028
LeasePlan, the reliable zero emission fleet accelerator, provides clients optimal support in the transition and delivers a desirable EV driver experience.

Local green energy storage
Connected & Electric shared pool
5.1.5. Strategic fit

The innovation strategy presented in this thesis with its fit to LP’s strategy, brand, product, customer, competitive landscape and market position is again substantiated here.

**Internal strategy fit**
LP wants to continue offering products and services that increase sustainability and reduce the CO2 footprint. Besides, LP wants to achieve net zero emissions from their fleet in 2030. LP is committed to take a leading role in the zero emission revolution and help their clients in the acceleration: ‘We work with some of the world’s largest companies on accelerating and facilitating the transition towards electric mobility.’ (LeasePlan, 2018). CEO Tex Gunning said: “As a leasing company with 1.8 million cars on the road, we have a responsibility to do everything we can to support the development of a more sustainable transport system. Our aim is to help create healthier environments in our towns and cities by promoting cleaner, low-emission vehicles and the infrastructure required to make these cars a viable option for our customers.” (LeasePlan Corporation N.V., 2019). The innovation strategy perfectly acts upon LP’s sustainable strategy and the role LP wants to take within the zero emission revolution. With the new product offer presented in this thesis, LP can do more to support the development of a more sustainable transport system and help to create healthier environments, because this offer will help the client to prepare better for zero emission vehicles. Additionally, it will contribute to a balanced energy grid that enables acceleration of the broader zero emission transition and it stimulates more renewable energy usage to reduce the CO2 footprint.

The innovation strategy also matches with LP’s general targets to reduce the total costs of ownership for the customer and improve driver satisfaction, as the new product offer promises to bring savings for charge infrastructure investment and energy costs, and the offer will improve the EV driver experience. Additionally, LP can leverage the latest digital technologies, with a purposeful use of the CV and blockchain. LP can also provide ‘what’s next in mobility’, since e-mobility and its fusion with smart energy management systems is what will transform the automotive industry.

Furthermore, this innovation strategy clearly pursues the LP’s employees experience the transition and the EV in use and can therefore better leverage LP’s aims towards clients. Concluding, with this target, LP internally develops knowledge and expertise about fleet electrification. LP is mainly known as a conservative and big lease company, but with its sustainable targets and actions towards fleet electrification, this image is slowly making a switch. With the presented innovation strategy, LP can proactively help clients with its own expertise in fleet electrification. This results for LP in a next step towards its image of the pioneer within electric lease vehicles and away from the conservative and gray organisation image.

**Product fit**
Currently, LP already offers a Charging App, EV consultancy services about charging infrastructure, charge point installation at home and at the office, a transaction charge card and fleet management advice. LP already helps the driver with the charging hassle and gives advice to clients, in collaboration with a technician and a charge operator, about the charge infrastructure installation and expansion. This innovation strategy brings these services and products to a next level. Additionally, LP needs to consider that not only the vehicle fleet is its asset, but also the many private charge points installed at offices and at homes. With these assets, LP can expand their influence within the zero emission revolution. As being the leading lease company, LP must also feel responsible for efficient energy management to further reduce the CO2 footprint and thereby play a role in tackling climate change.

**Customer fit**
This thesis handles a customer centric approach and the presented innovation strategy acts upon the needs of the clients and drivers in the zero emission transition. LP should be aware of the existence and rise of these customer needs, in order to find solutions to maintain the customer relationship. Currently, LP is aware that they don’t have strong customer relations yet and that the customer easily switches to competitors. With this innovation strategy, LP fulfills the novel customer needs and therefore prevents the customer switch-over. Besides, LP can establish a closer customer relationship by giving tailored advice and helping the driver throughout the customer journey. In this way, LP’s middleman position can shift towards an aggregator position.

**Distinguish from competitors**
LP will distinguish from the OEM’s, because this strategy is focused on providing support for the lease clients, that have vehicles from different OEM’s in their fleet. Furthermore, with the use of the CV as their asset, LP can enable smarter and personalised charge infrastructure and energy management and can thus distinguish from charge point operators and energy providers. Besides,
LP can help the driver throughout the customer journey and not only when he is plugged into a charge point. LP is a step ahead of their direct competitors within fleet electrification, mainly due to its own developed expertise and its bigger EV car model offer. Therefore, the customer expects further steps in EV innovation earlier from LP than from its competitors.

**Unique market position**
The scenarios sketched in this innovation strategy will definitely make a big change in the future of mobility and energy management and will be mainly taken up by OEM’s, chargepoint operators, grid operators, governmental institutions and energy providers. As stated earlier, LP needs to consider that with its [soon] big EV fleet and its [soon] big amount of private charge points, LP could play a big role in these scenarios and have influence in the realisation of a healthier environment. No party is active yet in the market where these scenarios are focused from the point of view of a client fleet and with the use of the CV. With this innovation strategy, LP can occupy this unique market position. However, there is a gap between this market position and LP’s core business. The best step for LP would be to launch this strategy under a new start-up, LeasePlan Energy, while still operating under LP’s big brand umbrella. In this way, LP core business stays recognisable for the customer, while he sees that LP is taking great steps in sustainability.

**Roadmapping**

**The innovation horizons**
The design solutions are placed into an innovation strategy by the help of the Three Horizons Model (Baghai et al., 1999), to ensure continuous innovation. Parking Support and Priority Load Balancing are placed in the first innovation horizon, because with these concepts LP brings value enhancement to the customer, by solving presently experienced problems, and strengthen its core business, by expanding its service offer of fleet electrification advice. Smart Charging and the Connected & Electric Shared Pool are part of the second innovation horizon, since they both deliver new value to new potential market segments. However, both concepts deliver different value propositions, therefore the choice was made to split the concepts in two horizons. Local Energy Storage and Energy Shares are in the last horizon, since these concepts entail the creation of new value propositions with the integration of new technologies, new markets and new business.

**Time pacing**
The first horizon concepts are technically feasible and meet current customer needs. Therefore a short implementation time frame would be desirable. Though the main challenges LP faces for implementation are: the development of the intelligent back-end system, the data monetisation by the establishment of partnerships and market acceptance in terms of privacy. The first horizon’s product launch time frame is roughly set to 1 to 3 years from now. The second horizon concept Smart Charging, is more desired by clients after the charge infrastructure and driver onboarding is settled. This concept is technical feasible, though LP needs to prove the revenue model, build strong partnerships and should explore the energy trading markets. For these reasons the time frame is set to 2-4 years from now. The third horizon timeframe is roughly indicated to 2-5 years from now, since the massive market acceptance of the Connected & Electric Shares Pool will take its time. For the fourth horizon concepts, the technology needs to mature and LP needs to expand its partnerships. This time frame is set to 5 to 9 years from now.

**Roadmaps**
The innovation strategy is presented in the format of two roadmaps: 1) the tactical roadmap gives an overview of the innovation strategy, but still give detailed information about the market and back-end system, 2) the strategic roadmap provides the information more on a generic level with more visualisations, for the communication with stakeholders.

**Strategic fit**
The innovation strategy meets LP’s strategy in doing everything they can to support the development of a more sustainable transport system. Although, LP is not known as a company that helps client in electric fleet acceleration, with the proposed strategy, LP can make the next steps in their company image switch, away from a gray and conservative organisation towards the pioneer in fleet electrification. The design solutions build upon LP’s current Charging App, EV consultancy offer and internal projects. If LP wants to avoid the threat of substitute and create strong customer relations, the proposed strategy is the right step. Despite that smart energy management will be mainly picked up by charge operators, energy providers, grid operators etc., LP has a big influence as well: wit its total fleet of 1.8 million vehicles and soon a comparable amount of private charge points, LP can take the responsibility to contribute to a healthier environment and cleaner cities, while occupying a unique market position.
5.2 Conceptualisation

This subchapter contains the conceptualisation of the first and second horizon, by further detailing the customer interaction, the service blueprint and the service implementation.

5.2.1 The customer interactions

At the following pages, the customer interaction with Parking Support, Priority Load Balancing and Smart Charging is more detailed by the presentation of possible applications screens and via storyboards. The driver interaction can be seen in the light blue boxes and the client interaction in the light gray boxes.

Parking support

Always insight in the real time battery level, on the way and during charging.

Based on your travel plans, a personal charge plan is created: when, where (which charge spot at the parking lot) and how much battery.

Before you leave you can change the charge plan by choosing between several parking time slots.

Receive notifications when you can make room for a colleague or when a colleague made room for you at the parking lot.

You can see directly the changes back in the new created personal charge plan.

Priority load balancing

Check out the expected charge plan, to have insight in the expected charging speed, based on the expected capacity availability.

Add a last minute meeting and become first in line to charge with full speed.

Check your personal charge plan and see why your car just charged till the exact battery level you need, to extend the battery life.
Smart charging

You just have to plug in your car and the app will manage the charge session based on your charge plan.

Have always insight in the real time charging status: battery level and charging speed.

The charging status is explained by status of the energy prices & energy mix.

Have insight in your personal charge plan and see exactly the battery level you need.

Based on your travel plans a personal charge is created to smart charge on the go: when and where you have to plug in.

Check the expected sustainable and financial impact of your smart charge session planned for on the go.

Check out your score of sustainable and financial impact of the day, the last period and compare it with colleagues.

You expect a last minute departure in the afternoon? Put on the confidence mode so smart charging is only applied when you can really make it.

You are flexible today and want to make extra impact? Put on the go green mode and make sure you charge during the best moments.

Add a last minute meeting, in the app or in your regular agenda and see directly how your charging session is adjusted.

The client interaction

Monitoring

Parking support

Office managers can monitor the parking lot occupation and include visitors.

Have insight in the efficiency of charge point occupation by the fleet and charge behaviour.

Have insight in the efficiency versus the driver satisfaction by the fleet and charge behaviour.

Receive tailored advice on if and how to expand the charge infrastructure, to meet the real needs of the fleet.

See expected impact of the given advice on the efficiency, cost savings and driver’s satisfaction.

Priority load balancing

Fleet and office managers can monitor the load balancing, by changing settings up front. They can steer the energy division: when should more capacity available for the fleet and when more for the office.

They can also monitor the energy consumption in the office, by real development in the fleet demand.

Have insight in the efficiency of capacity usage by the fleet, charge and energy consumption behaviour.

Have insight in the efficiency versus the employee satisfaction by the fleet, charge and energy consumption behaviour.

Receive tailored advice on how to expand the charge infrastructure, how to alter the capacity division in the building and how to alter the energy consumption in the building, to meet the real needs of the fleet and the energy consumption.

Smart Charging

Fleet manager can adjust settings for the fleet to steer drivers to make more financial or sustainable impact. The settings can also be changed to give the driver more freedom in smart charging to increase employee satisfaction.

Have insight in the real costs savings and sustainable impact.

Have insight in the financial impact versus the driver satisfaction.

Receive tailored advice on how to expand charge infrastructure to increase the sustainable impact.

See expected impact of the given advice.
5.2 Conceptualisation

Storyboard - Parking support
See here how the parking support system enables fair sharing of the charging spots and helps Anna, Peter, Thomas and Emma throughout their charge journey.

Anna
- Her travel plan
- Her charge plan
- Her current charge plan

Anna needs to go to work today and has an appointment in the afternoon. She uses the app to check her battery needs, which automatically calculates the number of available spots. She checks her travel plans and needs to be plugged into a charge spot after work. She realises she needs to charge more slowly to make sure she can get to her appointment on time.

Peter
- His travel plan
- His charge plan
- His current charge plan

Peter parks his car in the morning at the office and it is now charged enough for him to reach his work and appointment. He checks the app to ensure there are enough charge spots available.

Thomas
- His travel plan
- His charge plan
- His current charge plan

Thomas parked his car in the morning at the office and it is now charged enough for him to reach his work and appointment.

Emma
- Her travel plan
- Her charge plan
- Her current charge plan

Emma has not time to move her car for someone else today. She expects to have a last minute meeting in the afternoon, so she activates the confidence mode.

Storyboard - Priority load balancing
See here how the priority load balancing system enables efficient division of the capacity over the electric vehicles, to enhance flexibility for the driver.

Anna
- Her travel plan
- Her current charge plan

Anna joined a priority load balancing system, which automatically calculates her charge plan based on her travel needs.

Peter
- His travel plan
- His current charge plan

Peter personal charge plan is automatically calculated, based on the several meetings he has in the afternoon.

Thomas
- His travel plan
- His current charge plan

Thomas has a meeting at the office, so he activated the load balancing system in the morning and requested notification in the afternoon with the question to replace his car by another car.

Emma
- Her travel plan
- Her current charge plan

Emma is notified when the best moment is for her to move her car. She replaces her car with another car and it is guided to her reserved park spot.

Peter
- His travel plan
- His current charge plan

Peter requests the option which fits his travel pattern. A charge spot at the office is given to Peter and it is automatically reserved.

Thomas
- His travel plan
- His current charge plan

Thomas could notify when the best moment is for him to move his car, so he is happy he could do something good.

Emma
- Her travel plan
- Her current charge plan

Emma has a last minute meeting to move her car for someone else today. She expects to have a last minute meeting in the afternoon. To be confident that her car is charged enough in case the meeting will take place, she activates the confidence mode.

Anna
- Her travel plan
- Her current charge plan

Anna needs to leave her car at the office and it is now charged enough for her to leave her car during the day. She checks her travel plans and realises she needs to charge less in the early morning when her colleagues are in need and in the afternoon charged more to others.

Peter
- His travel plan
- His current charge plan

Peter has to leave his car at the office parking spot. The app lets him know when the next charge spot will be available.

Thomas
- His travel plan
- His current charge plan

Thomas might expect a last minute meeting in the afternoon. He knows his car is charged enough in case of the meeting takes place, so he activates the confidence mode. His car will now be charged more to be confident that he can go to the last minute meeting.
See here how smart charging creates energy cost savings and further reduces the CO2 footprint, with the least effort required from the driver.

**Storyboard - Smart charging**

Anna

Anna just parked her car at the office and plugged it into a charging socket. Her car needs to be charged for a meeting to drive to the airport in the afternoon and return home at the end of the day.

Her personal charging plan is calculated. The system knows how much battery is required for her meeting for its own plans.

When she has to leave, she sees that her car is charged enough and that her car can be charged for her meeting. He thus activates his confidence in the system’s ability to charge the car automatically.

The next day, Anna is out of her car charged and it still needs to be charged enough to be charged now, although the prices and fees are not desirable. She sees that the charge session is activated again, and that the battery level goes up when energy prices are high.

Thomas

Thomas might have a meeting in the afternoon. He wants to be sure he can make it there. Therefore, he activates the confidence in the system’s ability to charge the car automatically.

James is met and how satisfied they are with more sharing and sustainable impact will be when he will charge then. James is the best moment to go green.

Peter

Peter has several meetings planned for the day. He is always acting to contribute to a healthier environment and for his energy mix and prices are not desirable. He sees that the charge session is activated again, and that the battery level goes up when energy prices are high.

Based on his agenda, the charge point at your house is the best moment to charge the car. When her car is plugged in for 5 hours, but will only be charged during the moments when the energy prices are the lowest and when the most green electricity is available. Though her car will be charged according to the charge plan.

**Storyboard - Client fleet management**

Companies need to further integrate their fleet, but they are facing the need for extra investments to smart the fleet operation. The parking support system manages efficient sharing amongst the charge points and building.

The fleet manager can see the expected impact of the given advice. The system gives advice on the demand for charge infrastructure expansion.

Peter can see what the expected cost savings and sustainability impact will be when the meeting time is changed. He is committed and convinced in the booking of the right meeting.

For companies that are ready for further reduce their CO2 footprint and save energy costs, the system automatically manages the charge session and helps drivers to charge more green.

The fleet manager can see how much battery is required for its fleet. The system automatically manages the charge session and helps drivers to charge more green.

The system shows the expected impact of the given advice.
5.2.2. The service blueprint

Figure 21 shows the service blueprint when the driver interacts with the services. This service blueprint contains the service experience, the service output and the service back-end. In case an element in the service blueprint does not count for each service, only then it is highlighted (see legenda). See appendix G for rough overview of the back-end when the client interacts with the service.
# 5.2 Conceptualisation

## Replacement
- Why should I put extra effort in replacing my car now?
- Can I replace my car later during the day when I have more time?
- Checking notification where is kindly asked to replace my car to make room for a colleague
- Checking notification where they announce that I can replace my car to a charge spot for lower energy prices and renewable energy
- Checking notification to replace my car to a charge spot
- Check where I can charge and when exactly.
- Replacing car.

## Departure preparation
- Do I need to charge at my destination?
  - Where can I charge at my destination?
  - If I want to make more impact, when and where can I charge?
- Checking battery status
- Checking needed battery level.
- Checking the smart charge plan.
- Approving the reserved parking spot for the smart charge plan.
- Putting on go green mode and following smart charge plan.

## On the go
- Is it better to charge here or later somewhere else?
  - What is the financial and sustainable impact if I charge there and spend more effort?
- Checking the smart charge notification
- Check expected impact smart charge plan.
- Decide to follow the smart charge plan or not
- Charge the car to save cost/charge when more renewable energy is available.

