Service Design—nudging people towards more sustainable choices

A case study to support the adoption of electric vehicles

Service Systems Design MSc. thesis
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I. Abstract

This thesis explores how a service can nudge people to make sustainable choices, leading to the purchase of electrically powered vehicles.

The research was conducted on the theme of electric vehicle adoption in Denmark in cooperation with Startup Lighthouse. The case study focused on gathering and synthesising research to highlight market gaps, including target audience's needs and motivations for purchasing an electric vehicle in Denmark. The study resulted in a service concept that introduced collective second-hand electrical vehicle purchasing as a solution and explained how its processes would operate.

The case study's design process has been divided into Double Diamond's phases. The methodology has helped plan methods such as—service safaris, user scenarios, pretotyping or service's blueprint—into the different design stages throughout the case study. A survey, interviews with various stakeholders, remote pretotyping and prototyping sessions were used to determine electrical vehicle purchasing barriers, solution direction and adjustments along with the service's development.

The study discloses that bringing down electric vehicles' barriers, such as the initial ownership cost while presenting ownership pros and cons, nudges consumers to consider purchasing electric vehicles. According to respondents, the research also shows that less urbanised areas of Denmark are not fully prepared for the mainstream shift to electric vehicles. Therefore, newly arising communities of electric vehicle owners can be seen as early adaptors that will encourage local municipalities to speed up the development of public infrastructure meant for electric vehicles. As a result, the designed service solution aims to bring people into community clusters, presenting the electric vehicle owning experiences and offering an opportunity to bulk purchase second-hand electric vehicles cheaper with reassurance.

Keywords: Service design, Electric vehicles, Sustainability, Nudging.

II. Acknowledgements

Due to the COVID19 pandemic, a lot of thesis-related processes have been impacted negatively. Acknowledging it from the beginning of the thesis, we decided to perceive the pandemic as another challenge that encouraged us to design in the "new normal". Throughout our thesis, we have received a lot of support from various actors that were happy to guide us, critique our work and contribute to the project by giving their personal opinions, industry insights and time.

The master thesis was inspired by cooperation with the Startup Lighthouse and its representative, Tim. We want to thank Tim for proposing the thesis theme and collaborating throughout the project by sharing his expertise regarding global EV/PHEV market trends and an overview of the Danish market.

Without the participation of upcoming or existing EV/PHEV owners, automotive industry experts and a public sector's representative, the thesis would be relying on dry desk research. Therefore, we would like to thank all participants that dedicated their time to our project and were eager to participate in the project's research and test phases.

Our thesis supervisor Luca Simeone did everything in his power to ensure that we were on the right track when it came to academic-related matters. Luca's clear communication, long-term planning, and academic knowledge helped us foresee what was expected to be delivered. Even more, Luca had done a great job when it came to initiatives to collaborate with the classmates and share our frustrations, achievements and, most importantly, support. We do not think that there is a short-expression representing our gratitude for Luca's effort and determination while guiding us.

Support from fellow Service Systems Design students was greatly appreciated. We have received critique, opinions, and hands-on knowledge, helping us have a more refined and polished master thesis project.

We are also grateful for the support from family members and friends. They always heard our frustrations, listened to our neverending thesis-related rants, and encouraged us to carry on when we were stressed and without a clear sight of the light in a dark tunnel.

We hope that our work will benefit others and be another shoulder on which other colleagues could stand, as we did while standing on the shoulders of academic giants.

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V. Reading guide

The below-presented reading guide introduces the upcoming chapters of the thesis.

Chapter 1: Thesis introduction

Chapter 1 introduces the thesis' collaboration partner and motivations behind the decision to work on the proposed thesis theme. The chapter will continue with a brief introduction to a global electricity-powered vehicle market and elaborate on abbreviations throughout the thesis. The initial problem statement will be presented as a last section of the chapter, deconstructing it and reasoning for the presented formulation.

Chapter 2: Literature review

Chapter 2 presents the thesis' theoretical foundation that is used to develop the academic research question. The foundation is based on 4 academically researched themes. It starts with a reflection on service design as a discipline and continues with exploring the current electrical and plug-in hybrid vehicle market. Further on, the nudging subsection reflects on it as a technique and showcases how service design can benefit from applying it. After thoroughly presenting conducted research on each theme, the formulation of the academic research question is presented, indicating the thesis' research focus and knowledge areas that are used throughout the process.

Chapter 3: Theoretical approach

Chapter 3 reflects on design methodology and additional framework that served as a theoretical foundation for the design process and method selection. The thesis methodology was based on the Double Diamond design process model, dividing the thesis' design process into diverging and converging design phases: Discover, Define, Develop and Deliver. Framework for Innovation was used as an additional layer on top of methodology— presenting design principles that served as a basis when deciding on methods and participant involvement. With the theoretical foundation introduced, the methods overview is presented, showing how each method was placed when considering the Double Diamond Design model. The chapter finishes with an explanation of how each design phase was practised throughout the design process.

Chapter 4: Case study

Chapter 4 thoroughly presents the case study's design process, explaining it from the beginning to the end. Each sub-chapter will elaborate on the used methods, argumentation for using them, findings and conclude how each method contributed to the design process. During the design process, a refined problem statement will be presented as well. This chapter will highlight general reflections and conclusions at the end of each sub-chapter, indicating process transitions between design phases.

Chapter 5: Discussion

Chapter 5 introduces the project's limitations regarding encountered barriers from outside the project's scope, method selection and other processes. Furthermore, the chapter will discuss design process aspects, reflect on the research question and touch upon future research directions that could improve, expand and bolster the service concept. Learning goals and objectives that were considered while working on a thesis project are also covered and reflected upon concluding this chapter.

Chapter 6: Conclusion

Chapter 6 will conclude the thesis project, summarise key findings related to the research question, and highlight how these findings can contribute to other research areas such as sustainability, electric vehicle adoption, circular consumption, and nudging mechanisms in designing services. The conclusion will also reflect on the delivered service concept, presenting how the solution addressed the thesis's problem area and problem statement.

1. Introduction

This chapter will familiarise the reader with the project's context, presenting the thesis theme, cooperating partner, motivations and selected automotive industry. The project's focus area and initial problem statement will be introduced, arguing for the taken thesis direction. The chapter will end with acquainting the reader with used abbreviations, thesis structure and chapter's content.