## Reflection
- How much costs did I save?
- How much more sustainable did I charge?
- How sustainable are my colleagues charging?
- Checking scores
  - Checking scores colleagues.
- Checking notification where is kindly asked to replace my car to make room for a colleague
- Checking notification where they announce that I can replace my car to a charge spot for lower energy prices and renewable energy
- Checking notification to replace my car to a charge spot
- Check where I can charge and when exactly.
- Replacing car.
5.2.3 The service implementation

For the implementation of the parking support, priority load balancing and smart charging services, LP needs to establish and consider the following:

Insight in the size of the target segment
What became clear throughout this thesis is that clients experience or will experience the following problem by the expansion of their electric fleet: not being able or not willing to install enough charge points or to deliver enough load to the charge points to facilitate the charge demand of the employees. This became clear through desktop research, the product/service offer of parties in this field, informal interviews with LPD employees, an informal interview with Faraday Keys and by internal interviews with LPNL employees who are in close contact with clients who experience the above mentioned problem themselves (see evaluation subchapter). However, LP should gain insight in the real size of the customer segment that experiences this problem. From there, LP has to explore the size of the customer segment that is willing to use the services. Here LP needs to take in mind that the client might solve this problem by the use of existing products from chargepoint operators or energy providers and don’t see the extra need of the more smart and digitised service offer from LP. Profiling the client segment by the experience of the problem and their openness towards smart systems, should help LP to determine the market size and the adoption ratio of the new service offer. With profiling, LP can see which client segments are more open for their product and which factors play a role here (e.g. more demand in urban areas). The same counts for the smart charging service. How willing are LP’s clients and drivers to spend extra effort and time in saving some energy costs, charging with more renewable energy and to contribute to the broader zero emission transition? As explained before, the value that smart charging brings is a value that will be experienced later in time. LP needs to gain insight in the right timing, the size of the early adopters and in the adoption of the massive client segment.

Monetary value and revenue model
For parking support and priority load balancing the client will pay a certain price for the services, in the format of a subscription model or included in the contract. For the client, this price must be low enough to still experience the financial benefits when using the charge infrastructure efficiently. During the tailored quotation phase with the client, LP should advice the client if the usage of the service is really financial beneficial for the client. will it really saves investments for the client and how much? To set this price, LP needs to research what the average financial benefits for the clients are and what price they are willing to pay for this service.

Besides the client side, the internal revenue model must also be proven. How valuable are the data streams of the battery life and other car functionality status data for residual value estimation for LP? What control expects LP to have on the battery life endurance by steering the customer in optimal charging? What impact can these services have on the battery life and how much revenue will this generate for LP? With this indirect profit in mind, what price should LP handle to cover the costs and to generate profit?

Furthermore, smart charging promises to bring energy cost savings for the client or driver. These costs savings are not expected to be as high as the investment savings when charge infrastructure is used more efficiently. LP needs to further explore, by advanced modelling, what real cost savings and what real sustainable impact can be reached. In the first place, LP profits from the energy costs savings by the changed charge behaviour. How much of these cost savings can be subtracted from the client’s or driver’s monthly bill or contract, such that LP can still cover the costs and generate profit? The factors that LP should consider are: 1) Are the drivers willing to change their charge behaviour and spend extra effort and time just to charge with more renewable energy and have a small impact on the broader zero emission transition, without a financial benefit?, 2) Are clients willing to force or steer their driver to change the charge behaviour with these sustainable benefits in mind, but without a financial benefit?, 3) Are these clients willing to pay for the service just to reach the sustainable benefit?, and 4) How much energy costs savings does the client or driver want to receive to change the charge behaviour?.

Scout potential partners
For LP to establish the partnerships which are required for the realisation of the service, the right partners should be scouted. These partners should be willing to cooperate and have the internal knowledge and capabilities in-house. LP has to establish the restrictions and requirements for these partnerships. During the pilots and first versions of the services, LP can choose to outsource more of the service for this testing phase. In this way, LP lowers the risk of high losses in case of product failure, due to high investments for internal development. In the starting phase, LP can choose to outsource more to the charge point operators and to partner with software & cloud parties and parking service providers.

Privacy risks
The driver has to give permission that the car data, which contains personal information about the driver, and that his agenda will be used for the services. LP must guarantee that the driver’s personal information is handled in a secure manner and that the information is
not leaked for the use of other purposes. When the driver is willing to share this information, he receives the service related benefits in return. LP needs to explore if these benefits are enough for the driver to share his personal information. Furthermore, a consent system needs to be developed where LP correctly informs the driver about the data usage and clearly describes the benefits for the driver when he shares the data.

**Warranty service operations**
The consequences of a failure in the back-end system or a failure in the UX design front-end system have to be identified, in order to guarantee the desired result of the service. The consequences of failures of the system for the driver may result in:

- Not an available park & charge spot, even though the system ensures it.
- Extra frustrations by unfair sharing of the parking spots, even though the system ensures it.
- The agenda connection failed and the car isn’t charged enough.
- The desired battery level isn’t reached and the driver can not realise his travel plans.
- The driver spend extra effort in changing his charge behaviour and the real financial and sustainable impact isn’t the same as the expected impact.

These examples are just a starting point for LP to further identify unpredicted situations, a bad design of the service might cause. In this way, LP can plot the risks and can use this during the design and pilot phase to further improve the services quality.

**UX & UI design**
For the parking support service, it is really dependent on the company’s culture whether employees are willing to replace a car to help out a colleague. For some companies timeslots have a better impact, while the employees of another company prefer more personal contact with their colleagues. Besides, some employees might not be willing to follow the parking advice, they ignore the guidance and will only follow the advice or replace their car when they receive something in return. Maybe reward and punishment features need to be integrated for the companies that expect this behaviour. How the service may optimally operate is not only dependent on the culture, also the demand and supply of chargepoint infrastructure at the office and nearby will play a role.

For the customer service interaction, LP needs to better empathise with the customer to understand how they want to receive the information. For parking support: 1) In what way does the customer want to receive the suggestions and information for parking availability, a timeslot and car replacement? 2) To what extent, and how, does the driver want to have control over the options and suggestions given by the system and draw their own plan? For priority load balancing: 1) In what way does the customer want to have insight in the charge session and the priority list? 2) What are the possibilities for the communication to the driver when he adds a meeting last minute or turn on confidence mode, but the system cannot guarantee the desired battery level?. For smart charging: 1) In what way is the sustainable impact communicated? 2) In what way are the several green route options presented with their fit with the driver’s travel plan?. For the client: How should the efficiency and driver satisfaction impact be presented to the fleet manager? These questions are just a few examples; many more questions are present around the UX and UI design.

LP needs to explore the possibilities of the several experience, interaction and communications systems which is the best fit for the biggest client segment. They have to establish a basic service that has a more mass fit and from there they can tailor the service interaction to the several client profiles.

**Service development**
The Lean Startup Method by Eric Ries (2011) with the Build Measure Learn (BML) Cycle could serve as a base for the development of the services. The many questions about the real (monetary) value creation, the willingness to change the charge behaviour, the UX & UI interaction and the expansion of service features can be formulated into hypotheses. These hypotheses can then be tested step by step: minimum valuable products are build, their desired impact is measured and this results in a learning, where the team creates deeper insight in the customer’s real values. After the cycle, the team needs to decide to persevere or pivot the service feature. The development of the service can take the following steps:

1) User research: value hypothesis testing, 2) Usability testing, 3) internal pilot testing, 4) external pilot testing, 5) launch basic version, 6) launch advanced versions.

Throughout the development process, new features can be tested through the BML-cycle. In this thesis, a start is made with the first user research step, see the evaluation chapter. Though, further user research is needed to indicate the size of the customer segment, the adoption rate and the value fulfillment. The usability test could be executed internally with LPD employees as participants. For the internal pilot test, employees from LPNL and LPCorp would be a great target group: both offices experience the problems and because of LP’s sustainable target for the employee fleet, they are the early adopters or pioneers within fleet electrification. For external pilot testing, LP could conduct this research with a client that is also an early adopter in this field. Both pilots could be executed with Tesla’s, because of Tesla’s more open API of the CV. Figure 22, gives an idea about the development of the services.
The design solutions in the first and second horizon are further conceptualised. The storyboards present the customer interaction in a storytelling way and the screens provide an example for how the smartphone applications could look like. The service blueprint shows the customer acts and thoughts throughout service usage, but also gives an idea about the back-end system with its output. Product teams can use this material as an inspiration source for the final product development.

>> Service implementation

LP needs to take the next steps for service implementation: 1) gain more insight in the target market’s size and the service’s market potential by extensive qualitative and quantitative research, 2) establish the revenue model for each service which results in monetary value for the client and driver and profitable business cases for LP, by advanced modelling, 3) scout potential partners for the pilot phases and for the final services, 4) create the consent system that shows the data collection purpose and customer benefits in a fair way, 5) consider the risks in case of product or interaction failure, 6) iterate and build the UI and UX designs that fits the target market. LP can develop the services in the following steps: 1) user research: value hypothesis testing, 2) usability testing, 3) internal pilot testing, 4) external pilot testing, 5) launch basic version, and 6) launch advanced versions.

>> Conceptualisation

<table>
<thead>
<tr>
<th>Main hypotheses</th>
<th>Basic version features</th>
<th>Improved version features</th>
<th>Advanced version features</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Willing that car is not charged right away</em></td>
<td><em>BASIC CHARGEPLAN</em></td>
<td><em>TIMESLOTS</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
</tr>
<tr>
<td><em>Willing to strictly updating agenda to get charged</em></td>
<td><em>CHECK EXPECTED AVAILABILITY CHARGE SPOTS</em></td>
<td><em>REPLACEMENT SUGGESTIONS</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
</tr>
<tr>
<td><em>Willing to charge elsewhere for more sustainable impact</em></td>
<td><em>CONFIRMATION OKAY TO OCCUPY SPOT</em></td>
<td><em>FLEXIBILITY MODE</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
</tr>
<tr>
<td><em>Want help in generating charge plan</em></td>
<td><em>LOW PERCENTAGE PRIORITY</em></td>
<td><em>MORE PRIORITY DISTINGUISHMENT</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
</tr>
<tr>
<td><em>Want fair sharing of charge points</em></td>
<td><em>CAR TYPE PRIORITY</em></td>
<td><em>FLEXIBILITY FAST CHARGING LAST MINUTE MEETING ADD</em></td>
<td><em>GO GREEN ADVICE</em></td>
</tr>
<tr>
<td><em>Willing to be steered by the system and only charge during the timeslot</em></td>
<td><em>AGENDA PRIORITY</em></td>
<td><em>MORE PRIORITY DISTINGUISHMENT</em></td>
<td><em>GO GREEN OPTIONS INTEGRATED WITH TRAVEL PLAN</em></td>
</tr>
<tr>
<td><em>Willing to replace car for a colleague</em></td>
<td><em>BASIC CHARGEPLAN</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
<td><em>ADVANCED CHARGE PLAN: DRIVER BEHAVIOUR + TRAFFIC &amp; ROAD CONDITIONS INCLUDED</em></td>
</tr>
<tr>
<td><em>Willing to follow park advice</em></td>
<td><em>AUTOMATIC BATTERY LEVEL SYNC</em></td>
<td><em>FLEXIBILITY STOP SMART CHARGING LAST MINUTE MEETING ADD</em></td>
<td><em>GO GREEN ADVICE</em></td>
</tr>
</tbody>
</table>

Figure 22: Service development: hypothesis testing and version development
5.2 Conceptualisation
5.3 Evaluation

This subchapter presents the insights from the external and internal evaluation sessions of the innovation strategy and the concepts.

The innovation strategy and concepts are evaluated externally and internally through interviews. This design evaluation is just a starting point of concept validation. Many more steps and design iterations need to be taken to ensure the market potential of these services. See the service implementation paragraph for the advice of the further process. Appendix F shows more information about the approach of the design evaluation.

External evaluation

Two clients of LPNL were interviewed to evaluate the concepts, with the use of the storyboards presented in the conceptualisation chapter. These clients are both rapidly expanding EV’s in their fleet and aim to realise a zero emission fleet as soon as possible. See here the main insights from these evaluation interviews:

Main obstacles: getting the infrastructure ready & scarcity and availability EV car models offer

The main obstacle both of these clients face is to get the charge infrastructure ready. This is because of the many investments that are needed for the installation of the infrastructure, the waiting time of the installation and the deliberation between the several involved parties like the property owners, energy providers, charge point operators, real estate developers etc. This thus confirms the needs of the clients where the concepts are designed for. The other main obstacle is out of the scope of the design solution, but the scarcity in the offer and availability of the EV’s is delaying the adoption as well. Clients experience the problem to offer a viable EV with an acceptable range to each employee, also in the lower salary scale, and are waiting for more car model options.

Load Balancing is a must have

Both clients stressed the importance of load balancing, by saying that this is a must have and unavoidable for every party that wants to meet the demand for charge facilitation at the office. Both clients showed their interest in priority load balancing and for one client this concept would be applicable and valuable now. This client struggles with the delivery of enough capacity to each personal and operational EV, to charge within a desirable timeframe. This is because currently they experience very slow charging sessions. This client sees the potential for a smart load division solution that exactly fits the needs of the fleet in the moment. In this way, they would be able to facilitate optimal charging for both the operational vehicles, that have busy travel schemes and for the personal vehicles, that mostly occupy a charge point the whole day. The other client explained that because of their upcoming office move, they avoid the installation of charge points at their current location. However, the client stated that it would definitely be important for them to look for smart solutions during the installation of the infrastructure to charge each EV efficiently.

Finding solutions for charge point sharing

One client experiences the over-occupation of EV compared to the amount of charge points. This client already makes use of the group charge application by Newmotion, where employees can communicate in a chat to share the charge points. This provides a good solution to them now. Though, he saw potential in Parking Support, to steer the employees to charge elsewhere when there are not enough charge points available for the operational vehicles. The other client mainly stimulates the installation of charge points at home. But this client does expect that at the new office, with their expected growth of the electric fleet, a solution for fair charge points sharing might be needed, when looking at other companies that are already a step further in fleet electrification and experience this problem.

More sustainable ambitions not urgent now, but keeping it in mind

One client stressed explicitly that smart charging might be interesting for them by around 4 years from now, when the charge infrastructure and the onboarding of the employees to an EV is settled. Then they might be willing to look for taking sustainability a step further and achieving cost optimisation. But now, they are mainly focused on getting each vehicle on the road with enough battery. However, this client expects that more progressive companies in fleet electrification will be very interested in smart charging solutions. This client does expect that in the future, the company is willing to install solar panels to charge the fleet with renewable energy and to make the step towards more shared vehicles in the pool. It has to be mentioned that this interviewee is fleet manager and stated that these decisions are not made solely by the fleet manager.

Also the other client explained that charging with more renewable energy isn’t something they would aim for in the short term, but installation of solar panels to charge the fleet is definitely something the management board should consider for the new office building.
Expect help from LP
Both clients are discussing the main obstacles with LP. LP is thus one of the parties where clients come to, to receive advice about the charge infrastructure. Though, LP then mainly refers to its charge point operator partner or to its expensive EV consultancy services for advice. The clients doesn’t see LP directly as the partner that will help them in zero emission fleet acceleration by efficient charge infrastructure, but they do see LP as the pioneer in EV’s that has a lot of knowledge to share from their own expertise.

Internal evaluation
The internal evaluation sessions were held with employees from LPD and a consultant from Faraday Keys during the roadmapping and conceptualisation phase. The participants of LPD existed of the senior product owner of big data, the head of product and the director product development. After the completion of these phases, the evaluation sessions were held with the Global EV lead of LPCorp and with employees from LPNL: 5 account managers and a fleet manager that are in close contact with clients, the project manager of the EV desk and LPNL’s EV lead. During the validation interviews with LPNL employees, also the storyboards were used to discuss the short term concepts. The majority of the interviewees were EV drivers and could speak from their own experience.

Short term concept evaluation
Most interviewees stated explicitly that Parking Support and Priority Load Balancing aims to solve present-day problems. LPNL employees see that a lot of their clients are struggling with these problems and LPNL employees experience these hurdles as well in their own EV fleet and charge infrastructure. They also expect that more and more companies, which will expand their EV fleet, will experience these problems sooner or later. However, the problem of over-occupation of the charge points will mainly arise in more crowded urban areas and does not occur for every company. Although the majority of the interviewees agreed that smart charging solutions isn’t within the interest of clients and drivers presently, some interviewees stated that when clients and drivers make this switch, they are more aware of their CO2 footprint. They will show more interest towards charging with renewable energy, from for example solar panels, sooner than people might expect.

For Parking Support, a feedback point was that the best communication and interaction of this service is very dependent on the company’s culture. Within some cultures, people are very willing to follow the park advice and to make room for a colleague, while elsewhere the employees might not care that much about fair charge point sharing. A solution for these service could be the integration of a reward and/or punishment feature, to motivate each employee. For Priority Load Balancing, the majority of the interviewees saw great potential in a smart load division system that takes into account a lot of variables to reach full optimisation of capacity usage. One interviewee doubted the extra impact of the involvement of more variables (agenda, car type, employee position etc.), than just making the distinction between battery levels, where low charged vehicles receive more capacity than almost fully charged vehicles. The real impact of the integration of more variables must thus be proven. Since the impact is also dependent on the specific charge infrastructure, a solution would be that LP gives tailored advice to clients about the expected impact of this service and whether it brings monetary value to that specific client case.

Some interviewees showed excitement for the ‘go green mode’ expansion feature in comparison to the smart charging pilot features. Still some iteration and testing might be needed to determine the communication and interaction with this feature: is it just an advice or suggestion message or really integrated in the charge plan?

The feasibility of the short term concepts with its intelligent system were confirmed within LPD. Though, the main requirement is the establishment of several partnerships.

Innovation strategy evaluation
Because the long term concepts presented in this strategy have quite an innovative level, the first reaction of some interviewees was the doubt of the LP role in these developments. However, the concepts needed some incubation time and at some moment the majority of the interviewees realised that LP indeed has a big influence on these development with its big fleet and private charge points. Some agreed that LP should definitely realise this, but not under the core LeasePlan brand but within a start-up that operates under the LP brand umbrella. The director product development of LPD confirmed that this strategy is indeed the direction LP wants to and should go, with the realisation of a startup.