The chapter is divided into the following sections:

1.1. Project context;

1.2. Focus area;

1.3. Discovered and used abbreviations.

1.1. Project context

This thesis project addresses the Danish government's proposed initiative to stop the sales of new diesel and petrol vehicles by 2030 (Danish Ministry Of Climate, Energy and Utilities, 2018). The paper will explore themes of electrical vehicle (EV) adoption in Denmark, service design and nudging. The conducted case study will present how service design can be applied to design a solution that supports EV adoption.

1.1.1. Cooperation with Startup Lighthouse

The thesis theme and direction has been proposed by a business developer and management consultant that represented Startup Lighthouse, a for-profit organization housing several start-ups (Startup Lighthouse, 2020). One of the organization's projects was Greencarlane (Greencarlane, n.d.), aiming to increase electric and hybrid vehicle adoption worldwide by 2040. Throughout the search for thesis collaboration and interviews with various business representatives, we found the Greencarlane project to differentiate itself from other proposals. The project seemed to be an excellent fit for the Service System Design master thesis. The brief enabled to conduct a design process that included a large number of activities related to the service design field. The suggested theme was broad, challenging and relevant at the time of researching and writing the thesis. An agreement was reached that Startup Lighthouse's representative will advise throughout the thesis writing process regarding worldwide and Danish automotive industries and practises related to vehicle-related businesses. In exchange for our presented research and activities, we have received business-oriented feedback on the presented material.

1.1.2. Introduction to electricity-powered vehicles market

Before delving into the proposed theme deeper, it was decided to look at statistics that reflect global, European and Danish automotive markets regarding electricity-powered vehicles. It was discovered that there was a gradual increase from 2015, leading to an estimation (Figure 1) that, globally, plug-in electric vehicle (PEV) sales reached more than 3 million units sold in 2020 (Wagner, 2021c).
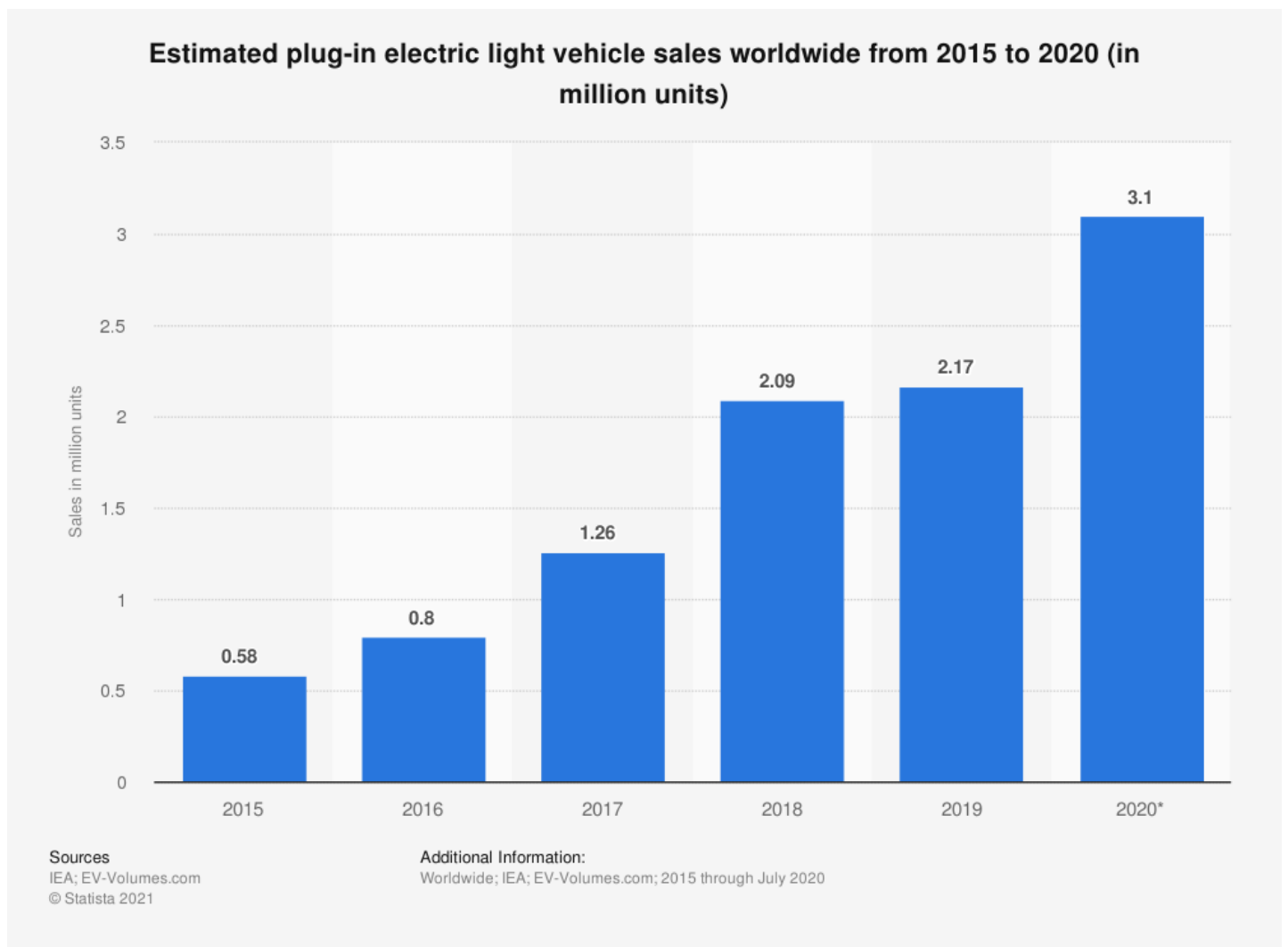
Figure 1. Graph showing an estimate of plug-in electric vehicle sales from 2015 to 2020 (Wagner, 2021c).