One point is that the business and revenue model needs to be further explored and validated, to determine the indirect profit of the data streams and the profit of energy trading, to set attractive prices for both LP and its customer. Besides, the real market demand and potential needs to be proven, also to set the best timing for the launch of these services.
Conclusions

Concluding the master thesis’ study
In this chapter the thesis’ study is concluded by stating its contribution, answering the research questions and explaining its desirability. This chapter also presents the final recommendations and the personal thesis reflection by its author.

In this chapter:

6.1 Conclusion
6.2 Recommendations
6.3 Personal reflection
Conclusion

This subchapter explains the contribution of the master thesis, answers the thesis’ research questions and discusses the deliverables’ desirability in comparison with the design direction.

Contribution master thesis
This master thesis adds value to stakeholders in the automotive industry, to stakeholders in the zero emission transition, to the Strategic Product Design field of study, to fleet management parties and to the problem owner LP in particular. This thesis aims to contribute to the development of beneficial use cases of the CV in relation to a more livable and healthier environment. Future scenarios of the CV are sketched in this thesis and these can serve as an inspiration source for several parties in the automotive industry, mobility industry and energy industry. Besides, this thesis aspires to spark research at the faculty of SPD on how emerging technologies can enable acceleration in the zero emission revolution, while handling a customer centric approach. Furthermore, fleet management parties can be inspired by how the CV creates insight in the fleet behaviour and what applications this can have. Fundamentally, this thesis provides LP with a solution that takes away some of the threats LP’s future faces and strengthens LP’s market position, customer relations and its influence in the zero emission transition.

Answers to the research questions
The research questions have already been answered throughout the several chapters discover, define, develop and deliver. In this paragraph, the most important conclusions are drawn to explicitly answer the research questions.

What opportunities and threats are there for LP within the connected automotive future?
The rise of the CV brings LP a lot of business related benefits in terms of operational efficiency, cost reduction and better risk estimations. Though, the main opportunities LP embraces in relation to the CV, to gain competitive advantage, to distinguish from competitors and to build customer relations, are:
1) offering an improved, digitized and seamless customer lease experience to distinguish from direct competitors.
2) offering connected sharing services for companies, neighbourhoods, for private individuals and for events, to meet the customer demand of livable and cleaner cities.
3) Helping EV drivers with personalised charge planning, to give clients tailored advice based on the real fleet behaviour and to accelerate the zero emission transition.
4) providing the driver and clients with the possibilities for connected mobility, to realise the most efficient travel plan.

The main threats LP faces in direct relation to the CV concern the threat of substitution: Tech giants, OEM’s, service provider startups and direct competitors may establish strong customer relationships by providing services that fulfill needs throughout the end-customer journey and may realise a more financially attractive lease offer. However, the CV is not a stand-alone concept in the automotive or mobility future, because many other trends and developments threaten LP’s position and product offer. Though, the CV seems to be an enabling technology for these various trends and developments. In the opportunity mapping subchapter, the threats and opportunities in which the CV plays role are extensively presented.

What new products and services could LP offer to create value for the customer within the connected automotive future?
In this thesis several opportunity directions for LP in relation with the CV are presented, but only one direction was chosen to design new products and services for. This direction, ‘providing the full EV package’, is substantiated as being most promising for LP’s business and market position. The new service offer presented in the innovation strategy in this thesis are Parking Support, Priority Load Balancing, Smart Charging, Electric & Connected Fleet, Local Energy Storage and Energy shares. These services create value for the customer in terms of:
1) Tailored client advice about charge infrastructure expansion.
2) Prevention of extra investments by efficient charge point occupation and smart charge capacity division.
3) Reduction of hassle, stress, frustration and uncertainty by automatically altered charge sessions, personalized charge & park plan creation and fair charge point sharing.
4) Energy cost savings.
5) Further reduction of the carbon footprint by charging seamless and hassle free with renewable energy.
6) Taking efficient usage of resources further and contributing to a livable environment by seamless EV sharing.
7) Realising self-sufficiency of households and offices.
8) Contributing to the broader zero emission transition by making gray electricity plants superfluous and by enabling earlier readiness of the energy grid to facilitate electricity for the expected amount of EV’s in the future.
What favourable position could LP take in the connected automotive future to create competitive advantage?

LP could take the position as the reliable zero emission fleet accelerator, that provides clients support in the transition and delivers a desirable EV driver experience. With the presented service offer, LP can distinguish from: 1) Direct competitors, because LP is already one step ahead of the competition since it is a pioneer in fleet electrification and has already built knowledge in this field by own expertise. 2) OEM’s, since LP focuses on the client fleet. 3) Grid operators, charge point operators and energy providers, because LP can serve the customer throughout the customer journey and can give the client tailored charge infrastructure advice based on the real fleet behaviour, all enabled with the CV as its asset. With LP’s total fleet of 1.8 million vehicles and soon a comparable amount of private charge points, LP has a big influence on the development of a sustainable transport system. With this innovation strategy, LP can take the responsibility to contribute to a healthier environment and cleaner cities, while occupying a unique market position.

How can LP realise this innovation strategy where they obtain a new market position and offer new products and services?

LP can realise this innovation strategy by establishing several partnerships: 1) OEM’s, to have access to the CV’s data stream, for remotely controlling of dashboard features and to expand the fleet with vehicles that are capable of bidirectional charging. 2) Chargepoint operators and smart energy management system providers, to have insight in load division, to control the smart load division and to install smart charge points that are capable of bidirectional charging. 3) Energy providers, to have insight in real time and expected energy prices and mix and to trade within the energy market. 4) Grid operators, to receive information about the expected grid peak load and to receive a revenue stream for less grid reinforcement. 5) Governmental institutions to receive a revenue stream for less grid reinforcement. 6) Solar panel providers to provide the service in a package. 7) Software and cloud parties for the early stages in the product development, before LP realises the intelligent system internally.

Furthermore, for the realisation of the services, LP needs to develop an intelligent back-end system where the several data streams come together to provide output for the front-end application for the customer and the capacity management system in the buildings. Besides, LP has to develop a smart transaction system in collaboration with LP Bank. Lastly, LP needs to launch Smart Charging, Local Energy Storage and Energy Shares under the LeasePlan Energy brand.

Design direction vs deliverable

The innovation strategy meets the objectives that are set in the design direction vision house: 1) Client transition acceleration is reached (see the values explained earlier). 2) Clients experience full support because LP also helps them in the struggles around the charge infrastructure that delays fleet electrification. Besides, a charge plan is created for the driver at any moment throughout the customer journey. 3) LP has the opportunity to set favourable prices for the customer, while LP indirectly profits from insight and control on the EV’s battery life. 4) These are viable solutions for LP to distinguish from competitors (see previous paragraphs). However, LP still needs to further establish a profitable revenue model. The services presented in this thesis are build upon the values that describe the desirable EV driver experience: 1) Hassle freeness by a service that thinks and plans for the driver and automatically saves him money and makes him contribute to renewable energy usage. 2) Seamlessness by the help throughout the driver’s journey and one application where it can all be managed and viewed. 3) Flexibility by smart load division, by adding confidence options, by enabling employees to more efficiently share charge points and by enabling last minute travel changes. 4) Personalisation by taking into the account the driver’s agenda and the driving behaviour and by a system that remembers and predicts the driver’s preferences. 5) Transparency, because the driver can always have insight in the calculation of the charge plan, the explanation of not being in priority and the real financial and sustainable impact of the smart charge sessions. Though, these values still need to be taken into account within the further design and development process. Furthermore, the presented innovation strategy is feasible, because it has a strong strategic fit with LP and it makes use LP’s internal resources and its capability to acquire these knowledge and resources elsewhere by establishing partnerships. The reliability of the service is something that needs to be taken into account in the further development process as well, and this also counts for a privacy respected consent system, which shows what the data is used for and what benefits it brings for the driver.
# 6.2 Recommendations

The study’s limitations, discussion points and next step recommendations are presented here.

## Limitations

**Market potential**
The customer research study in the discover phase was not yet focused on the needs and desires around the EV explicitly. Besides, only drivers were interviewed here and the client interviews were conducted during concept evaluation. The services were originally based on internal insights and desktop research. Only two clients have been interviewed and this may thus not be representative for all customers. An extensive qualitative and quantitative study is needed in order to scout the market potential of the services and to create a final service interaction that fits the customer. Unfortunately, this could not be realised within the project’s time frame.

**Desirability uncertainty for LP: revenue model**
The potential profitability of the service offer and business model have not been calculated and thus have not been proven in this study. A revenue model is hard to establish, since it is very dependent on the nature of collaboration with the recommended parties, the technological development, the possibilities for LP within the energy trading markets and since it differs widely among client specific use cases. The required research for revenue model establishment was not feasible within the project’s time frame and the SPD field of study.

## Discussion points

**Hydrogen vehicle**
This study focuses on full electric vehicles, whereas the hydrogen vehicle achieves net zero emissions as well. The hydrogen vehicle is not included in the innovation strategy, because currently the demand for these vehicles is little, due to the high price and the limited charge infrastructure. LP is building expertise in what comes across in fleet electrification and can use this knowledge for the presented services in this thesis. LP has minimum experience with hydrogen vehicles. However, since this innovation strategy reaches to 2028, the operating landscape of hydrogen vehicles has probably made a big loop. LP needs to keep scouting the potential demand of hydrogen vehicles and needs to explore how hydrogen vehicles can be included in this innovation strategy, because also the hydrogen vehicle can play a role in renewable energy storage.

**Expansion to private lease**
The innovation strategy focuses on business lease, because SME’s and corporates are 97% of LP’s customer segment and therefore the biggest impact of these services are gained here. However, private lease is growing and although this isn’t LP strongest segment, there might still be opportunities. Though, LP needs to find a way to compete with OEM’s and many other competitors that obtain a strong position in private lease. Nonetheless, with this service offer, LP might differentiate from these big players and attract new customers.

**Full EV package provider**
This study focuses on how the CV enables support for clients in the zero emission transition and a desirable EV driver experience. Though, throughout the study it became clear that there are way more opportunities for LP to fully provide the EV package to the client and the driver, without the CV. Some of the examples are: help in the choice for the EV and fast onboarding to how the EV works. LP needs to realise that still big opportunities lie in their service around the EV.

## Next steps

The next steps LP needs to take for the implementation of these services are clearly stated in the service implementation paragraph. These steps entail: gain insight in the market size and potential, establish the monetary value and revenue model, scout potential partners and do more customer research for desirable UX & UI design iterations. After this, minimum viable products can be built for usability tests and pilots. Through the use of Eric Ries’ [2011] Build Measure Learn cycle, the service features can be realised step-by-step.

The first main step is internal communication of this master thesis by a presentation to the executive management board and the LPD management board and by a message to all employees through the internal communication channels. In this way, the ideas can incubate and flourish within the company, as being the eye-opener of what’s next for LP’s electric vehicle fleet.
6.3 Personal reflection

On a final note, the reflection on the personal goals and developments are shared.

When looking back at my graduation project, I am sure to speak that I reached my learning goals and that I developed myself in a personal and professional manner.

As I stated in my learning goals, with this project I wanted to gain in-depth insight in digitalisation, transversal innovation and user centred product development processes within corporates. I am thankful for the many professionals that wanted to share their expertise during informal conversations, interviews and creative sessions, from LeasePlan and elsewhere. They expanded my knowledge in this field of study and in the corporate world. Before I started this project, I could not imagine that I would speak to this big amount of people that gave me the chance to absorb their knowledge and collect their feedback.

When I reflect on my process, I am very proud how I developed myself within project management. It was a challenge to start the project with the connected vehicle as given solution, to scout the possibilities to leverage its full potential for LeasePlan strategy and business. Normally, I would start the design process with an acknowledged problem. However, I wanted to experience a technology driven design process with the use of the SPD’s Roadmapping method. Since the connected vehicle, or the Internet of Things within the automotive industry, is not a stand-alone concept and is mainly an enabler for many other technologies, trends and developments, I experienced some struggles with scoping along the way. Though, I am proud how I presented the four main opportunity areas and I am thankful for how my supervisory team gave me that little push in confidence, to choose for the design direction in which I already saw the most potential. For next projects I would motivate myself to find that confidence earlier in the project, to say goodbye to my ‘design babies’ and focus my research in a more valuable scope. Because in this project, I had to catch quite some research within the chosen design direction.

Another thing in which I experienced struggle, is also focused on the nature of the project brief. With my deliverable I want to show the design solutions where the connected vehicle enables LP to enhance their influence in sustainable transport system development and where they support the client and driver in this zero emission transition. The final deliverable entails in total 6 design solutions divided in four horizons, which can be seen separately but also strengthen each other and build together towards the realisation of the vision. Normally, I would propose one final design solution for one acknowledged problem. But because of the technology driven and possibility scouting nature of this project and the demand for a ‘full EV package’ from the customer, the proposition of these 6 design solutions are in my opinion the best possible deliverable of my project for LP. In this way, LP can create overview in what’s next for its connected and electric vehicle fleet and further develop and test the potential of these design solutions. I stated that I wanted to grow confidence in lobbying my ideas and stand behind my own design decisions, well this is definitely achieved.

To my believe, I made big steps in my communication skills within a professional environment. I have grown in my presenting and writing skills, something in which I sometimes experience insecurity since I am more a designer and doer. I am very glad that I had the chance to grow as a creative facilitator as well, by organising several sessions with the target market and with LeasePlan employees. It provided me with more insight in how I can structure a the sessions and sparkle creativity to achieve fruitful session results.

Furthermore, I am highly impressed how I dealt with the project management and stress along my journey, since I intensely struggled with coping stress throughout my study. This project gave me the confidence that I can accomplish a project in a professional manner in which I am very proud of the result, but where I still found a good balance.

This project assembled all the skills and knowledge I gathered throughout the course of my entire study and many curricular activities.

I sincerely hope that I sparked LP’s curiosity within the electric and connected vehicle field and that they can use my design solutions as inspiration source and guidelines for product development.
References


Appendix

Detailing the master thesis
Content:

A. Expert Interviews
B. Customer interviews
C. Focus Group
D. Co-creative session: opportunity mapping
E. Co-creative session: idea generation
F. Design Evaluation
G. Back-end system
H. Project brief
A. Expert interviews

A.1 Expert interview approach

The choice for two expert interview was to answer the technology and industry related questions. Both participants have certain knowledge in the connected vehicle technology and industry development, because of their academic background or work experience. The interview were qualitative, in-depth and semi-structured, based on Patton (2002). For both interviews an interview guide was constructed (See A.2). The interviews took around 45 minutes at the participants offices and were recorded. The valuable insights from the recordings were transcribed and labeled. The insights can be found back in the technology and industry chapter. See A.3 for the detailed results.

Mark de Reuver, TU Delft
Associate Professor Delft University of Technology, Faculty Technology Policy and Management, Section Information and Communication Technology.
- General research field: Digital Platform Architecting in Engineering Systems, with specific interest in e-Mobility and Smart Energy.
- Research field that was interesting for this thesis: Development of digital platform in the internet connected car domain. Range of new car sharing solutions. Managing open platform that allows third party innovation.

Niels Vos, TomTom
Product manager Connected Car at TomTom Telematics in Amsterdam
- Years of working experience in the telematics field: Fleetmatics, Cobra (by Vodafone) and Ismarel.
- TomTom offers a range of products to enable car connectivity, either by aftermarket devices or via OEM connectivity, and is also in charge in harmonizing the data set and providing a data platform.
- TomTom is currently collaborating with LeasePlan on the predictive maintenance project.
A.2 Expert interview guides

Interview Guide
Interviewer: Claire den Boer. January 2019

Main research question:
How will the connected vehicle further develop and what is its impact on the several industry players?

Interviewee:
Mark de Raveur, Delft University of Technology. TBM. Information & communication tech, telematics & informatics. Impact internet connected cars. Conceptualize digital platform for the mobility domain.

Checklist for start:
- Introduction: Graduation Project LeasePlan Digital, connected vehicle development
- Interview ~ 45 min. Ok for recording?

Intro. Subtopic 1: Connected vehicle definition
What is your definition of a connected vehicle (CV)?
Probe/follow up:
- Where is the vehicle connected to? definition of collective terms: V2I, V2V, V2R, V2P, V3C?

Intro. Subtopic 2: Connected vehicle definition
What benefits will the connected vehicle bring?
Probe/follow up:
- What promising scenarios will the CV bring?
- And for who?
- Which benefits sound most interesting to you?
- Which benefits/scenarios are most interesting for a lease company?

Subtopic 3: Connected vehicle technologies
Which technologies enable and contribute to the connected vehicle?
Probe/follow up:
- How will wireless technology enable the CV?
- How will cellular technology enable the CV?
- How will data processing technologies contribute to the CV?
- Which technologies are most important for the CV?
- Which hardware and software is needed? Is this embedded during the manufacturing process or an aftermarket product?

Subtopic 4: Technology development
How do you see these technologies develop over the coming years?
Probe/follow up:
- Which data can be gathered now? Which data will be available in the future?
- When is what possible? (2025/2030) What are the challenges?
- What is the impact of 5G on the CV?

Subtopic 5: Connected vehicle development
How do you see the connected vehicle develop over the coming years?
Probe/follow up:
- What is required for implementation? What are the challenges? (cybersecurity)

- How would the connected vehicle in 2025 and 2030 look like? (EV, a car sharing, Av/x)
- What are the future use-cases?

Subtopic: Involved parties
Which parties & industry players are involved in the development?
- Please Draw ecosystem...
Probe/follow up:
- Which parties are involved to create a fully connected vehicle and what will be their role?
- (OEM’s, software/hardware providers, MNO, government)

Subtopic: Data collection and distribution
Which parties will gather / own / share the data over the coming years?
- Please Draw ecosystem...
Probe/follow up:
- Which parties gather what data?
- How will the data be distributed?
- Who will be responsible for the data distribution?
- Will all data be open for usage? Will there come an open digital platform?
- Is the gathering/data party willing to share the data and for what in exchange?

Subtopic: Who wants the data?
Which parties will be interested in the data?
- Please Draw ecosystem...
Probe/follow up:
- How will these parties collect the data?
- How can a company like LP collect this data?

Subtopic: Impact on industry
What will be the impact of the CV on the automotive & mobility industry?
- Please Draw impact on ecosystem...
Probe/follow up:
- So which parties become important?
- How will the roles, business models and product of the current industry players change?
- Will new parties enter the industry?
- How do you see the collaboration within the industry in the future?
- Will roles change in the connected industry?
- What is the impact for a company like LeasePlan? How will their role change?

Subtopic: Privacy
Is the driver willing to share the data and for what in exchange?
Probe/follow up:
- What is the impact of the GDPR on the connected vehicle?
- What is the impact of the GDPR for collecting data for LP?

Checklist for closure:
- Do you have the feeling that you said the thing you wanted to say, or do you have anything to add?
- Do you have the feeling that any question or answer is missing?
- Do you have any question for me?
- Thank you very much for being my interviewee, your answers are very valuable for me.
Interview Guide TomTom

Checklist voorbereiding:
- Introductie: Afstudeerproject TUDelft Connected Vehicles
- Doel: De samenwerking binnen de industrie om de connected vehicle mogelijk te maken. Welke partijen zullen de data verzamelen, processen en weer aanbieden. Betrekken naar huidige product, maar ook hoe jullie dit zullen verderontwikkelen.
- Is het idee als ik het gesprek opneem?
- Introductie persoon (werk, functie, rol binnen telematics product.)

Subtopic 1: Telematics product
Welke producten en services biedt TomTom telematics precies aan en hoe werken ze?
- Welke producten en services bieden TomTom aan?
- Waarom zijn daar deze producten en services aanwezig?
- Waar wordt dit product en service gebruikt?
- Wie is de bestemming van deze producten en services?
- Welke hardware en software is daarvoor nodig?
- Wat zijn de voordelen van het gebruik van deze producten en services?

Subtopic 2: Gebruikers en klanten
Wat zijn de klanten van deze producten en services?
- Op welke gebruikers behoeften speelt TomTom in?
- Waar hoeft de klant om van deze producten en services gebruik te maken?
- Welke rol vervult TomTom telematics voor de klant?
- Maken jullie het product getailored naar de klant, dus in samenwerking?
- Voor welke klanten hebben jullie zo'n samenwerking lopen?

Subtopic 3: Stakeholders
Met welke partijen werken jullie samen op de product/service te verwezenlijken?
- Wat zijn de belangrijkste suppliers?
- Met welke third party API's werken jullie samen?
- Wat is de rol van TomTom telematics in de industrie, moet ik het zien als het harmoniseren van de data?

Subtopic 4: Concurrenten
Wie zijn de concurrenten in dit gebied en wat bieden zij aan?
- Concurreren met OEM's?
- Wat zijn de voordelen van de concurrenten?
- Wat is de rol van TomTom telematics in de industrie, moet ik het zien als het harmoniseren van de data?

Subtopic 5: Innovatie
Hoe zien jullie de toekomst van de producten en services van TomTom eruit?
- Wat is de toekomstvisie van TomTom?
- Op welke manier zullen de producten en services zich veranderen?
- Welke nieuwe technologieën gaan jullie gebruiken?
- Wat zijn de voordelen van deze toekomstvisie?

Checklist afsluiting:
- Heeft je het idee dat je alles hebt verteld? Wil je nog iets toelichten?
- Heeft je nog een vraag voor mij?
- Heel erg bedankt, je antwoorden zijn heel waardevol voor mij.
- Publicatie binnen TUDelft. Referentie.
A.3 Detailed results

Based on the in-depth interviews with Niels Vos and Mark de Reuver, desktop research and literature research, the following tension fields in the industry are spotted:

1 Waiting for the OEM’s to replace the aftermarket telematics hardware devices

As explained before, for older car models where no hardware or intelligence is integrated during the manufacturing process, aftermarket hardware (telematics boxes) need to be installed in the car to connect with either the OBD port or the CAN bus. For newer models, the intelligence and connectivity is already installed during the manufacturing process. In that case, the data can be gathered in collaboration with the OEM. More and more OEM’s see the commercial opportunities for selling the cars’ data and are taking action in creating their own data platform for third parties to access. Many parties are waiting for the ideal situation, where data can be gathered via the OEM’s data platform, instead of investing money and time in installing aftermarket telematics devices in the car. [Interview Niels Vos TomTom]

2 Will the OEM’s have power over the data and come with their own end customer services?

OEM’s have a certain control over the CV development, since they need to integrate the hardware during the manufacturing process. OEM’s may question whether their interest lies in sharing the car’s data instead of using it for their own purposes. With the data, they could improve the in-car experience for the end-customer, by an extension of for example of the services from BMW Connected and Tesla in the premium car model segment [Interview Mark de Reuver]. OEM’s are already have their own connected car programs [Mark de Reuver]. However, OEM’s have the need for collaborating with digital tech companies, since they don’t have all the capability in house and it is not in their DNA to do all of this in house [Mark de Reuver]. What the car data can bring to the OEM’s is only limited to vehicle testing to improve the car’s performance and in the premium segment the in-car experience. But the data can bring way more benefits for other parties, like a LP, and the OEM’s see the commercial opportunity in selling the data. [Niels Vos]

3 Entering of Tech Giants

“Tech giants like Apple, Google, Yandex and Baidu are already operating in the connected car fields, just by collecting a lot of data with their smartphones, but also with their smart and autonomous car programs. [...] Their influence will undoubtedly grow, because they have excellent requirements to mingle themselves in this field, as capital powerful companies with big influence in the tech industry.” [Niels Vos TomTom]. Besides, Mark de Reuver expects the same and has the following vision: “I am not sure whether the car manufacturer receives the car’s data. I think it is more likely that giant internet parties would be in between. I think we can expect an extension from the operating system and app stores from our smartphones in the mobility domain.”. Mark de Reuver also expects that big cloud parties, like an Amazon, will become bigger players in this field.

4 Collaboration in the industry

Collaboration in the industry to realize growth within the connected car field is required and this is already happening. Telecom parties are already collaborating with OEM’s for the connectivity part, the SIM cards. But also with a party like TomTom, which are collaborating with the OEM to establish a system in the car during the manufacturing process to enable clean data gathering. [Niels Vos] As explained earlier, it is likely that OEM’s will collaborate with digital tech companies and cloud companies to process and store the data streams. But besides the OEM’s, you also see collaboration is happening between a lease company and a party like TomTom and between telecom companies and fleet management service providers. [Niels Vos] OEM groups are also collaborating among each other, to create together a connected car platform [Mark de Reuver]. Collaboration in the industry is increasing, but whether it comes that far like the operating system at the smartphone which is open for third parties to build applications, can be questioned.

5 Harmonizing & standardizing towards a homogenous data set

“Then it is the question whether this information from all vehicle manufacturers is homogenous. There are like 20 vehicle manufacturers in the world and they all do something else.” [Niels Vos TomTom]. Homogenous data is very important for processing and analysing the data. Currently, data from different OEM’s comes in, in different frequencies and formats, and for each data stream some kind of ‘conversion formula’ is needed [Niels Vos]. “A lot of parties hope that under the pressure of the European Commission and the commercial possibilities, that car manufacturers will standardise this. Well I think this will never happen, because vehicle manufacturers do not have interest in this.”, Niels Vos compares it to the truck industry, where it already takes 15 years to get to a fleet management standard. He is not expecting a consensus...
for the standard for a homogenous data set from all OEM’s in this industry, since way more vehicles and parties all involved and are spread over the continents.

6 Room for middle mans

What comes with the problem of the homogeneous data set, is that there will still be room for parties in between who gather the different kinds of data, harmonise it and offer it in the environment of a platform, like TomTom is doing currently. They offer a platform product, but also APIs so their clients can use the data within their own IT systems [Niels Vos]. Mark de Reuver expects as well IT parties in between, like service application providers, operating system suppliers, data integrators and more.

7 Open Digital Platforms not in the near future

An open digital platform based on for example the android technology with open API’s where application developers can build upon, but then in the automotive industry, will take some time. The lifecycle of a car takes longer and the cybersecurity risk are more impactful when using a car [Niels Vos]. Then it is the question who will initiate the open digital platform, with limited interest from the OEM’s and the problem around who is really owning the data in terms of privacy. Though it can become as promising as in the smartphone industry, where either the phone manufacturing, the operating system providers and the applications providers all profit from the situation.

8 Regulations around driver’s privacy

As explained earlier the data belongs to the driver and partly to the party that owns the car. How this GDPR will exactly be implemented in the connected car field is still being discussed within the European Commission [Niels Vos]. Also, whether it should be available to a broader public [Niels Vos], like via the idea of the open digital platform above. Parties who are operating in this field, IT parties in between, should prove that they are compliant with the data gathering. Service providers may only use the data which is required for operating their service and that beneficial for their customers. Always a form of consensus from the driver is needed [Niels Vos]. Being compliant can serve as a competitive advantage for the IT parties in between. When these parties have have full control over the whole data gathering system, it is easier for them to prove being compliant [Niels Vos]. How such a compliant system will be organized and regulated, still needs to be determined. However, in most innovative industries, regulations are lagging behind.

9 Cybersecurity

The connected car brings several cybersecurity risks, where via the wireless connected the car can be hacked from a distance and can take of the car’s fully control and causes an accidents. Also Mark de Reuver stresses the security risks when a platform can communicate back to car and is able to take control over the car. Currently the software systems in the car doesn’t meet the security restrictions. To ensure a safe trip and taking the control back to the driver, in terms of operating the car, but also being in charge of the data in terms of privacy, new regulations are needed on a international level.

10 Waiting for the infrastructure authorities

To realize Vehicle-to-Road-Infrastructure, traffic infrastructure management, Intelligent transportation systems and smart cities, the involvement of parties like infrastructure authorities, municipalities and (regional) government are needed [Niels Vos], since the actual intelligence need to be placed in the infrastructure and someone needs to be responsible of gathering and opening up this data. In this case it is waiting for their involvement and their move. However it will bring also possibilities for them: managing the traffic flow, making cities more livable, more sustainable traffic solutions and when going towards paying per kilometer driven.

11 The rise of service providers

What the smartphone already enabled, but what the connected car will even bring further, is the possibility for direct customer relations, for OEM’s and for a party like LP. But these means that there is also room for many other end-customer service providers. More companies are rising and offering services to the end customer like car sharing, optimal travel planning, smart parking, efficient fueling and more. These startups have the flexibility to dive fast into this market, compared to a big company like LP.
B.
Customer interviews

B.1 Customer interview approach

The choice was made for qualitative, in-depth and semi-structured interviews, based on Patton (2002), the This is Service Design Doing book (Online companion: www.tisdd.com) and the Design Thinking book (Vianna et al., 2011). In this way, underlying motivations, opinions and feelings of the customer towards several topics could be scouted. Five interviews, each around 45 minutes, were conducted with the support of an interview guide and a probe diary. The interview questions in the diary and the guide are mainly to empathise with the customer. The approach was inspired by the Jobs-to-be-done methodology by Ulwick (2016), but also by the value proposition canvas (Osterwalder et al., 2014) and the empathy map (This is service design doing).

A few days before the interview, a probe diary was given to each participant. The probe diary is a small booklet, which consists of several questions, divided over several days. By the use of the probe diary, the interviewees were more prepared and the interview had more guidance. Because the interviewee already prepared some answers in his personal environment, he/she could better formulate the answers. With already filled in questions, there was more room for asking follow-up questions to get to the underlying ‘why’ and more room for asking other questions. During the interview, each page of the diary was discussed with the help of the interview guide. See Appendix B.2 for the probe diary. Probes diaries were only made for the customer who were lease drivers (private and business), not for the fleet manager. Appendix B.2 only shows the diary of the business lease driver, because only the questions on the front page were different compared to the private lease driver diary.

Three different interview guides were constructed, for the business lease drivers, the private lease driver and the fleet manager. See appendix B.3 for the interview guides. Again tips from Patton (2002) were used to structure the interview with several sub topics and probes and follow up questions. The interview guide clearly stresses the overarching research question and the sub research topics.

Each interview was recorded and transcribed afterwards. The valuable insights from each interview where clustered and labeled.

Participants
The group of participants consisted of business lease drivers, one private lease driver and one fleet manager.

The fleet manager
To gain insight from the fleet manager perspective for LP clients, Julian Alkmade, Fleet Management Coordinator at LeasePlan Nederland was interviewed. He is serving a lot of LP’s Nederland clients and drivers and he is assisting the client’s fleet managers. This interview was focused on what his perspective was on the need of his clients and drivers, but also what connected car data could bring for benefits for his work.

The private lease driver
Participant 1 has a private lease car via Audi Financial Services. No lease car was offered by his employer. He doesn’t have to visit clients so there is no need to drive for work. He made the decision to buy a lease car together with his girlfriend. They chose for a lease car because then everything is fixed and that there is no need to worry anymore.

The business lease drivers
Participant 2 has a new Renault Clio from her employer via Alphabet. She lives and works in Amsterdam. She chose for a lease car because saves her a lot of costs for her private trips, compared to public transport or buying her own car. In a few months she can has more choice for car models because then she finished her first year as employee.

Participant 3 has a Ford Fiesta from her employer via Athlon. She is a first year employee and she receive the car which was available in the pool. She lives in Rotterdam and works in Amsterdam.

Participant 4 has an Audi A3 e-tron from her employer via LeasePlan. She has lease cars for many years. She lives far away from work and her home town is almost unreachable by public transport so she is really in need of a car.

Limitations
Please consider that the amount of participants is not enough to prove the main outcomes. However, the goal of this study is to get acquainted with the lease driver and not about mapping the whole customer journey pains and gains. Because in this thesis the customer journey will not be optimized. This research is only for helping to spot some user trends and opportunities for LP. This research serves as an inspiration source.
B.2 Probe diary

Ik & mijn leaseauto

Ik ben ..................................................
en werk bij ..........................................
Mijn leaseauto van de zaak is een ....................................................................
Leasemaatschappij: ...........................
Ik heb deze auto sinds .................
Ik ben blij met deze auto omdat ..................................................................

Ik naast mijn leaseauto gebruik ik ook (wel eens) andere vervoersmiddelen namelijk:

Tijdens het reizen met mijn leaseauto doe ik meestal de volgende activiteiten:

Als ik met andere vervoersmiddel reis, doe ik de volgende dingen ter voorbereiding en afsluiting anders:

Bijv. muziek luisteren/belmeeting
Bijv. nieuws lezen/netflix/socializen

Dag 1: Mijn leaseauto journey

Niemanddaag 5 minuutjes om de volgende vragen in te vullen en gyomorgen verder met dag 2

Wanneer, waarvoor en hoe vaak gebruik je je leaseauto?

De laatste keer dat ik de leaseauto gebruikte was voor:

De volgende activiteiten deed ik voordat ik de auto gebruikte ter voorbereiding van mijn reis:

Als ik een ander vervoersmiddel gebruik is dat meestal om de volgende redenen:

Ik vond dat de leasemaatschappij dit toen heel goed deed:

Ik vond dat de leasemaatschappij dit toen minder goed deed:

Ik ben naar het algemeen tevreden/blijf tevreden met mijn leaseauto omdat:

Ik ben naar het algemeen niet tevreden met mijn leaseauto omdat:

Dag 2: Mijn lease journey

Niemanddaag 5 minuutjes om de volgende vragen in te vullen en de volgende dag verder met dag 3

De laatste keer dat ik contact heb gehad met mijn leasemaatschappij was vanwege:

De volgende activiteiten deed ik na het reizen ter afsluiting van mijn reis:

Ik kon dit regelen via de website/telefonisch/email/app etc.

Ik ben in staat om de volgende activiteiten te doen:

Dag 3: Mijn informatie journey & toekomstbeeld

Niemanddaag 5 minuutjes om de laatste vragen in te vullen

Welke informatie gebruik jij in het algemeen ter voorbereiding, tijdens en ter afsluiting van je reis met de leaseauto?

Bijv. muziek luisteren/offerte/invullen
Bijv. nieuws lezen/netflix/socializen

Ik vond dat de leasemaatschappij dit toen heel goed deed:

Ik vond dat de leasemaatschappij dit toen minder goed deed:

Ik ben in staat om de volgende activiteiten te doen:

Ik kan deze activiteiten ook te doen met andere vervoersmiddel namelijk:

Bijv. weer waarneming of routeplanner

Gebruik je heden, morgen, of nader de nevel, om van deze informatie te leren? Over de betrouwbaarheid en weet ik bijvoorbeeld zoiets? (zie je het in de toekomst)

Ik ben in staat om de volgende activiteiten te doen:

Bijv. breukwacht of Google Aids

Ik ben in staat om de volgende activiteiten te doen:

Bijv. breukwacht of Google Aids

Ik ben in staat om de volgende activiteiten te doen:

Bijv. breukwacht of Google Aids
B.3 Interview guides

Interview Guide

Checklist voorbereiding:
- Afstudeerproject TU Delft & LeasePlan
- Doel: ervacher komen welke activiteiten een leaserijder tijdens de lease-service doorkoopt en welke huidige en toekomstige behoeften en wensen er zijn op het gebied van lenen en reizen.
- 45 min. - 1 uur
- Zou jij mij wat meer kunnen vertellen over hoe je de auto hebt verkregen, hoe werkt dat bij jullie op de zaak?

Boekje pagina 1

Subtopic 1: Waarom een leaseauto
- Waarom heb je gekozen voor het aannemen van een leaseauto van de zaak?
- Heb je de keuze gehad om een auto te kopen en waarom heb je de keuze niet gemaakt?
- Had je keuze in welke leaseauto je zou kiezen en waarom heb je voor deze auto gekozen?
- Zijn er nog andere dingen waarvoor je hebt gekozen, bijvoorbeeld extra kilometers privé rijden of juist een auto die niet pene wordt aangeboden binnen jouw laag in het bedrijf of iets anders? Waarom heb je hier voor gekozen?