As presented by researchers, 5 largest European markets have also surged in PEV sales, predicting that Germany will become one of the largest markets for PEVs because of the introduced incentives and harsher regulations for petrol and diesel cars (Wagner, 2021c). The below-presented figure (Figure 2) shows that it is expected that between 2019 and 2027, the global market for electric vehicles will continue growing and might reach a global market size of 803 billion USD by 2027 (Wagner, 2021b).
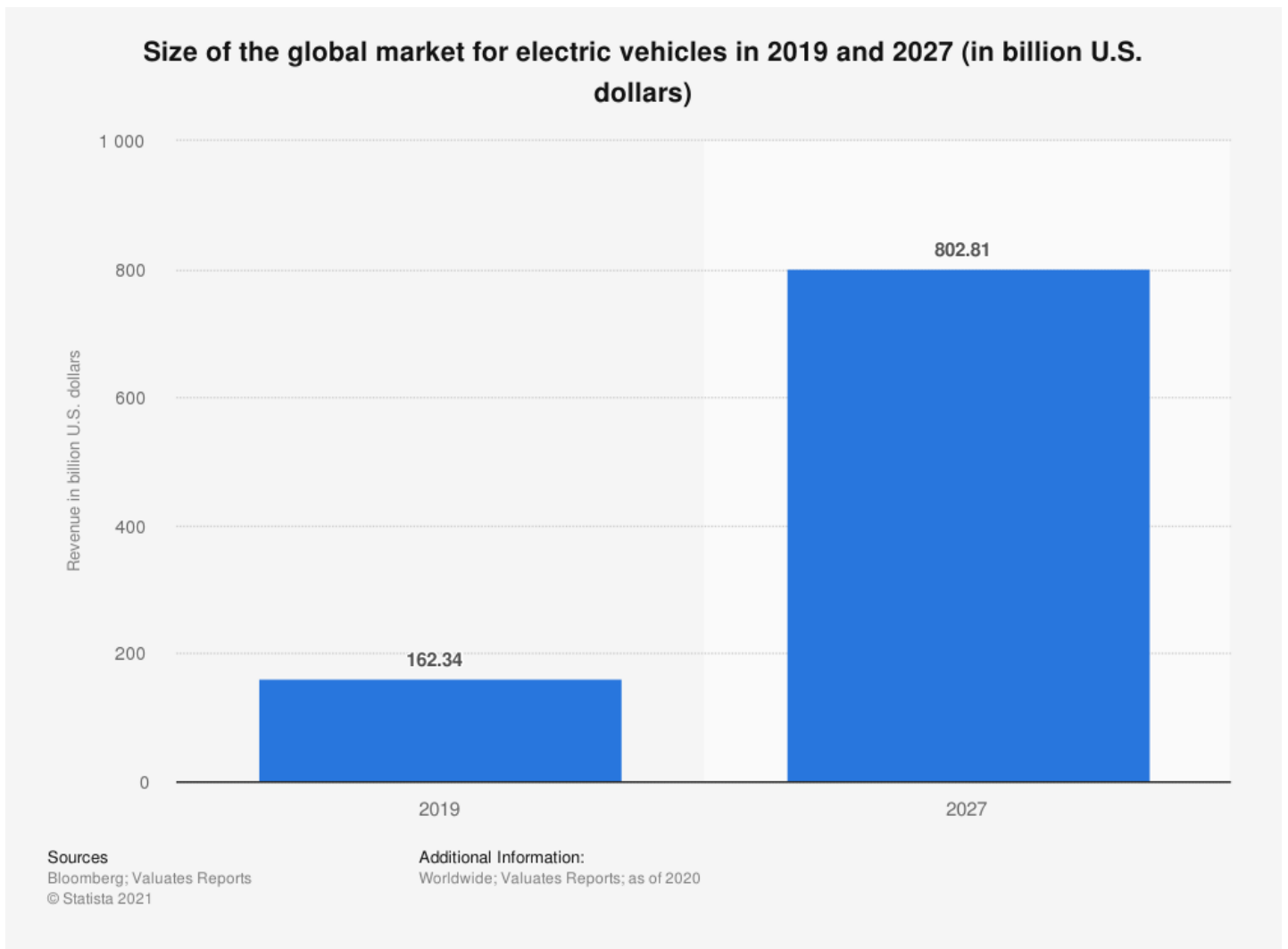
Figure 2. Graph representing an estimate that from 2019 to 2027, the global market of electric vehicles will increase almost 5 times (Wagner, 2021b).

Besides car sales, an increasing number of public electric vehicle charging stations in European countries also show the surge of electric energy powered vehicles and the demand to charge them (Figure 3), (Wagner, 2021a).

Number of public electric vehicle charging stations in Europe from 2010 to 2020

Source
EAFO
© Statista 2021

Additional Information:
Europe; 2010 to 2020
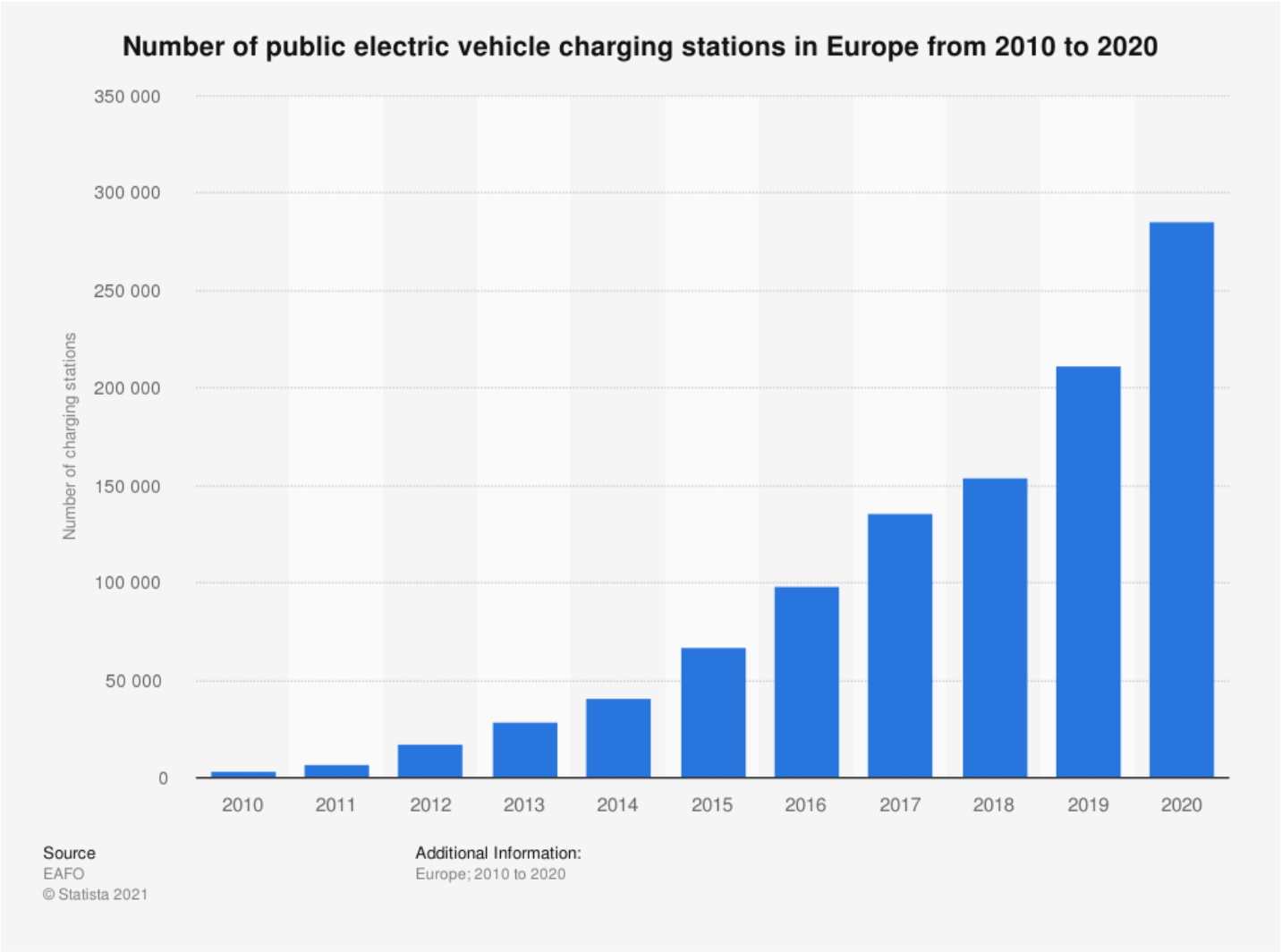
Figure 3. Graph reflecting on a period from 2010 to 2020 during which there was a gradual increase of publicly accessible electric charging stations in Europe (Wagner, 2021a).

In Europe, the gradually increasing trend to purchase electricity-powered vehicles could be influenced by the fact that the transport sector is also the largest contributor to greenhouse emissions. Therefore, the adoption of electric vehicles can be seen as one way to meet the emission reduction goals. By 2030, the European Union's legislation has set a target to cut CO_2 emissions for light vehicles by 37.5%. Therefore, using electric-powered vehicles instead of traditional internal combustion ones could help achieve the goal set by European Union. However, as experts indicate, the current tendency of EV and PHEV sales' gradual growth is still not enough to reach the previously mentioned CO_2 emissions goal by 2030.

The newly registered electric cars account for only 3.5% of newly registered light vehicles, which is considered low (European Environment Agency, 2020).

Even more, it seems that the European automobile industry is encountering never before met challenges. The increase of new market actors aiming to disrupt the market to compete with the established business models—introduces an additional resource need for the market to adjust. New emerging technologies, such as digitalisation, and new decarbonisation programs, require attention from the industry participants to ensure synergy. To address new emerging challenges, European Automobile Manufacturers' Association has introduced fundamental principles to increase collaboration between the European automotive industry's actors (European Automobile Manufacturers' Association, 2020). The announced "Affordable mobility & choice for all" pillar (Figure 4) is also connected with the chosen thesis theme to increase EV adoption in Denmark. Such connection serves as an argument that the chosen thesis theme is relevant and corresponding with the principle(s) that the European automotive industry declared and relies upon to address some of the market's issues.

Figure 4. Illustration showcased the 4 main pillars introduced to increase collaboration between European automotive partners (European Automobile Manufacturers' Association, 2020).

In the Danish market context, an increase in EV adoption is relatively low (Figure 5), considering that electric-powered vehicle sales only took 21.27% of all sold vehicles in 2020 (ACEA, 2021). Therefore, Denmark's EV adoption is considered to be a challenge that needs to be addressed.

Passenger car sales in selected European countries in 2020, by fuel type

Legend: Petrol, Diesel, Battery electric vehicles, Plug-in hybrid electric vehicles, Hybrid electric vehicles, APV other than electric

Source
ACEA
© Statista 2021

Additional Information:
EU; 2020
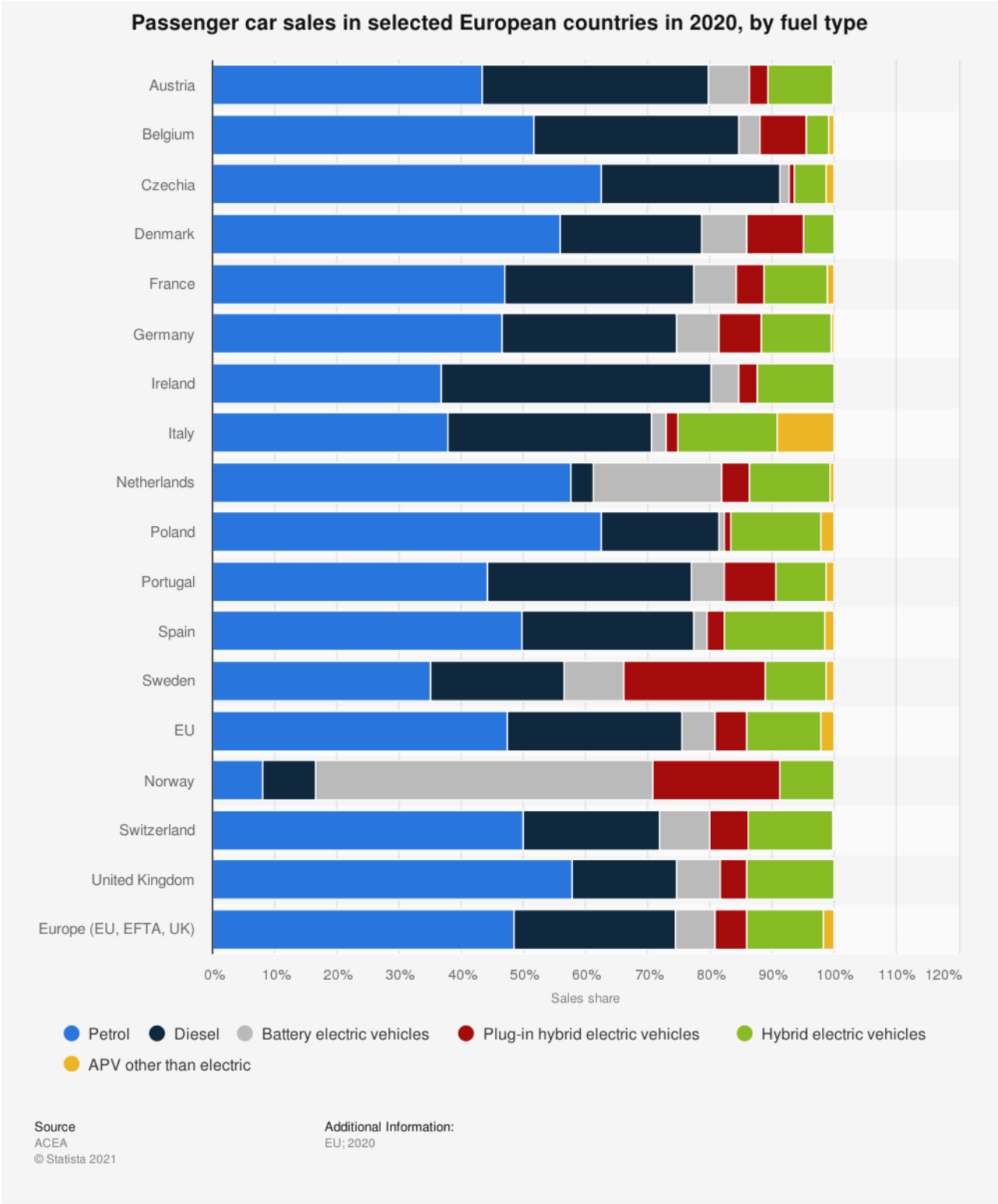
Figure 5. Graph representing selected European Union countries and their 2020 car sales that are categorised by sold car types (ACEA, 2021).