Boekje pagina 2 & 3

Subtopic 2: Waarvoor een leaseauto
- Wanneer gebruikt je je leaseauto, voor welke situaties?
- Hoe frequent gebruik je je leaseauto?
- In welke situaties maakt jij niet gebruik van je auto maar van andere vervoersmiddelen? En waarom?
- Hoe frequent gebruik je andere vervoersmiddelen?
- Wat vind je fijn aan het reizen met je auto t.o.v. andere vervoersmiddelen?
- Wat vind je fijn aan het reizen met andere vervoersmiddelen t.o.v. je auto?
- Slet je hebt geen leaseauto, tegen welke dingen zou je dan aantoon?
- Hoe belangrijk is het hebben van een auto voor jou?

Boekje pagina 2 & 3

Subtopic 3: Mijn leaseauto reis journey
Ter voorbereiding tijden ter afsluiting:
- Zijn er naast de activiteiten voorrijden/me reis met de leaseauto, die je hebt opgeschreven in het boekje voor je laatste gebruik, nog activiteiten die missen maar die je vaak ook doet? (Tanken, kilometertstand etc.)
- Welke activiteiten vind je vervelend en welke vind je leuk?
- Welke gedachten gaan er door je hoofd voordat je de leaseauto instapt/ bij deze activiteiten?

---

8)
Heel erg bedankt voor het invullen van deze vragen! Wil je het ingevulde boekje meenemen naar het interview? Dankjewel!

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Heel erg bedankt voor het invullen van deze vragen! Wil je het ingevulde boekje meenemen naar het interview? Dankjewel!

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Boekje pagina 4

Subtopic 3: Mijn leaseauto service journey
- Ik welke situaties ben je nog allemaal bezig met de lease auto naast de directe voorbereiding, het rijden zelf en de afsluiting?

---
onoprijwijk situaties op post it---
- Zou jij me mee kunnen nemen in deze situaties en vertellen welke activiteiten je hier allemaal doet?
- Welke gedachten gaan er dan door je heen?
- Vind je deze activiteiten leuk? Waarom wel/niet?
- Welke doelen wil je behalen in deze situaties?

Boekje pagina 4 & 5

Subtopic 4: Contact lease maatschappij
- Hoewel contact heb jij of hoe vaak kom je in aanraking met je leasemaatschappij?
- Wanneer (in welke situaties) heb je allemaal (indirect) contact?

---
onoprijwijk situaties op post it---
- Op welke manieren heb je allemaal contact met je leasemaatschappij? (touchpoints)
- Kan je me door de activiteiten heen lopen bij zo'n situatie? (banken met tankpas, schade, onderhoud etc.)
- Zijn er dingen waar je tegenover loopt zodra je contact hebt met je leasemaatschappij of gegevens in mijn handen? Wat vind je just fine aan?
- Zijn er nog dingen die je te weten lichten over hoe treedt je bent met de lease service van je leasemaatschappij? Of over die dingen die je graag anders zou willen zien? Of over hoe jij dit graag anders zou willen zien?
- Hoewel contact heb je met de facturatie minister binnen jouw bedrijf? In welke situaties en op welke manier?
- Weet jij meer over de rol en de activiteiten van de facturatie minister van jouw bedrijf?

Boekje pagina 4 & 6

Topic 5: Informatie en verbondenheid

Informatieverzameling partijen:
- Welke gegevens verzamelt de leasemaatschappij allemaal van jou?
- Vul jij dat handmatig in of krijg je leasemaatschappij dat automatisch binnen?
- Welke gegevens heeft je bedrijf over jou en je lease auto en rijgedrag?

Informatieverzameling bestuurder:
- (nog toevoeging of toelichting vraag pagina 6)

Verbonden auto:
- Hoe slim verbonden is jouw auto? (onderhoudsaal bijv.) Hoe verbonden is hij met jouw mobiel?

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Interview Guide

Checklist voorbereiding:
- Afsluiten project TUDeff & LeasePlan
- Doel: erachter komen welke behoeften en wensen er zijn op het gebied van leasen en reizen
- 45 min - 1 uur

Checklist afsluiting:
- Heb je het idee dat je alles hebt verteld of wil je iets nog extra toelichten?
- Zijn er nog dingen die ik ben vergeten te vragen?
- Heb je eventueel nog een vraag voor mij?
- Interviewee bedanken

Checklist voorafgaand:
- Zijn er naast de activiteiten voor/tijdens/na je reis met je leaseauto, die je hebt opgeschreven in het boekje voor je laatste gebruik, nog activiteiten die missen maar die je vaak ook doet?
- Welke activiteiten vind je vervelend en welke vind je leuk?
- Welke gedachten gaan er door je hoofd voor je de leaseauto instap? bij deze activiteiten?
- Ga je vaak met een goed gevoel je auto in (of met een ander/negatief gevoel), hoe komt dit er en is dit specifiek voor bepaalde situations?
- Welke doelen wil je bepalen per fase (voor/tijdens/na)?

Overige:
- Zijn er verder nog momenten naast dat je de voorbereiding, het rijden zelf en de afsluiting dat je bezig bent met je lease auto (service) of met je leasemaatschappij?
- Welke activiteiten doe je dan meestal?
- Vind je deze activiteiten leuk?

Checklist afsluiting:
- Heb je het idee dat je alles hebt verteld of wil je iets nog extra toelichten?
- Zijn er nog dingen die ik ben vergeten te vragen?
- Heb je eventueel nog een vraag voor mij?
- Interviewee bedanken
Interview Fleetmanager

Checklist begin:
- intro afstudeerproject
- Doel interview: erachter komen welke behoeften en wensen er zijn op het gebied van wagenparkbeheer
- 45 min
- Ok voor recording?

Subtopic: Intro
- Zou jezelf even kort willen introduceren (kennis/achtergrond etc.)
- Hoelang ben je al wagenparkbeheerder?
- Hoe ben je hier terecht gekomen?
- Waarom wilde je wagenparkbeheerder worden/zijn?
- Doe je dit fulltime? Wat doe je er nog naast?

Subtopic: Functie
- Zou je je functie willen omschrijven?
- Waar ben je alleraarantwoordelijk voor? (schrijf op?)
- Hoe groot is jouw vikot?

Subtopic: Interactie bedrijf
- Werk je alleen of werk je in een team?
- Zijn er meerdere fleetmanagers binnen LP Nederland? Heb je daar contact mee?
- Wat zijn hun verantwoordelijkheden?

Subtopic: takenpakket
- Zou je je misschien in detail je takenpakket kunnen beschrijven?
- Welke systemen of programma’s gebruik je? Hoe vind je dit werken
- In hoeverre verschilt jouw takenpakket met een fleetmanager bij een andere bedrijf?
- (een klant van leaseplan)
- Welke doelen wil jij behalen tijdens je werk? (per dag of activiteit)
- Waar denk jij alleraar aan tijdens je werk, het uitvoeren van de taken?
- Hoe ziet een gemiddelde dag er bij jou uit?

Subtopic: Interactie bestuurders
- Met wie heb je alleraar contact om je taken te vervullen?
- Hoe vaak en op welke manier ben jij in contact met de bestuurders?
- Wat zijn de behoeften van jouw bestuurders?
- Welke behoeften van de bestuurders vervul jij?
- Waar lopen zij alleraar tegen aan? Wat vinden zij vervelend of waar liggen hun frustraties?

Subtopic: verbetering
- Waar loop jij voornamelijk tegen aan tijdens je werk?
- Wat vind jij leuk aan je werk?
- Wat vind je minder leuk aan je werk?
- Waar heb jij nog behoefte aan tijdens je werk?
- Wat zou jij willen veranderen aan de taken die je uitvoert, systemen waar je mee werkt?
- Hoe zou jouw ideale wagenparkbeheerder baan eruit zien?
- Hoe zou je ideale wagenparkbeheerder service eruit zien voor jou bestuurders?

Subtopic: Eigen reflectie
- Heb jij zelf een leaseauto of een auto? Wie is bij jou de fleetmanager dan?
- Hoe zie jij jezelf in zeventig jaar? Heb jij een (lease)auto, waarom?
- Maakt je dan gebruik van OV?
- Waar is dit afhankelijk van?

Checklist afsluiting:
- Heb je het idee dat je alles hebt verteld of wil je iets nog extra toelichten?
- Zijn er nog dingen die ik ben vergeten te vragen?
- Heb je eventueel nog een vraag voor mij?
- Interviewee bedanken
B.4 Detailed results

The main insights

The customer is sometimes not aware of the existence of a phone or web application where they can arrange things and isn’t always putting effort and time in checking this.

“There is an app, but I don’t use it. Well I think there is one, not sure. [Athlon]”

“There is no or I don’t have an online account, not sure how this works. [Alphabet]”

Not always willing to spend time and effort in really knowing how the lease service works. “The car was delivered by the lease company I think, because there was package for me from Athlon. ‘This is your car, it is ready for you now’. In the package was I think, from what I remember, the fuel card, vehicle registration document, reserve key, a car manual and manual from the lease company. Didn’t read it though.”

The customer isn’t always aware where they can arrange certain things, is the via the app, the website, via a phone call or can they just directly go to the dealer. “My car gave a sign that I drove 10,000 km and maintenance was needed. I had no idea what to do so I just called. They told me I could go to any renault dealer and they would fix it. [Alphabet]”

“The first time I got in contact with the lease company was for changing to winter tyres. No Idea how that worked so I just called. [Athlon]”

“I want to update the car’s navigation. I think I can arrange it there. [Athlon]”

The customer isn’t always aware how certain things are working. “I have a damage report document in my car always and then I think I can call Athlon and things will be arranged. Not sure what is included within the insurance when I drive damage, is it for my own risk or not. I don’t know how it works.”

“I think when something happens on the way we can just call this audi service and they pick up the car. [Audi Financial Services. Private Lease]”

Not always willing to put effort and time in arranging certain things. “I don’t have time to look up where I can go or can’t, I just go to the Audi Dealer and then I see. [LeasePlan]”

“When I reach mileage for maintenance, I delay this and then I drive another 3 weeks. I have to arrange everything myself, call the renault dealer, plan a meeting, going there, mostly really early in the morning before work. Didn’t have time for that. [Alphabet]”

Most contact and service moments with the dealer instead of the lease company. “Before I order a car it try out some car models at the dealer. What options do I like, which colours, which accessories. You want to see it in real time. Then I ask the dealer what the delivery time is for this model. [LeasePlan]”

“Most of the time you get it from the dealer and then they give explanation. Because when you drive another car, a different model, you always have to find out how the buttons etc work. You have to get used to it. [LeasePlan]”

“Everything is arranged via the dealer close to our home. We always go there. Went there and they fixed everything, checked if we were qualified to lease the car, did a test drive etc. We have limited contact moments [with lease company], not that much. [Audi Financial Services. Private Lease]”

“So we drove by and they also said the wiper fluid was almost done so they also refilled that. No costs for us, part of the service. We got a coffee and it was fixed within a few minutes. [Audi Financial Services. Private Lease]”

“I don’t have time to look up where I can go or can’t, I just go to the Audi Dealer and then I see. [LeasePlan]”

Expecting catch up contact moment. “The message ‘there is your car, here is the key, good luck’. And then not even a phone call from LeasePlan like ‘Hey, everything went well, do you have any questions? Totally nothing.”

“Actually, I have never heard anything from the lease company after I got my car. Nothing like ‘is the car all right’ and ‘is everything fine and are you enjoying until now? Sort of expected something, but not that it matters. [Athlon]”
The main wishes

Everything can be found and fixed in the app. Which refers to pain 2 and 4. “An app with all services in there. When you can find all information and what to do in certain situations in there. That you can see your mileage.”

Least effort in reporting the situation in the app. “An app with all services in there. [...] Or not even that. You just take a picture, of for example the broken car window and it will all be arranged and fixed.”

Ability to have insight in the situation, transparency. Which refers to pain 1 and pain 9.

Wanting proactive support. Which refers to pain 3. “Reminder it is time to change your tyres’. I called LeasePlan where the previous driver of this car changed the tyres. Because there the tyres are stored then. So I was like: I need to change the tyres, so where do I need to go? I don’t know. Would be nice if they told me upfront.”

Want after care. Which refers to pain 5. “Not bringing your car for maintenance and waiting at the garage.”

Not planning and arranging anything. Which refers to pain 10, 11 and 12. “Would be nice that when you have damage and can’t drive further, they or something picks you up so you can just continue your day. That you are not busy the whole that with fixing stuff or being at the garage. [Athlon], “So many cars need maintenance, why don’t they just go come by the office or something like that in the future.”

“Would be ideal if everything is fixed for you, like changing tyres or repaired, when you are just working at the office and they just pick it up and deliver it back. [LeasePlan]”

“This is partly possible already. It is ideal when they pick up and deliver the car back when you are at work. But you can arrange all of this via the app so yeah you can already arrange quite something. But you do have to think about it. I have to arrange something then. [LeasePlan].”

“Would be ideal that when I have a smarter car that he knows based on my agenda or something whether the kilometers travelled are for work or private and I don’t use the excel sheet anymore. [Athlon]”

Not thinking about anything. Which refers to pain 10 and 11.

“The most ideal would be if you don’t have to think about anything anymore. When your car needs maintenance, the cars knows when he needs it and send a message to LeasePlan. And that the system is connected with my agenda. And then knows where the car is and then plans a meeting at a garage and the car will be picked up, there’s maintenance and delivered back. And then I can just go home after the day with my car and I haven’t been interfering at all, not even
The pains

1. No feedback or information received during waiting after the order. “You order a car and then it’s being ordered for you and then you don’t hear anything. Some cars have a long delivery time, but yeah you don’t hear anything. I think they give an indication now when the car will be delivered, but no idea whether it is in time then or not. [LeasePlan]”

2. No fast access to copy or lease car details via the online environment. “To report the [in-car] theft I needed to hand in a copy of the lease car details and I couldn’t find that on the website. I only could arrange this via phone. [Alphabet]”

3. No idea what to do when the car gives a maintenance alert. “My car gave a sign that I drove 10,000 km and maintenance was needed. I had no idea what to do so I just called. They told me I could go to any renault dealer and they would fix it. [LeasePlan]”

4. No (clear) information available on how certain things work on the website or app. “I saw online that the winter tyres could be arranged. But what works for my car and can I really go just to any garage and arrange this everywhere? Wasn’t that clear, so I had to call. [Athlon].” “To report the [in-car] theft I needed to hand in a copy of the lease car details and I couldn’t find that on the website. I only could arrange this via phone. [Alphabet]”

5. No catch up or feedback moment after receiving the car. “The message ‘there is your car, here is the key, good luck’. And then not even a phone call from LeasePlan like ‘Hey, everything went well, do you have any questions? Totally nothing.’ Actually, I have never heard anything from the lease company after I got my car. Nothing like ‘is the car all right’ and ‘is everything fine and are you enjoying until now?’ Sort of expected something, but not that it matters. [Athlon]”

6. Push messages to stimulate choosing for cheaper gas stations. “They spam me with emails that I have to to go somewhere.”

7. Receiving fines too late. “Fines are fixed weirdly. Alphabet receives the fine. Then when it finally comes to me and when I disagree with the fine and want to challenge the fine, the time span is already done. And then my company holds it from my loan. You really have to proactive call to receive the money back.”

8. No explanation nor service from the distributor how the new car is functioning. “The whole support then, I find it very moderate. I had to pick it up at Schadenet, so also a distributor. But then I didn’t get any explanation. It is an electric car, I have to find out myself how I can charge it? How it works? You don’t get any instructions. I expected some explanation. Most of the time you get it from the dealer and then they give explanation. Because when you drive another car, a different model, you always have to find out how the buttons etc. work. You have to get used to it. It was just the message ‘there is your car, here is the key, good luck.’ [LeasePlan]”

9. No insights in car’s history and what was arranged at the garage. “After you have been to the dealer or garage everything is fixed automatically, and you never hear from it again. I find this a bit odd, would be nice to me to see my cars history. [Alphabet]”

10. Putting effort and time in arranging everything yourself when there is a need of maintenance, repair or tyres. “When I reach mileage for maintenance, I delay this and then I drive another 3 weeks. I have to arrange everything myself, call the renault dealer, plan a meeting, going there, mostly really early in the morning before work. Didn’t have time for that. [Alphabet]” “I don’t have time to look up where I can go or can’t, I just go to the Audi Dealer and then I see. [LeasePlan]” “I get a notification from LeasePlan in my e-mail and the MyLeasePlan app: ‘Reminder it is time to change your tyres’. I called LeasePlan where the previous driver of this car changed the tyres. Because there the tyres are stored then. So I was like: I need to change the tyres, so where do I need to go? I don’t know. Would be nice to find to information somewhere.”

11. The opening hours of the dealer/garage. “I am driving with this defect lamp for three weeks now. Don’t have time to drop by the garage since I can only drop by during working hours. [Alphabet]”

12. Spending time to go to the dealer/garage yourself and waiting there. “And then I have to drop by very early in the morning and wait there. Okay there is a place to work but then you are at a garage and not in the office. [Alphabet]” “Would be nice that when you have damage and can’t drive further, they or something picks you up so you can just continue your day. That you are not busy the whole day with fixing stuff or being at the garage. [Athlon]”

13. Not want to stand in between which garage will be fixing the car and taking care of this. “I had to report this in the MyLeasePlan app as a repair, so I did. Then I was called by Schadenet: ‘We see your car needs repair, we want to make an appointment’. Then I told, ‘it is already being fixed by the Audi dealer, I have been there.’ Schadenet told me that wasn’t possible, only they are appointed by LeasePlan to fix this. ‘I don’t know, I think something goes wrong here’. For me it doesn’t matter who fixes my car. Now I have to deal with this. Just fix it for me.”, “As a driver it doesn’t matter to which tyre service I need to go. [LeasePlan]”

14. No single contact point. “Now I am calling with all the parties, a bit annoying. I want to communicate with one party. [LeasePlan]”
The gains

1. **Pick-up and delivery service for repair and tyres.** "I had a punctured tyre on a Sunday and they just picked up my car in front of my house and 2 hours later they brought it back with a fixed tyre. [Alphabet]", "When a friend of mine needed a tyre change, they just picked up the car and delivered it back with the new tyres. Nice, that would be a good service."