1.2. Focus area

Throughout the discussion with Startup Lighthouse, it was agreed that there were no exploration and solution restrictions. The process of the thesis project was determined by us, carrying out a holistic service design approach where the project starts from gathering research, then analysing it, considering what could be proposed for the market and thoroughly presenting a solution. The main expressed requirement by the collaborating party was to propose at least a semi-digitised service. Therefore, the design brief was more focused on proposing a digitalised EV selling solution that could be somewhat similar to the already existing manufacturer's operating processes and selling platforms, for example, Tesla's operating model (Tesla, 2021).

1.2.1. Initial problem statement

Considering the thesis theme, design brief and capabilities of service design, the initial problem statement was formed as follows: "How might we design a service to help change peoples' perception towards EV/hybrid vehicle adoption?". We set ourselves to focus on designing a service solution from scratch with the initial problem statement. The solution was meant to address the stereotype that electric-powered vehicles are still not advanced or affordable enough for a regular consumer.

Through the discussion meetings with the thesis supervisor Luca Simeone, the initial problem statement was refined and introduced the concept of nudging. The final problem statement is presented and discussed in the "5.2.5. Redefining problem statement" sub-chapter.

1.3. Discovered and used abbreviations

While exploring and researching the electric-powered vehicles theme, a lot of abbreviations have been found. In most cases, each abbreviation was used to define a vehicle's unique specifications or categorisation.

When it comes to electric-powered vehicles, most often found abbreviations were: PEV that stands for a plug-in electric light vehicle or electrically chargeable vehicle; BEV—meaning battery or electric vehicle; and EREV—referring to extended-range electric vehicles. Another abbreviation connected to electric vehicles is CPO that stands for charging point operator.

HV stands for a hybrid vehicle. In this thesis context, a hybrid vehicle was seen as a car that used fossil fuels and any additional technology that powers the vehicle with electricity.

Traditional vehicles were considered to be solely powered by diesel or petrol engines. Abbreviation ICE means internal combustion engine while FV stands for fossil fuel-based vehicle.

Throughout the paper, to avoid confusing the reader with various vehicle powering technology types, it was decided to use three main abbreviations that helped to distinguish main vehicle category types. Abbreviation EV stands for an electric vehicle that is not using any other energy source besides electricity. PHEV—a plug-in hybrid vehicle that can be charged with electricity and has a fossil fuel-powered engine. ICEV refers to internal combustion engine vehicles that do not use electricity as a power source instead of relying on diesel, petrol, or other fuel types that need to be burned to power the vehicle.

If the presented abbreviation has a letter V at its end, it means that the abbreviation is ending with the word "vehicle". For example, ICEV—an internal combustion engine vehicle. Such an approach was used to refer to vehicle types rather than directly implicating used technologies.

The topic of vehicles is only focusing on light, passenger cars that any private individual or business can acquire.

2. Literature review

The literature review explores different aspects of Design, particularly Service Design, electric vehicles adoption, the concept of nudging and its correlation in Service Design practices. By analysing the literature in the previously mentioned fields, we have gained additional knowledge that was also used while addressing our problem statement for this thesis. At this stage, we took a closer look into how service design can incorporate nudging, practical examples, ethical considerations and a summary of literature suggestions on how to best construct a *nudge. The chapter concludes with our academic research question based on the extrapolated insights.*

This chapter is structured as follows:

2.1 Service Design;

2.2 Adoption of EV, current areas of resistance from the consumers;

2.3 Nudging;

2.4 Can service design be used to nudge?

2.5 Research question.

2.1. Service Design

It took some time over the past decade for Service design to be acknowledged as an independent design field (Kimbell 2011; Sun 2020). Hollins and Hollins (1991) and Voss (1992) were among the first authors to have service design presented as a separate topic. Later on, Stickdorn and Schneider (2011) have listed a sequence of principles that best defined service design. According to them, service design was: (1) The user-centred, where a service is designed from the user's viewpoint; (2) Co-creation one, having stakeholders and users engaged in the design process; (3) Sequencing by visualising, for example, through maps how a service or parts of it are organised; (4) Evidencing, by visually illustrating the identified issues; (5) The holistic principle which implies zooming out and deal with a service as a whole.

Out of 150 service designers evaluating a series of definitions, listed by Stickdorn et al. (2018), that outlined service design, the most popular one was: "Service design ... is an approach to designing services that balance the needs of the customer with the needs of the business, aiming to create seamless and quality service experiences. Service design is rooted in design thinking, and brings a creative, human-centred process to service improvement and designing new services, through collaborative methods that engage both customers and services, enabling holistic and meaningful improvements."—crowdsourced by Megan Erin MIller (Stickdorn et al., 2018, p. 20).