2. **There is a place to work at the dealer/garage.** "It’s nice that you can work a bit at the dealer until your car is ready or they give you a replacement car. [Alphabet]"

3. **Don’t have to arrange anything when you are the dealer/garage.** "I am satisfied. I only have to go to the garage and don’t have to do anything. You don’t need to fill in documents and you don’t have to pay. At the garage they get all the car information easily because it is connected with the license plate. [Alphabet]"

4. **Always reachable and giving support by phone.** "In general I am satisfied, because they it doesn’t matter which day it is, I call and they fix everything. So when my car window was broken because someone broke into my car, I called and they gave me tips what to do. [Alphabet]" "When I am stuck at the highway. Then I call like 'my car does nothing, help me'. And then they arranged everything. Within no time someone came to get the car. [LeasePlan]"

5. **Pay fines easily in the app.** "I get a message via the mail and app when I have a fine. And then I can pay immediately via the app. That is really handy. Via iDeal. I make use of that, that’s easy. [LeasePlan]"

6. **Freedom of dropping by the dealer any time.** "I can go any time to the dealer and they’ll fix it. [Alphabet]"

7. **Planning appointment via the app.** "Reminder it is time to change your tyres. And then I make an appointment via the app. Then I plan the location, day, time etc. That went really well and fluent last time. [LeasePlan]"
C. Focus Group

C.1 Focus group approach

The focus group guide gives the best overview of the focus group approach. The guide also stresses how group bias was prevented. During this session the focus lied on the current mobility needs but also on the future mobility needs. The session was 2 hours, with a small break. Individual assignment were followed by group discussions. The four different templates in appendix C.2 show the individual assignments. After filling in the templates, the participants explained their answers and there was room for questions and discussions. The recordings of the session were transcribed and together with the filled in templates, the insight swere clustered and labeled. The approach of the focus group was partly based on This is Service Design Doing book and the Design Thinking book.

The participants
There were 5 participants, all studying at TU Delft but with different study years. They all have their driver’s license but none owns a car. The age ranged from 21-26 and from bachelor students, master students, graduate students and alumni.

Limitations
Please consider the limitations of the participants. As students at TU Delft, they will have a different view on the future mobility than maybe the average person from their age. Besides the limitations of the focus group approach, the participants might indirectly influence each other opinions. See the focus group guide how I dealt with this. As for the customer interviews, the goal was not to prove a certain outcome. The goal of this session was to create empathy for the target market and gather inspiration for the project.
C.2 Focus group templates

1. Hoe reis ik nu?

Ik gebruik de volgende vervoersmiddelen:

- Hoe vaak, wanneer en waarvoor gebruik je deze vervoersmiddelen?
- Wat vind je leuk en wat vind je vervelend als je met deze vervoersmiddelen reist?
- Ik ben gestresst/relaxed tijdens het reizen met dit vervoersmiddel omdat:
- Als ik met dit vervoersmiddel reis vind ik het volgende belangrijk:
- Het volgende heb ik nou echt nodig, of zou ik goed kunnen gebruiken, als ik met dit vervoersmiddel reis:
- Om mijn reizen makkelijker en fijner voor mezelf te maken doe ik het volgende:
- Omschrijf hoe jij bent als je reist in 3 woorden. Waarom ben je zo?

vervoersmiddel 1
bijv. gebruik van handige apps/ samen reizen etc.

vervoersmiddel 2

vervoersmiddel 3

vervoersmiddel 4

vervoersmiddel 5

2. Hoe reis ik later?

2.1. Over 5 jaar zie ik mezelf zo (maak een leuke tekening)

2.3. Van welke vervoersmiddelen denk je dan gebruik te maken en op welke manier? Waarom?

2.2. Hoe zijn mijn reisbehoeftes anders over 5 jaar en waarom?

2.4. Hoe moderner denk je dat jouw vervoersmiddelen zijn over 5 jaar? En waar helpt dat jou bij?

Wat vind je belangrijk in dit leven? Wat heb je nodig in dit leven? Waar maak je je zorgen om? Waar haal je energie uit? Wat wil je bereiken?

Wat doe je voor werk? Wat doe je in je vrije tijd? Wat is je 'status': single/relatie/getrouwd, woon samen/alleen, kinderen?

Heb je een eigen auto? Heb je lease auto (prive of van de zaak)? Maak je gebruik van deel auto's?

Maak je nog gebruik van OV? Taxi of andere mobiliteitsservices?

Hoe 'smart' zijn jouw vervoersmiddelen dan? Welke features hebben ze? Hoeveel slimmer zijn jouw app's geworden die je gebruikt voor het reizen? Welke slimme features heeft jouw auto? Hoeveel efficiënter is het reizen dan?

3. Mijn elektrische auto & een auto gebruiken i.p.v. hebben

Geen eigen auto hebben later maar een auto gebruiken, wat vind ik daarvan?

Wat zal je er vervelend aan vinden? Wat zal je er leuk of fijn aan vinden? Waar zal je je zorgen over maken?

Hoe zal jouw ideale 'deel auto service' eruit zien?

Hoe zal de deel auto/ de service / de bijbehorende app voor jou moeten werken of zijn, zodat jij het echt zal gaan gebruiken?

Een elektrische auto hebben later, wat vind ik daarvan?

Hoe zal de elektrische auto / de service / de bijbehorende app voor jou moeten werken of zijn, zodat jij het echt zal gaan gebruiken?

4. Mijn slimme zelf rijdende auto

Een zelfrijdende auto hebben later, wat vind ik daarvan?

Wat zal je er vervelend aan vinden? Wat zal je er leuk of fijn aan vinden? Waar zal je je zorgen over maken?

Hoe zal jouw ideale zelfrijdende auto eruit zien?

Stel je voor, je hebt zoveel jaren verder een 'butler functie' in je slimme auto (die ook samenwerkt met je telefoon) en deze 'butler' weet alles en kan alles voor je doen. Wat zou je die 'butler-functie' dan allemaal willen vragen om voor je te doen?

Hoe zal de ideale zelfrijdende auto er voor zorgen dat jij het niet vervelend vind en je er geen zorgen over maakt?

Hoe zal de ideale zelfrijdende auto er voor zorgen dat jouw reis nog fijner en leuker wordt?

Hoe zal de 'butler-functie' er voor zorgen dat jij je geen zorgen meer maakt over dingen waar je tegen aan loopt tijdens het reizen?

Hoe zal de 'butler-functie' er voor zorgen dat jouw reis nog fijner en leuker wordt?

Hoe zal de zelfrijdende auto voor jou moeten werken of zijn, zodat jij het echt zal gaan gebruiken?

Welke behoeften zal je over zoveel jaar hebben en hoe kan de 'butler-functie' die voor je vervullen?
Focus Group Guide

C.3 Focus Group Guide

Preparation
To bring:
- Print templates
- Markers (big, small, colored and black) + pens
- Paper A3
- Post it
- Printing images (smart cars, smart city, car sharing, Maadi electric & self-driving cars)
- Snacks
To prepare:
- Write down rules

10:30-10:35
Introduction participants
1. Name / age / study / work / city
2. Make a name label
3. Icebreaker: Tell us your weird fun travel fact

10:35-10:40
Introduction of the program
1. Introduce myself
2. Explain briefly graduation topic + discover phase
3. Explain purpose of today: I would like to know and understand your thoughts, attitudes, opinions towards the topics we will discuss today about current and future ways of travelling. I want to empathize with you. It is about short transport travels for daily purposes. Long travel like an holiday by plane are out of scope.
4. Explain: Today is not about making a consensus in the group and not about generating ideas together, I am interesting in your own personal perspective and opinions towards the topics. The reason I put you together is that you get inspired by each other and can see things from another point of view and can think what you would do or want or believe in that situation. Besides, when talking about this topic helps refresh your memory. Don't let yourself be influenced by others' opinions. We don't know what the future bring. We can only think of scenarios and how we might behave in them. There are no stupid questions and no wrong answers. Creativity will be rewarded! (Write down these rules!)
5. Please let everyone talk. I am curious about all your thoughts and perspectives
6. Explain: I am being the moderator today and I will not participate in the discussion. I will only guide you through the session and I will observe.
7. The planning and content of today: 5 topics today. Individual assignment followed by group discussions.
8. Ok for recording? Ok for pictures?

10:40 - 11:05
Assignment 1:
1. Explain topic: Current way of travelling with car, public transport or other mobility services
2. Explain way of working: First I will give you the templates and you can fill it in in silence. After that everyone will shortly present their answers, where only one person talks and the others will listen. After each person, we have a short moment to ask the person some questions for clarification of their behaviour and thoughts. After that I have some more questions, but you can answer these in a group discussion. Please let everyone talk and explain their thoughts.
3. Fill in templates + discuss them
4. Extra questions for clarification:
   a. Why don't you use other ways of transporting?
   b. How often do you change from different means of transport during the same travel? In what way? What do you need that?
   c. Which means of transport do you like the most and least? How and why?
   d. What activities do you do before/after the trip?
   e. If you would like to prepare really good for your trip: what have you fixed?
   f. Which apps do you currently use that helps you with and during travelling?
5. Group discussion questions:
   a. In what do you think your attitudes towards these ways of travelling is different than people who are 10 years older? Or the age of your parents? Or the age of your grandparents?
   b. Have you ever made use of ride-hailing services like Uber or Lyft? Why? What did you like and what not? What was important to you? How would you like to improve it?
   c. Have you ever made use of a car sharing or car pool services? Why? What did you like and what not? What was important to you? How would you like to improve it?

11:05 - 11:30
Assignment 2: near future
1. Explain topic: me in the future & my transport in the future
2. Icebreaker question:
   a. Please describe how the person right to you would travel in 5 years from now and what he/she would definitely need and why, based on person's different lifestyle.
   b. You just listen and don't react on the others person's answer. We will see after the templates are filled in
3. Fill in templates + discuss them
4. Extra questions for clarification:
   a. When your future employer offers you a lease car, would you accept it? Why?
   b. Would you like to buy your own car? How important is a car to you? Why?
   c. Which travel app do you like the most and why? If it become even smarter in coming years, what would the app then do for you?
5. Group discussion questions:
   a. How would your ideal travel journey look like in 5 years from now?
   b. If your employer offers you a mobility service instead of just a lease car, what should the service all contain?

11:25 - 11:30
--- Small break for coffee and toilet ---

11:30 - 11:55
Assignment 4:
1. Explain topic: near future mobility solutions: no car ownership & electric vehicles
2. Fill in template + discuss them
3. Extra questions for clarification:
   a. What would be your reasons to use a pool car?
   b. Would you willing to share your own car? Why would you share it?
   c. Have you made use of an electric vehicle before?
D. Co-creative session: opportunity mapping

D.1 Session approach

Why?
A co-creative session was facilitated for the define phase to:
• Brainstorm & decide together on interesting opportunity areas for LP
• Brainstorm & decide together on how LP can bring value to their customers & business
• Brainstorm & decide together on a promising vision for LP
In order to:
• Understand which changes and developments in the world we are interest in
• Understand what LP employees find important for the vision & design direction
• Inspiration and guidelines to better shape the final future vision
• Inspiration and guidelines to better shape the design direction
• Start the develop phase with a goal in mind
Why together:
• Transform individual knowledge into collective action
• More perspectives, better imagination of the future
• Shared understanding
• Ownership
• Higher quality of solutions
• Improve implementation

How?
The session is partly based on the value mapping session by Lianne Simons [2018] in the Design Road Mapping book. The session is tailored to the project. The Creative Facilitation book [Tassoul, 2009] and Integrated Problem Solving [Buijs & van der Meer, 2016] book provided guidelines, ideas and facilitation tips for the session. The session was built up in:
• a preparation assignment before the session, to warm up the participants
• a diverging phase, to brainstorm about opportunity areas for LP
• a converging phase, to decide upon the most interesting opportunity areas and to determine the future vision

What?
A 2,5 hour session with 5-6 participants. The session is long enough to understand what the participants find important and interesting and which is short enough to attract enough LP employees to participate in the session. A creative session divided in individual and group assignments.

The set-up:
• Preparation assignment: the participants were asked to create opportunity areas for 3 different external environment scenarios. The external environment scenarios were created based on the findings from the discover phase. The participants created the opportunity areas to answer the following 2 questions for scenario: What [unique] position could LP take in this scenario? What value can LP bring to the [potential] customer in this scenario? Besides, they were asked to think of which opportunity area they find most interesting. The participants had to prepare a 3 minute pitch were they would present the answers. See the assignment in appendix D.2. The choice for this individual assignment was to warm up the participants in the thinking process. Besides, to make room for hearing individual perspectives and opinions, without the interference of others.
• Introduction session: To start the session, some background information about the project and its progress was explained. Then, the purpose, the rules and the planning of the session were explained. See the slideshow in appendix D.3. The session was kicked-off with an energizer.
• Diverging phase ‘the pitches’: The diverging phase was kicked off with the pitches. Participants could take notes during the pitches to write down any ideas or other opportunity areas which could come to mind. After the pitches there was room for questions and a small discussion. Interesting requirements or values which served as inspiration for the final vision, were written down by the facilitator.
• Converging phase ‘the brainstorming’: The participants were asked to individually brainstorm of more opportunity areas and think beyond the given scenarios. In this way the total possibilities could be scouted and more out of the box thinking was created. Probing material was given to inspire the participants of other scenarios and opportunities. See the probing material in appendix D.4. All opportunity areas, from the pitches and the brainstorm, had to be placed on a big sheet.
• Converging phase ‘choosing’: all opportunity areas were first clustered with the ones that were related. In this way an overview was created of all the opportunities and there was room for everyone to understand the opportunity areas and clusters. Then a dot-technique was used, so the participant could individually highlight the most interesting areas for him/her.
• Converging phase ‘value map’: The participants were asked to place the opportunity clusters with the most dots over a timeline. There was room to rewrite the clusters or to stress better the value LP would bring for the customer in the opportunity cluster. It was possible to spread a certain cluster over the timeline, in case it was applicable to multiple time horizon. In that case for each time horizon a new opportunity area was made.
• Converging phase ‘vision’: The participants were asked then to think of the end of the time horizon: the future vision. The meaning and purpose of a vision was explained in a slide. The group was again divided in couples and they could fill in the vision template. See appendix D.5 for the vision template. At the end the couples presented their idea for the vision or vision elements. During the discussion the points were written down were the group agreed on and disagreed on.
• The session was closed by a thankful moment and explanation of the next steps in the project. At the end the participants were asked for a small reflection exercise on the session. See appendix D.6 for the session’s guide.
D.2 Preparation assignment

Assignment

In this assignment you will create different opportunity areas for LeasePlan in 3 possible external environment scenarios. Prepare a 3 minute pitch for the session this Friday where you answer the questions below.

1. To create opportunity areas for LeasePlan, please answer for each external environment scenario the following questions:
   a. What (unique) position could LeasePlan take in this scenario?
   b. What value can LeasePlan bring to the (potential) customers in this scenario?
2. Which opportunity area for LeasePlan do you find most interesting and why?

It is not a problem if you come up with multiple opportunity areas within one scenario or when you didn't come up with any opportunities within one scenario. Please consider that it is just an exercise to generate a lively discussion this Friday. No answers are wrong and out of the box ideas are appreciated. Don't spend too much time on shaping the opportunity areas, since they just have to opportunities within one scenario or when you didn't come up with any opportunities within one scenario. Please consider that it is just an exercise to generate a lively discussion this Friday. No answers are wrong and out of the box ideas are appreciated. Don't spend too much time on shaping the opportunity areas, since they just have to

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External environment scenarios

1. Connected travels
   - The customer expect to be online anywhere and anytime. They expect to find and arrange everything online. Customers are getting used to supportive and proactive smartphone applications to make their life efficient and easy. The goal is to spend as little time as possible on arranging things themselves if a smart system can solve it for them.
   - With the rise of internet connected cars, real-time insight in the car's status and the driver's behaviour can be obtained. Huge amount of data can be gathered and combined with history data and third party APIs. By intelligent data analysis, proactive responding to the situation can be realised.
   - Startups and tech giants are taking over the end customer interaction with several apps. They help the customer in choosing the best route when getting from A to B, while meeting the customer's moment specific needs. The apps help the customer throughout the whole customer journey, so the customer has one place to fix many things.

2. Need for different mobility solutions
   - While cities are growing, with more traffic jams and less parking space as a consequence, the demand for cars in cities is decreasing. Employers are getting more interested in reducing the car fleet and offering their employees pool cars and access to other mobility solutions, all operated from one system. Although younger generations are less 'spoiled' with the luxury of having a car, for most people having a car, instead of sharing your car or making use of sharing or pay per use services, has still more benefits in terms of accessibility, ease, privacy and trust.
   - With the rise of internet connected cars and several digital technologies, optimal planning and fleet management solutions can be realised. Besides, services can become trustful and transparent. Furthermore, the vehicle's interior can easily adapt to the user's preference. In this way car sharing, ride hailing or pay per use services can become as attractive as having your own car.
   - Direct competitors are expanding with leasing micro modes of transport or mobility services: with the use of a mobility card the customer can make use of different modes of transport. Employers become more interested in all-in-one mobility providers.