Designing services has become an expanding necessity that led to the birth of service design as a strong and growing practice, using its methods and tools to support the creation of innovative service solutions (Foglieni et al., 2018). In her work, Mager (2010) indicates that service design aims to produce the most favourable service experiences possible, pointing out the user's involvement importance in the service. The practice of service design assembles a handful of activities. Morelli et al. (2021) have described what a service designer's core capabilities, explicitly used in the design of a service, should be: (1) Context addressing—needs to best analyse and respond to relationships between the solution and its context; (2) Experiential aspects control—emphasise with people and best approach experiential aspects of the solution; (3) Modeling—the competence to simulate, visualise and explore possible solutions before all data is accessible; (4) Vision building —the competence to determine coherent potential futures; (5) Stakeholders engagement—commence and facilitate participatory co-creation processes; (6) Working across distinct levels of abstraction; (7) Creating logical architecture by identifying or articulating the correct structure to frame problems and creative activities; (8) Open problem-solving—the competence to determine solutions across distinct logical domains and ambiguous contexts.

Service design is perceived, by some, as the favourite approach to generate enjoyable interactions for customers and at the same time create an organisational culture that is flexible and responsive (Kolko, 2015). Some designers see service design just as a design area mainly (Nisula, 2012), where others see service design as interdisciplinary, combining elements not only from the design but also from marketing, research and management disciplines (Moritz, 2005; Reason et al., 2016). Because of its methods, tools, human-centred principles and capability to shape services in new effective ways, service design has the potential to assist entrepreneurial startups, for example, especially on the co-creation and co-design level (Meroni et al., 2011). Service design can grease the wheels of collaborative environments for teams, handle communication channels, spur creativity during ideation and development, explore competition, enhance brand identity and design superior customer experiences (Pantazis et al., 2020). Research by Steen et al. (2011) also demonstrates that service design tools can contribute to competitive advantage for businesses.

Design has the capability to inspire social and cultural transformation, reshape business and industrial processes. It plays an important role in how the world can innovate more sustainably, especially due to its human-centred viewpoint. Sustainable innovation represents the heart of the Circular Economy, which attempts to prolong products' utility as long as possible by implementing various strategies to re-use resources. Design, as a problem-solving discipline, can be used as a tool to stimulate the necessary innovation that the Circular Economy demands by dealing with a large number of human-related constraints when it comes to implementation (Fleischmann, 2020). Designers are more and more involved in devising service concepts around products, for example, EVs and the need for people to quickly adopt such products to cut down green gas emissions in the transportation sector. Service designers become part of a "network of actors who produce, deliver and manage the PSS [Product Service System]" (Ceschin & Gaziulusoy, 2016, p. 131).

2.2. Adoption of EV/hybrid vehicles, current areas of resistance from the consumers

Electric vehicles are seen as a more innovative substitute to scale down greenhouse emissions created by conventional means of transportation. While the replacement of traditional vehicles running on combustion engines with Electrical or at least Plugin Hybrid Electrical ones seems to be the solution for private companies and governments that are going for in the near future, there are still barriers to overcome the adoption transition. During our desk and field research phases, the most important barriers identified by us are mainly related to infrastructure, policies, technical, economic, and social factors.

Moving away from traditional vehicles is one of the many steps

Electric vehicles can be fully (BEVs—battery electric vehicles) or partially (PHEVs—plugin hybrid electric vehicles) dependent on electric energy coming from an electrical grid. In both cases, the energy is stored in batteries. PHEVs use a combustion engine like traditional vehicles (ICEVs—internal combustion engine vehicles) that require petroleum-based fuels to run. Still, the consumed fuel quantity is considerably lesser as vehicles are also powered by the electrical energy stored in the batteries (European Environment Agency, 2016). EVs do not generate any direct carbon dioxide emissions while driving, but they need to be charged from a power grid. How the energy from the power grid is obtained is also an important aspect, impacting the greenhouse emission footprint of an EV user. To reduce this footprint to a minimum, it is also important that renewable energy sources (wind, solar, hydro) are used by electrical energy suppliers to power the grid.

A change requiring help from governments and industry itself

The adoption of EVs is considered by many countries worldwide as a response to fighting the current climate change. Unfortunately, not all countries can make a step in this direction at the same pace. Several enabling policies are needed taking into account each country's context. The policies should primarily take into account the development and improvement of charging infrastructure, the higher price for EV, tax deductions, and governmental subsidies for purchasing electrical vehicles (Park, 2017).

Demand for EVs is directly affected by people's perception of them, even though there are clear benefits to owning an EV (Rezvani et al., 2015). Higher prices in comparison with combustion vehicles, a longer charging time, limitations in driving distance based

on one charge, travel behaviours, the economic and environmental issues are key factors affecting the rate of adoption of EVs (Vassileva, 2017). Technological advancements are continuously implemented in the production of EVs', but the price of batteries and performance issues are still barriers hard to overcome by vehicle manufacturers (Broadbent et al., 2018). Poor implementation and constant friction between various stakeholders limit the advancement of charging network infrastructures and EVs related requirements, helping with their expansion (Shao et al., 2014). Even though one of the most compelling barriers is the higher price, the environmental benefits associated with EVs might be the strongest enabler for consumers in adopting this trend (Straten et al., 2007).

The literature review revealed no specific ranking for the existing barriers within the adoption of EVs. It is not possible to classify them and clearly stipulate which one is more important. If such rankings were possible, that would allow for the most influential barriers to be addressed first to spur EVs adoption depending on a country's context. Economic conditions and resource availability usually prevent a country from having the possibility of addressing all the barriers at once (Nesterova et al., 2016). It is improbable that the EVs market will evolve by itself without a joining effort from governments and industry stakeholders (Tal et al., 2020).

Factors that are affecting the adoption's progress

The European Union has policies and programs committed to the promotion of sustainable mobility and particularly electric mobility. Electric mobility has been determined to be the natural transition towards sustainable mobility from fossil fuel vehicles by the EU for a long time and one of the main priorities for decarbonisation of all aspects of transportation in all Member States. (*ACEA, 2020*). *Even though continuous efforts are made for the diffusions of EVs across markets, the sales from this category were only at 1.5% of the total cars sold in Europe in 2018 ("Promotion of Electric Mobility in the European Union-Overview of Project PROMETEUS from the Perspective of Cohesion through Synergistic Cooperation on the Example of the Catching-Up Region," 2021). At the current rate, the EU's proposed goals regarding greener mobility by 2030 will not be easily achieved.*

As the literature review shows, the charging infrastructure is one of the main barriers. Most of the existing electric vehicles are PEVs (plugin electric vehicles). Technological advancements in the way EVs charge are constantly researched. Technologies besides using a plugin cable are piloted or have already been implemented. For example, wireless charging stations for light electric vehicles (SAE International Releases J2954 Wireless Charging Standard, n.d.) or specially design fully-automated stations where

the car's batteries are just swapped in less than 5 minutes with fully charged ones (*NIO To Launch Power Swap Station 2.0, n.d.*). *This diversity and expansion in charging options will only improve EV's position and provide more support in the customer's decision-making process of acquiring one. In the coming years, this will also strengthen positive electrification scenarios for the charging networks and help to decrease the cost of batteries by increasing demand (McCollum et al., 2014). The 2020-2030 decade is to be seen as an essential one in which major investments need to be made to help the transition to electric mobility (Statharas et al., 2019).*

Adoption barriers that need to be addressed

Policymaking should be approached firstly from a holistic perspective to accomplish a large scale adoption of EVs. Several objectives need to be met to achieve that. By analysing behaviour and combining it with extensive literature research on barriers and motivation to EV adoption (Carolin et al., 2020), developed a roadmap model showcasing the customer's journey in owning, leasing or renting EVs (Figure 6).
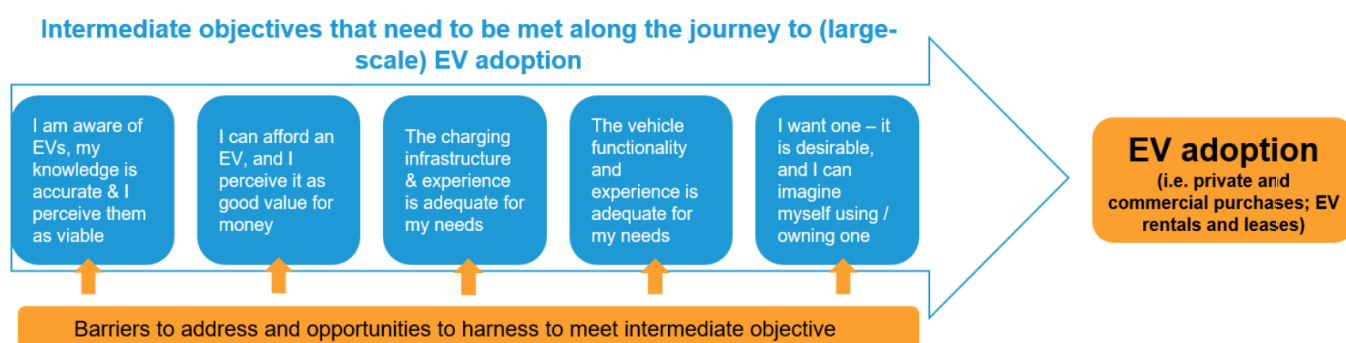
Figure 6. Illustration showing intermediate objectives that need to be met during the EV uptake journey (Carolin et al., 2020).

It is important that all opportunities are harnessed and barriers addressed to succeed: (1) **Awareness and knowledge** - both consumers and car fleets must carry the necessary knowledge about EVs. They need to know how they function, charge, available models, where they can be acquired from, cost-related issues and where to find additional information if needed; (2) **Financial factors**: here we include the purchase price, running and total costs of ownership, existing financial stimulus and information about the vehicle depreciation. People have the tendency to focus on the initial costs of acquiring an EV rather than on the long term lower running costs. Therefore cognitive dimensions need to be taken into account; (3) **Charging infrastructure**: The need to charge the car is probably one of the most critical aspects of owning an EV. It is essential to have access to a charging point at or near home. Secondly, at the working place and thirdly on a national level charging infrastructure for long trips; (4) **Vehicle attributes:** Charing time, battery performance in the long term, and range anxiety are the

main barriers against EVs adoption; (5) **Consumer attitudes:** A positive attitude is a key aspect in spurring adoption. Symbolic attitudes associated with the symbolic meaning and value of a car, affective attitudes associated with the emotions and feelings of ownership and instrumental attitudes associated with the practical aspects of a vehicle are such examples.

Conclusion

The International Panel on Climate Change concluded in its report: "warming in the climate system is unequivocal, with many of the observed changes unprecedented over decades to millennia: warming of the atmosphere and the ocean, diminishing snow and ice, rising sea levels and increasing concentrations of greenhouse gases" (IPCC, 2014, p. 188). Achieving a sustainable transportation infrastructure is a crucial aspect for many countries and cities globally as mobility activities have an important negative impact on the environment (Carlucci et al., 2018). Currently, EVs are being developed at a more accelerated rate compared to previous years, but yet their adoption by end consumers also in Denmark is still low correlated to the rest of the automobile market due to a wait and see attitude. To obtain a significant impact on people's perception of clean energy technologies such as EVs that affect their behaviour or habit, it is important to learn and integrate their decision-making process in the product and service design and delivery strategies (Pakravan et al., 2020).

2.3. Nudging

If we are to search the term nudge in the dictionary, we will find it explained as gentle touch or gentle push (Oxford dictionary, 2014). By using nudging, for example, political institutions have the opportunity to shape people's behaviour in the context of achieving a mutual and desired benefit for both the user and the society in which he/she lives. Of course, results are otherwise obtained by imposing laws, regulations and injunctions (Haug et al., 2014).

Richard Thaler and Cass Sunstein first defined nudging as a method as "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler et al., 2008, p. 6). Nudging mechanisms have been studied for a long period to best leverage its power in order to influence the user's decision-making process. In today's ever-expanding online environment, nudging plays a key role through what we call "personalised recommendations". For example, platforms are influencing how items are presented, or information is provided, making a significant impact on the choices made by a consumer. From an individual perspective, these recommendations influencing a consumer's decision-making process are called *a nudge in behavioural economics (Leonard et al., 2008).*

Nuding as a concept implies different tools that are used to help people make enhanced decisions "without forcing certain outcomes upon anyone" (Thaler et al., 2012, pp. 428-439).