3. Electrification
   - The interest of customers towards sustainable transport solutions like the electric vehicle (EV) is increasing. Though, the choice for a fully EV instead of a hybrid is not always made, because of the hassle charging can bring. Customers can be insecure: they are not fully informed about how it works. Besides, they do not want to risk an extra charging stop, spending time and effort in planning and searching for a place to park and charge. Also employers want to electrify their car fleet, to meet the employees' needs, but also to meet their sustainable targets. However, most companies are not aware what a full switch towards EV's can mean. For example in terms of arranging parking spots with charging stations and managing the energy costs.
   - With the rise of internet connected cars, real time insight in the car's status and the driver's behaviour can be obtained. Besides, more infrastructure and buildings are becoming intelligent and connected. EV's require less maintenance and when the vehicle becomes more connected, maintenance can be done in different forms (e.g. software updates over the air).
   - Direct competitors offer information and training for employers and customers for the EV switch. Several parties are discovering smart charging solutions with smart demand and supply.
D.3 Session Preparation Slideshow

Co-creative session: Value map & vision
February 22nd 9:30 - 12:00

The Connected Automotive Future
An innovation strategy for LeasePlan

Project Phases

Discover
- Customer trends & future needs
- LP needs & capabilities

Define
- Industry developments
- Opportunity mapping
- Value mapping

Develop
- Vision
- Design Brief

Deliver

Why? This session

The purpose of this session
- Brainstorm & decide on interesting opportunity areas for LP
- Brainstorm & decide how LP can bring value to their customers & business

Why together?
- Transform individual knowledge into collective action
- More perspectives, better imagination of the future
- More creativity
- Shared understanding
- Ownership
- Higher quality of solutions
- Improve implementation

Session ‘Rules’

Step out of your role and embrace the bigger picture
- Nothing is wrong we don’t know what the future will bring
- Postpone judgement
- Quality through quantity
- Dare to brainstorm
- Hitchhike on each other’s ideas
- Use affirmative judgement
- Protect originality
- Have action in mind

Session Planning
Step out of your role and embrace the bigger picture
Nothing is wrong: we don’t know what the future will bring

A vision:
- A strategic reference point for actionable innovation
- No branding vision & no corporate vision. No flashy branding tagline.
- It is for us, internally. Knowing where we are working towards. Dot on the horizon.
- Desired future end state
- What we hope to be and achieve
- Ultimate value or impact we bring to the world/customer/community
- Ultimate way of interacting with the customer
- What we deliver
- Why we exist

Room for questions for clarification and discussion

How we imagine the future:
- Postpone judgement
- Quality through quantity
- Dare to freewheel
- Hitchhike on each other’s ideas
D.4 Probing material

LeasePlan’s strengths & weaknesses

- Big stakeholder and supplier network
- Big, powerful multinationals as clients
- Big fleet
- Profit from economies of scale
- Switch towards EV’s
- Providing vehicles for the ride-hailing industry
- Market leader in leasing
- International oriented
- Successful online car sales platform
- Little to no end-customer relationship
- Car, business and organization centered
- Big middleman
- Late with catching up in the latest mobility trends
- Scattered LP companies over the world

External Developments: opportunities & threats

**Tech**
- Internet connected cars: real time insight in car’s status & driver behaviour
- Personalized and private car interior solutions
- Connected & intelligent infrastructure & buildings
- Communication directly with driver via the car (interface)
- Direct car to car & infrastructure communication
- Less need for & different maintenance for the EV, CV & AV
- Hydrogen car
- Intelligent analysis tech with big amount of car data
- Technologies enable trust and transparency
- Access to third party API’s

**Customer**
- Employers are looking for the all-in-one mobility provider
- Employers want to reduce car fleet and make use of carpooling
- Growing need for having access instead of having/owning car
- Less cars in crowded areas: parking & traffic flow, but urbanization
- Growing interest in car sharing to reduce costs & do good
- Delay adoption EV’s by charging challenges

**Industry**
- Rise of startups with sharing the lease car solutions
- Competitors offer more modes of transport for leasing
- Startups & tech giants take over the end customer interaction with apps
- GDPR, no access to the data without user consent
- Cutting out of middleman

What if’s

What happens if LeasePlan does nothing?
What if leaseplan’s cars could directly communicate with each other and to infrastructure and buildings (like offices, garages, parking lots)?
What if the car becomes an open digital platform like the smartphone and its apps?
D.5 Vision template

**Vision Creation Template**

*How will the world look like in 2027?*

*Why do we exist in 8 years from now?*

*What we hope to be and achieve in 2027:*

*Where we believe in in 2027:*

*The ultimate impact we have on + ultimate value we deliver to the customer:*

*Visualize the vision:*
D.6 Session guide

Creative session set-up

Vision & design direction session, Friday 22nd of February 9:30-12:00, 586 participants

Prepare:
- Print scenario assignment
- Print probing material
- Print vision template
- Prepare didactic
- Paper + post it sheets
- Prepare C-box + timeline sheet
- Prepare own opportunity areas on post its
- Bring macbook adapter + camera
- Buy snacks
- Markets
- Post it
- Tape

9:30 - 9:45
Introduction
1. Walk-in
2. Introduction participants
3. Slidehow
4. Energizer

9:45 - 10:30
Pitches
1. Explain: open for questions and discussions. Explain rules [SLIDE]. Explain: make notes during the pitches for brainstorm. Do you come up with interesting ideas for opportunities?
   Write it down.
2. For me: write down interesting values & requirements already for the vision
3. For me: write down the opportunity areas on a post it
4. For me: Write down what’s missing on a post it
5. Questions: Which change in the world are you interested in and why? Which opportunity do you find most interesting and why? Do you have the feeling something is missing in the scenarios?
   Explain opportunity sheet and stick to opportunity post its to it.
6. Question: Do you think some opportunity areas are missing?

10:30 - 10:50
Brainstorm
1. Explain purpose: when something is missing. Dive deeper in these scenarios but look also beyond presented in the scenarios, there is more. Look at other scenarios as well, changes/development in the external world. Can we come up with more?
2. Explain assignment: divide in couples/learn of threat’ or I join one. Generate opportunity areas. Make use of the probing material/visuals on the table (Trends, opportunity/weakness, what if’s). Write all ideas for opportunity down on post its. Write down LP’s position + the value they will deliver to the customers, show example. A value that fulfills unmet needs, resolves a dilemma or frustrations experienced by the customer. Broader than the current customer. Put the opportunity areas on the opportunity area sheet. Minimum three opportunity areas per couple.
3. Repeat diverging rules. Later we will make sense out of it. Postpone judgement, dare to freewheel, quickly through quantity, hit/kill on each other’s ideas.

10:50 - 11:00
Break
Put down my opportunity areas also on the sheet.

11:00 - 11:10
Clustering areas
1. Explain clustering purpose: to create overview & understanding what is written down
2. Explain assignment: cluster related areas together if needed.
3. Explain C-box purpose: To distinguish what is written down, better to choose later.
4. Explain: C-box exercise: plot the opportunities (clusters) over the matrix together. Don’t think about it too long.

11:10 - 11:15
Choosing areas
1. Explain converging rules. Use affirmative judgement, protect originality, have action in mind.
2. Explain purpose: Choose the most interesting ones for scoping.
3. Explain assignment: Individually. Place 3 dots on the opportunities (clusters) which you find most interesting and promising. Place 1 dot on the most you find most original. Don’t think about it too long.

11:15 - 11:30
Plot over time: value map
1. Explain purpose: What is interesting when. Aligned with the changing world. The value we will deliver over time, with meet changes in the world then. Don’t think about it too long, this will come back in a later phase of the project.
2. Explain exercise: Place the interesting opportunity areas over the time frame. Spread the opportunity areas if needed over the timeline. Rewrite final opportunity areas if needed.
   Stress then, in case it is not clear per spreaded post it what value you bring there at that moment to the customer. Value we bring that fulfills unmet needs and resolves present dilemma or frustrations experienced by a target group.
3. Question: Is it complete?

11:30 - 11:55
Vision creation
1. Explain purpose vision: Having a strategic reference points for actionable innovation. Knowing where we are working towards.
2. Explain vision: desired end state in the future world. Dot on the horizon. It is for us, internal usage. No branding and no corporate vision. No flashy tagline. Why the company exists. What we hope to be and what we want to achieve. What do we deliver? Ultimate way of interacting with the customer. Ultimate value or impact we bring to the world/customer/community. Vision from 5-10 years. “In a world where … LP brings … to the customer.” [SLIDE]

3. Explain exercise: Divide in couples. Brainstorm about vision ideas, ideas for elements of the vision. Explain rules. Use the template. Present your idea. I don’t expect a tagline. [HAND OUT TEMPLATE]
4. List what we agree and disagree on. List what we find important. Discuss
5. Look back from the vision, how could we realise this? Next session.

11:55 - 12:00
Closing & reflection
1. Explain what I will do with the results. Explain how I will continue the project. Explain how they helped me today.
2. Thank participants
3. Reflection: please write down on a post it a tip and top for me about the session. Anonymous.
Co-creative session: Value map & vision

Results

February 22nd 9:30 - 12:00

The Customer Experience - Damen Shipyards: an innovation strategy for LeasePlan

Master Thesis: Claire den Boer

Opportunity Areas that arose from the SWOT analysis from own research

Own research: Opportunity Areas

Own Research Results

Innovation strategy for LeasePlan

Focus areas

Vision 2027 ingredients

First Time Horizon

Second Time Horizon

Final Design Direction

Session Results

Co-creative session: Value map & vision

Results
**Future Vision**

**In a world where...**

- more cars, drivers and cities are connected;
- urban areas are crowded, where ownership is less important and where a healthy environment becomes more important.

**Because we are...**

- the all-in-one mobility provider and a major player in the EV world.
- the real-time insight in the fleet's status & performance, the back-end knowledge data infrastructure, the physical infrastructure and energy and power management infrastructure.

**And we have...**

- our customers want to experience a seamless travel from A to B to C, anywhere, anytime and anyhow, while contributing to a livable & healthy environment.

**We must our customers to...**

- reduce traffic in the built-up area, performance, the back-end knowledge data infrastructure, the physical infrastructure and energy and power management infrastructure.

**In 2027...**

- to experience a seamless journey from A to B to C, anywhere, anytime, while contributing to a livable & healthy environment.

**Design direction**

**Design challenge:** Design future product and service solutions which enable the customer experience seamless A-B-C travels, anywhere, anytime and anyhow, while contributing to a liveable & healthy environment.

**Design requirements:**
- Seamless, proactive & only thinking of driving experience
- Full EV package
- Improve livability by sharing
- All in one mobility
- Getting from A to B to C

**Design focus areas:**
- Improve the customer experience
- Establish a relation with the (end) customer
- Profitable for LP’s business
- Feasible, desirable & viable
- Trustful
- Transparent
- Efficient
- Personalized
- Always accessible
- Flexible
- Privacy protected

**Design focus areas:**
- Seamless, proactive & only thinking of driving experience
- Full EV package
- Improve livability by sharing
- All in one mobility
- Getting from A to B to C

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**Mapped over time**

- First Time Horizon
- Second Time Horizon
- Third Time Horizon

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**How many ideas?**

- More than a dozen ideas!
Co-creative session: idea generation

E.1 Session approach

Why?
A co-creative session was facilitated for the develop phase to:
• Brainstorm on and generate design solutions within the design scope
In order to:
• Serve as an inspiration source for the individual iterations loops
Why together:
• Use the internal knowledge of LPD employees
• More perspectives, more creativity
• Ownership
• Quantity and Quality
• Gain insight in what’s needed for implementation within LPD

How?
The session’s approach is inspired by the Creative Facilitation book (Tassoul, 2009) and the Integrated Problem Solving book (Buijs & van der Meer, 2016). This session was focused on the idea generation techniques. Also Simonse (2018) her idea mapping session, where techniques and customer values are combined to map ideas, was also used to shape the session.
The sessions contained a:
• Diverging phase, to brainstorm ideas for the ideation questions
• Converging phase, to choose the most promising ideas and conceptualise them

What?
A 2 hour session with 7 participants that were LPD employees, with different backgrounds and functions (designer/developer/manager).
The set-up:
• Introduction session: To start the session, some background information about the project and its progress was explained. The vision, technologies, internal project and customer values were explained. Then, the purpose, the rules and the planning of the session were presented. See the slideshow in E.2.
• Diverging phase: ‘brainstorm in groups’. The group was divided in 3 smaller groups. Each group brainstormed together on the ideation question with the technologies and customer values in mind. They had a big sheet and post its and they could write their ideas down on post its. After half an hour brainstorming, each group shortly presented their ideas.
• Converging phase: Again the group was split up in 3 groups, but with different compositions. Each group could choose the ideas they found most interesting. After they chose these ideas, they could further detail this idea with the concept template, see E.3. They had half an hour for conceptualisation.
• Presenting: The last 10 minutes were dedicated to the concept presentation, where each group explained their concept.
• The session was closed by a thankful moment and with the explanation of the next steps in the project.
E.2 Session Preparation Slideshow

Brainstorm:
Idea generation
March 28, 14:00-16:00

The Connected
Automotive Future
An innovation strategy for LeasePlan

MSc Strategic Product Design
Faculty of Industrial Design Engineering
Delft University of Technology

The connected vehicle
Internet of things of cars
Real-time insight in the car’s status, location & performance and driver behaviour.
Car to smart devices, smart building & smart infrastructure communication.

Focus area: the electric vehicle
Zero-emission total fleet by 2030

Future vision
In a world where...
... more cars, drivers and cities are connected...
... urban areas are crowded, and where a healthy and sustainable environment becomes even more important...
... we want our customers...
... to experience a seamless, hassle-free and zero-emission travel...

Because we aim...
... to play a key role in the EV world...
... and we have...
... real-time insight in the fleet’s status & performance, the data and physical infrastructure, and the power & energy management system, everything to manage our zero-emission fleet at scale.

How can the connected vehicle enable a seamless, hassle-free and zero-emission travel?
Opportunities

Smart charging
- Green energy
- Cost reduction

The connected vehicle enables:
- Insight in battery status
- Automation

Opportunity:
- Less customer interaction: hassle free; only thinking of driving experience, while contributing to a healthier environment.

Opportunities

Social charging
- Efficient park & charge
- Manage sharing charge spots with neighbours, colleagues & strangers
- Priority charging in case of smart charging

The connected vehicle enables:
- Insight in travel plans

Opportunity:
- Help managing the charge spot at the parking lane with social charging and give insight in priority charging

Opportunities

Electric carpooling
- Insight in travel plans

The connected vehicle enables:
- Which car to take & where it is parked based on battery status & travel plans. Easy access.
- Insight in driver behaviour & car status (damage, accident) & car travel plan (delay by traffic)
- Where to park the car and need for charging or not

Other takeaways:

Future technologies
- Wireless charging (induction)
- Smart AI sensors that recognize speech and facial expression to track emotion
- Smart AI sensors that recognize situations

Benefit for LP:
- Insight in the battery life
- Insight in the residual value

Goal of today: generate ideas & concepts

How can the connected vehicle enable a seamless, hassle free and zero emission travel?

- Real time insight in the car’s status, location, battery status & performance and driver behaviour.
- Car to smart devices, smart buildings & smart infrastructure communication
Session Planning

**Brainstorm**
- Work out ideas in teams
- Cluster & selecting ideas

**Brainstorming**

**Converging rules**
- Use affirmative judgement
- Protect originality
- Have action in mind

**Diverging rules**
- Postpone judgement
- Quality through quantity
- Dare to freewheel
- Hitchhike on each other’s ideas
Concept Template

Design for the seamless, hassle free and zero-emission travel with the connected & electric vehicle

Visualisation of the concept:

Describe the values the concept brings for the customer (the client & the driver):

Are there stakeholders involved? (Yes, then what value brings LP to them?)

Describe the value the concept brings for LP:

Describe the business model behind the concept:

Describe what is required for implementation:

This picture shows one paper sheet full with rough ideas from the group brainstorm session.
E.4 Session Results

Concept 1: Have insight in your real sustainable and financial impact.

Concept 2: The advanced self rotating parking lot

Concept 3: Neighbourhood charge point and car sharing. With EV and car sharing ambassadors.
E.4 More ideation results

Throughout the individual ideation phase, more ideas were generated. See here the most important ideas, that in the end weren’t enough to meet the customer value or design scope.

Concept 1: Enable chargepoint sharing in neighbourhoods were business lease driver life and who doesn’t have a private charge point.

Concept 2: Make office return their investment by opening their private charge point at their office parking lot for the neighbourhood. For example in the evening, when the parking lot is empty. Ask a higher price, for optimal return of investment. An app where the neighbourhood can reserve a charge spot, can pay and can check availability.

Concept 3: LeasePlan charging stations, where all lessees can charge. When they charge there, they always charge the cheapest, the greenest and help their city towards more green electricity by a balanced energy grid.
F.
Design Evaluation

F.1 Design evaluation approach

Why?
Internal and external interviews were organised to:
Validate the assumptions in customer needs
Validate the design solutions’ value
Validate the design solutions’ experience & interaction
In order to:
• Have insight in the possibility for design solutions improvement
• To recommend the next steps for LP with the design solutions

How?
The innovation strategy was internally validated in the format of a presentation. The short term design solutions that were conceptualised, were validated internally and externally during interviews, with the use of storyboards.

What?
Concept validation half an hour to one hour interview with the storyboard with:
2 Clients from LPNL that are rapidly expanding their CV fleet. Participants: A fleetmanager from Securitas and a HR and mobility consultant who works for Quoratio.
4 account team managers from LPNL, who are in close contact with client who rapidly want to electrify their fleet: Andre Krommenhoek, Ronald Hylkema, Cor Jongkind, Sandra van der Werff
1 Fleet Management Coordinator from LPNL: Julian Alkemade.
Project Manager EV Desk, Guido Ripken, and LPNL EV Lead Jeroen Erens
Senior Product Owner Big data Lourdes Pradeep
Innovation strategy validation in the format of a presentation:
Director Product Development LPD Niall Mcloughlin
Head of Product Daan Oostveen
Global EV lead Matthijs van der Groot
Interview Guide - Concept validation - Client

Topic 1: Het bedrijf & hun plannen
Wil ze hun vloot verder uitbreiden met elektrische auto’s? Wat zijn de plannen?
Gaan ze nieuwe laadpalen neerzetten op hun kantoor en aan de huizen van werknemers?
Hoe denken ze dat de vloot eruit ziet over zoveel jaar?

2. Behoeften van het bedrijf
Tegen welke problemen lopen ze aan?
Tegen welke problemen denken ze aan te lopen (over een bepaalde tijd?)
Hebben ze problemen met het aanbied van laadpalen bij hun kantoor en de vraag?
Hebben ze problemen met het delen van de laadpalen?
Hebben ze problemen qua aanleg van de laadinfrastructuur?
Komen er veel investeringen bij kijken?
Hebben ze problemen met benodigde vermogen voor de vloot genereren?
Waar ze behoefte aan? (kennis, advies, inspectie in financiële impact)
Zie je andere bedrijven om je heen met andere behoeften?

3. Duurzame ambities
Hebben ze verder nog duurzame ambities, laden met duurzame energie?
(Plaatsen van zonnepanels, duurzame energie opslaan in auto’s over een aantal jaar als de techniek dat toelaat.)

4. Verwachtingen van LP
Hoe vinden ze de huidige begeleiding van LP hierin?
Welke verwachtingen hebben ze van LP op het gebied van een elektrische vloot en de energie & laad voorziening?
Zien ze LP als een partij die hen daarin begeleidt?
Zien ze LP als een partij die producten aanbiedt om klanten te ondersteunen in de zero emission transition?
Zijn er andere partijen waarvan ze dit meer verwachten? Zijn er andere partijen waar ze nu al mee samenwerken op dit te realiseren?
Zijn er verder nog dingen waar ze een verwachting hebben van LP?

4. De concepten
Bespreken concept die het meeste bij hun behoeften past.
- Efficient omgaan met de laadpunten en het beschikbare vermogen om de auto’s te laden.
- Drivers helpen met hun laadplannen, laden op werk, thuis of onderweg, zijn er laadpalen beschikbaar, kan ik genoeg laden?
- Advies aan de hand van de echte vloot behoeften (advis fleet data).
- Laden met duurzame energie en goedkope energie.
Wat is voor hier juist echt belangrijk?

Interview Guide - Concept validation - Intern

Electrification
Veel bedrijven die over willen stappen? Waarom? Wat is de voornaamste reden dat ze hun vloot willen elektrificeren?
Waarom kiezen de klanten voor LP? hoe onderscheid LP zich van concurrenten?

Behoeften?
Tegen welke problemen denken ze aan te lopen?
Tegen welke problemen lopen ze aan?
Wat zijn de behoeften betreft het uitbreiden van elektrische auto’s in hun vloot?
Wat zijn de voornaamste behoeften van klanten?

Duurzame ambities
Hebben ze verder nog duurzame ambities (duurzaam laden/ duurzame energie opwekken om auto’s te laden)?
Zullen ze open staan in de toekomst hiervoor? Zal dit veranderen?
Zullen ze open staan voor de auto inzet als duurzame energie opslag?

Verwachtingen van LP
Wat zijn hun verwachtingen van LP?
Zien zij LP als een partij die de klanten ondersteunt in de transitie naar emissieloze auto’s?
Zien zij LP als een partij die de een rol speelt het energielaad management?
Welke andere partijen werken ze al mee samen om dit te realiseren?

De concepten bespreken
Door de storyboards heen lopen.
Hebben veel bedrijven behoefte hier aan?
Wat is belangrijk om mee rekening te houden met deze concepten?
G. Back-end system

G.1 Detailed back-end system

During-product/service system

- Data
  - General client info
    - Car model info & driver
    - Driver home work distance
    - Drivers home charge point
  - Connected car
    - Real time State of Charge (battery level and charge status)
    - History of location to destination, radius charge, driver behavior, battery used
  - Agenda
    - When & location meeting
    - When & location activities
    - When & breaking home
  - Route information
    - Distance & time location destination
    - Speed & driving behavior indication by limit, road type and traffic conditions
  - External charge spots
    - Type, location, price and availability
  - Client & customer settings & preferences
    - Client & customer preference within green-cheap-satisfaction
    - Flexibility or confidence mode customer
  - Chargepoint - Energy Management system - grid
    - Total amount & available amount charge spots
    - Power capacity maximum usage & division spots
    - Available power capacity & division spots
  - Energy prices & type
    - Real time energy mix / type
    - Expected energy mix / type

- Systems
  - MyLeasePlan
    - Chargepoint - Energy Management system
  - Fleetmanagement - MyLeasePlan
    - On the go charge planner
  - Priority engine
    - Flexible charging balance
    - My car state

- Output
  - Needed battery indicator
  - Parking lot overview
  - Priority based on employee functions
  - Real time GPS location
  - Parking lot charge planner
  - On the go charge planner
  - External API partnerships
H.

Project Brief

IDE Master Graduation
Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student’s IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student’s registration and study progress.
- IDE’s Board of Examiners confirms if the student is allowed to start the Graduation Project.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1.

family name: den Boer
initials: C.C.
given name: Claire
student number: 4235916
street & no: Nederwaardstraat 35B1
zipcode & city: 3019PM Rotterdam
country: The Netherlands
phone: +31 618204237
email: claredenboer12@gmail.com

Your master programme (only select the options that apply to you):
IDE master(s): [ ] PD [ ] DI [ ] SPD
2nd non-IDE master:
individual programme: [ ] (give date of approval)
honours programme: [ ] Honours Programme Master
specialisation / annotation: [ ] Meddesign
[ ] Tech. in Sustainable Design
[ ] Entrepreneurship

SUPERVISORY TEAM **

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and cv.

Chair: Prof. dr. H.J. Hulsink
dept. / section: PIM MCR

Second mentor: MSc. W. Janssen
dept. / section: PIM

organisation: Leaseplan Digital
city: Amsterdam
country: The Netherlands

The choice for 2 supervisors from the same department: H.J. Hulsink expertise lies in new product marketing in the academic perspective and F.M. de Jonge’s within strategic design & management in practice as consultant.

IDE TU Delft - E&SA Department // Graduation project brief & study overview // 2018-01 v30
**Procedural Checks - IDE Master Graduation**

**APPROVAL PROJECT BRIEF**
To be filled in by the chair of the supervisory team.

<table>
<thead>
<tr>
<th>Chair: Prof. dr. H.J. Mulder</th>
<th>Date: 4.1.2019</th>
<th>Signature:</th>
</tr>
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</table>

**CHECK STUDY PROGRESS**
To be filled in by the ISSO EBBSA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 30 EC
Of which, taking the conditional requirements into account, can be part of the exam programme: 30 EC
List of electives obtained before the third semester without approval of the BoE: 

<table>
<thead>
<tr>
<th>YES</th>
<th>All 1st year master courses passed</th>
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<tr>
<td>NO</td>
<td>Missing 1st year master courses</td>
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<table>
<thead>
<tr>
<th>Name: D. van der Meulen</th>
<th>Date: 11.1.19</th>
<th>Signature:</th>
</tr>
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</table>

**FORMAL APPROVAL GRADUATION PROJECT**
To be filled in by the Board of Examiners at IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **. Next, please assess. Disapprove and sign this Project Brief by using the criteria below:

- Does the project fit within the MSc programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be done within 100 working days/20 weeks?
- Does the composition of the supervisory team comply with the regulations and fit the assignment?

<table>
<thead>
<tr>
<th>Content</th>
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<td>Procedure</td>
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<table>
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<tr>
<th>Name: A. Hovace</th>
<th>Date: 22.1.19</th>
<th>Signature:</th>
</tr>
</thead>
</table>

IDE TU Delft - EBSA Department // Graduation project brief & study overview // 2018-01 v30

Initials & Name: C.C. den Boer

Student number: 4235916

Title of Project: The connected automotive future: an innovation strategy for Ford/Plan
The connected automotive future: an innovation strategy for LeasePlan

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

**INTRODUCTION**

The automotive industry is rapidly evolving towards a future where cars are electric and autonomous, with new car ownership and sharing models, where the car becomes just one component of the seamless mobility experience (Mobility-as-a-service) and where the car is fully connected to its surroundings and the internet which enables a whole new generation of applications. This development is fueled by the user's increasing expectations, the change in user needs and by emerging technologies.

This thesis focuses on the emerging connected vehicle technologies, where the vehicle is connected to external smart devices, to the internet, to other vehicles and to the road infrastructure. Figure 1 gives a glimpse of these technologies. The application of this set of technologies promises several benefits for safety, like car crash prevention, for efficiency, like the decrease of traffic jams, for sustainability, like the ideal driving behaviour with minimum impact, and for personalisation, like car adjustment by driver identification and infotainment. These technologies can also contribute to the development of autonomous driving, e.g. where the vehicle can make better decisions based on the gathered data from its surroundings. Moreover to electric driving, e.g. an optimal charge plan for the vehicle based on the traffic, vehicle and infrastructure data. Furthermore to mobility as a service, e.g. real time traffic information for an optimal travel planning. Besides, connectivity is crucial for car sharing, to track the location, availability and status of the car and for a car access (Riccardo & Morisio, 2016). Currently several OEM’s, like Tesla and BMW, are already offering some applications where the car is connected to smart devices and the internet.

The development of this set of technologies may also bring several opportunities for the lease company LeasePlan (LP) the global leader in Car as a Service with a total fleet of 1.8 million cars with private, SME’s, corporates and service mobility providers as their customer segments. It may help them realize their strategy in becoming a fully digital enabled business with more customer engagement, the leader in the latest mobility trends and the leader in providing services to the ride-hailing industry, and to achieve its several sustainability targets.

LP is aware of some of the early benefits it can bring for their business; in the area of their maintenance services, insurance system, commerce and fleet management. LP has already done research for the applications in predictive maintenance. However, it is a challenge for LP to have access to the car’s data and connect with it. Because LP is dependent on several parties to gather the data, the OEM’s are not really generous with the control over the data and there are data privacy issues. A collaborative ecosystem between the several industry players is required to gather, process and act upon the data. Figure 2 gives an idea about LP’s stakeholders. All industry players are looking for opportunities and positions in the connected automotive future, while LP has currently more a ‘wait and see’ attitude towards the OEM’s.

Besides that it may be clear for LP what gains this technology development can bring for their business in the short term, there is no clear view on what value it can create for their customers. This thesis focuses on bringing together the technology side, the industry side, the business side and the customer value side, and the development of all this elements over time, to identify meaningful opportunities for LP within the connected automotive future. (McKinsey&Company (2017). Future of Mobility: Trends and implications. Retrieved from: http://www.ofv.no/getfile.php/136991-1512549028/Dokumenter/OFV%20Frokostmoter/171205%20OFV%20Oslo%20Riccardo%20C%20%C2%B6r%20Morisio%20M.%20(2016).%20Connected%20Car:%20Technologies%2C%20Issues%2C%20Future%20Trends.%20ACM%20Computing%20Surveys%2C%20Vol.49%2C%20No.3%2C%20Article%2046.)
Emerging technologies enabling connected mobility. (Illustration based on Riccardo & Morisio, 2016)

A big network of stakeholders, competitors and upcoming industry players.
The rise of the connected vehicle technologies will cause changes in the competitive environment, where OEMs shift their focus from product to service and with new entering software and hardware suppliers and service providers. All these players are looking for new services, business models and positions, where they can make the best use of the data to the most valuable information interactions between the several market parties and the customers. Possible solutions for them will be making use of networked innovation or transforming their business models into a digital platform. What can be learned from other rapidly evolving sectors, that experienced digital transformations and where the roles of the several players were changing, like the travel sector with Booking.com and Airbnb, is that it is very important to determine how you will still create value to the customer, to not lose your position to a competitor. (KPMG N.V., 2017)

Currently, a clear view on how LP will create value for the customer is lacking. Will their current lease product/service offering still meet the future mobility needs of their customers? Besides, a clear view of the development of the connected vehicle technologies is missing. What applications and benefits will the connected vehicle technologies bring for LP's business and customers? Moreover, a clear view on what the industry will do with the technology development is missing. What benefits will bring these technologies to their competitors, stakeholders and other players? How will the roles of the industry players change? How will LP's position in the industry change? How can LP distinguish itself from their future competitors? Furthermore, it's not clear how LP will anticipate on these developments. How can LP make use of the connected vehicle technologies? What product and services can they offer with these technologies to create value to its customers and business? What internal steps do they need to take and what needs to be acquired? How can LP acquire these resources, capabilities or knowledge? In what way can LP create valuable partnerships and valuable interactions with their stakeholders and suppliers to acquire what is needed? (KPMG N.V., 2017).


I will design an innovation strategy for LP on how they will create value for their customers and business and what favourable position in the industry LP can obtain within the connected automotive future. I will design a vision, the 'preferred future state of LP' of future product/service solutions for several time horizons; a detailed roadmap to realize that and a first tangible concept.

The innovation strategy will be delivered in the format of a strategic roadmap which consists of the following: 1) A vision, a preferable future state of LP within the connected automotive future, with what value they will bring to their customers, business and their future position in the industry. 2) The value LP will bring to its customers mapped over several time horizons, based on the current and future user mobility needs. 3) Valuable product and service solutions LP will offer to its customers, that the connected vehicle technology can enable, mapped over several time horizons. 4) Process and business model solutions for LP mapped over time. 5) Internal steps like design, research, development LP needs to take over time to realize the product/service offering. 6) External steps mapped over time, like on with which suppliers and stakeholders LP needs to cooperate to acquire the needed knowledge, resources and capabilities and in what way they cooperate, with valuable collaborative interactions. The visualized roadmap serves as a summary, where the essence will be easy to grasp and the report explains the roadmap in detail. To ensure the start of the implementation of this strategy within LeasePlan, the closest possible first steps in the roadmap, will be conceptualized in such a way it can be picked up by any of the LP digital tribes for the implementation of building a Proof of Concept.
The project is based on the Double Diamond Design Process (Design Council, 2015) and the Design Roadmapping process (Simons, 2018). A designerly approach with diverging and converging, several iteration loops, empathizing and user centeredness, visualization and co-creation. During 'Discover' the connected vehicle tech development will be mapped over time. LP's needs & capabilities will be researched and determined. LP's stakeholders, competitors, value chain and the industry developments will be researched. The current and future mobility needs of LP's current and potential user will be identified. This all is done by desktop research, literature research and qualitative interviews with employees, stakeholders, experts and users. Though the research elements have their focus in some weeks, there will be overlap and iteration throughout the 1st phase. During 'Define' the gathered data will be analysed and the design direction will be determined. During a creative session, the value LP will bring to its customers and business will be mapped over time and a vision will be created. Multiple disciplines like experts, users, employees, stakeholders and outsiders will create together the value map and vision. The creative session will contribute to the creativity, shared understanding and feeling of ownership and thus to the quality of the solutions and their implementation. The results of the define and discover phase will be discussed during the midterm meeting in week 9. During the 'Develop' phase, several ideas for new product, service, business or process solutions will be generated and they will be mapped over several time horizons. A creative session will be facilitated, again with multiple disciplines. Then a clear path towards realizing the scenarios and the vision will be created. During this Path Mapping, interviews and sessions with LP, experts and stakeholders will be facilitated, to create a detailed roadmap. Also the first step in the roadmap will be conceptualized. In week 16, there is the green light meeting where the sufficiency of the project will be discussed. In the 'Deliver' phase the roadmap and the first concept will be validated and the deliverables will be finalized. The report will be delivered in week 20 (22nd of May) and the graduation ceremony is in week 21 in the 29th of May.}
I set up this project because of my interest in the course Roadmapping. A course where a lot of different elements come together and where the designer bridges the gap between the technology, the user, the industry, the stakeholder and the business side and the translation into a shared understood strategy. What I missed during the course was the involvement of the company and talking to experts in the field. During one of the IDE Academy workshops, Van Berlo showed their approach in future scenario mapping. Something I couldn’t put in practice yet. Moreover, during the SPD Research project our research consisted of dealing with the uncertainty of future visioning, where I gained several insights from design professionals with their visioning process. I want to improve my visioning and roadmapping skills by putting it in practice in a professional environment.

Several design professionals stated that besides gathering information for the argumentation of your vision and roadmap, a shared understanding, empathy and ownership are important elements as well. This can be created by organizing several co-creative sessions with people from multiple disciplines. The importance of this was also stressed throughout the IDE Academy workshop and the Roadmapping course, but we didn’t have the chance to organize this. I have already gained experience in creative facilitation during my first internship (Koos Service Design) and during the Creative Facilitation elective. I would love to improve this skill and apply it during the roadmapping sessions, with the focus on sparking the creativity, structuring the session and being a confident facilitator.

A more general skill I want to improve is about communication. I want to become more confident, clear and structured during meetings and presentations. Moreover, it is about improving my writing, my visualisation, lobbying and promoting my ideas and stand behind my own design decisions.

I personally aspire to gain in-depth knowledge about innovation within corporates: how do they enable innovation, empower employees and empathize with their user? How do they plan and communicate their vision and strategy? During my second internship (KLM) I have seen that transversal innovation within a big corporate can be a challenge. I am looking forward to see how other companies deal with this. Second, I have a great interest in emerging digital technologies. I haven’t done any technology driven design projects yet other than during the Roadmapping course. I want to expand my knowledge in this field and also about digitalisation within corporates and the way of working of digital teams. Last, I want to get another perspective on how a strategic designer can work within a corporate. In order to evaluate where I see myself in my future career after I am graduated.