Understanding the psychological phenomena at the base of the nudge theory, which influences people's way of making decisions, is how a choice architect will be able to create a choice environment. In this choice environment, people can be subtly guided towards taking a decision that is considered to be beneficial and in their best interest. A common scenario found in the literature exemplifying such an environment is in a school cafeteria. In this scenario, the goal is to order everything in such a way that will result in the students eating healthier food.

From the physical environment, nudging became popular and adopted quickly in the online space. Different authors (Mirsch et al., 2017; Schneider et al., 2018; Weinmann et al., 2016) used the term *digital nudging that relates to the UI (user interface) elements of an application that influence a user's choice. The goal of the specific UI elements would be to navigate a user to a predefined, desired option without forcing the decision path. In the beginning, we gave an example of nudging the personalised recommendations, but not every*

author considers it to be a means to explicitly nudge users. Giving people a specific subset of available options to choose from can be seen more as a "hiding nudge" (Caraban et al., 2019).

Opposed to how authorities try to handle behavioural patterns on people, the goal of someone that tries to use nudging should be the promotion of the best alternative, aligned with the long term objectives of the one who is being nudged (Haug et al., 2014). A nudge shall always be constructed only to "<...>help people live according to their own best interests." (Thaler et al., 2008, p. 6).

When using nudging, transparency is key. The person should be at all time able to deduct the intended behavioural outcome of the nudge. Political philosopher John Rawls (Wenar, 2017) describes the "Publicity Principle", which implies that the person nudging should never use a nudge that is impossible, or he does not want to explain to the person affected by it. Thaler and Sunstein explain in their book that nudge should be designed and used for those in need of guidance and at the same time not create obstructions for the ones that don't need or want to be helped.

Our brain

The key principle of nudging is in direct correlation with the way our human brain works and what stimulates it to sometimes make decisions against our best interest. Specialists have identified two levels on which our brain operates, an automatic one and a reflective one. Automatic thinking requires fewer energy resources as it is based on previous experiences, has preset biases and happens in a very short period of time. When the brain takes time to rationally reflect by using cognitive abilities to first evaluate a situation and then react, we talk about reflective thinking. Since the latest demands, a larger amount of energy and our built-in mechanism always looks to save as much energy as possible, the brain will most often rely on automatic thinking during the day. In their paper, Sunstein and Thaler present four situational examples in which someone, by making a decision, would compromise his rationality. First—the situation where someone goes for a decision from which he can benefit immediately and deal with the cost only later in time. Second—situations that are new or you don't usually find yourself in, and you lack the experience to base your decision on. Third—those situations where no immediate feedback is recalled from. The fourth—situations to which you are unaccustomed, and it is hard to relate the outcome to any previous experience or anything relevant (Thaler et al., 2008).

Automatic thinking is usually what results in an unwanted way of acting that does not reflect an individual's long term goals. "Humans have bounded rationality and

therefore make biased decisions that sometimes run counter to their best interests" (Rainford et al., 2011, p 2). People tend to perceive short term gains as more appealing than long term ones, even though the value of the future ones might be much greater. Due to individual bias, people will be nudged towards choosing most of the time the "default setting" if such exists because they will assume that is the most common setting, and in part, they want things to remain the same (the status quo bias). They assume that whoever designs a solution knows best and this reflects from their part in less time for assessment, and therefore limited brain energy utilised (Goldstein et al., 2008).

2.4. Can service design be used to nudge?

Designers are meant to find ways of designing positive and brighter futures and not only to create desirable solutions. The public sector and political institutions are using service design on a larger and larger scale for development and improvement (Design Council, 2014).

Service design uses methods and tools that can be easily aligned and integrated into the public welfare system. It is stipulated that: "Service design helps to innovate or improve services to make them more useful, usable, desirable for clients and efficient as well as effective for organisations. It is a new holistic, multi-disciplinary, integrative field." (Moritz, 2009, p. 6).

People using the service are the most important dependency for designers while designing the service (Fullerton, 2009). The focus points of the designer are the touch-points where the user interacts with the design and where the designer is able to influence how a user will behave and the outcome of the service. In the desire to improve the outcome of the service and add more value to the user, a *nudge towards a different process might be the solution to influence the desired behavioural result. Twenty-First-century designers should shift their focus and design for positive outcomes besides defining, forming experiences for users and brand values. "You can give people all the facts, which may change their attitude towards something, but it will not necessarily get them to change behaviour" (Girlin, 2012, p. 428).*

Design has been always influencing people. At this time, designers have the convenience of refocusing their skills and methods in combination with the new learning in human behaviour. This allows them to not only affect a person's choice but to also understand the reasoning behind a decision. The essence of service design is its user-centred focus, and if merged with the learnings in human psychology that are at the base of *nudging, this can only bring the best out of the two methods. A powerful combination that implies also more responsibility for the designers when shaping societal behaviour (Galbraith, 2013).*

Service design correspondent terms for nudging

Learnings of human psychology have been used as the basis for many directions in the field of service design without necessarily using the term *nudging. Among others in service design literature, we find terms like "design for sustainable behavior" or "design for emotions".*

A toolkit consisting of a set of cards, containing distinct questions and statements about different situations of human lives was developed in the field of design for sustainable behaviour by Dan Lockton, for example. He named the toolkit "Design with Intent" and its purpose is to spur designers to better reflect on how they can influence a person through the way a person naturally acts (Lockton, 2009). Lockton focuses a lot on automatic thinking and how people's natural actions and reactions can be played with, to obtain an intended behavioural goal. It is important to be able to connect people emotionally through their behaviour in order to achieve great results (Galbraith, 2013).

A solution for designers to influence the user's sustainability is presented by Debra Lilley and her colleagues in their paper. The approach takes into account the following three steps: (1) through a script and behavioural steering (e.g. intentionally and precisely guiding the user through a designed layout); (2) through eco feedback where the output's goal is to influence behaviour through information and (3) through intelligent products and systems holding liability for the decision themselves (Lilley et al., 2005).

From the previously mentioned examples, we can see that service design already has common points, its background already incorporating some aspects of nudging. Therefore the use of nudging in service design can be conveniently integrated to help design positive outcomes for the users of a service solution.

Examples of using nudge

Nudge is used to guide a person's behaviour and decision-making process in a predictable manner. This might include subconscious hints, corrections on how we perceive social norms or emphasising specific choices. A good way of using nudging, for example, is to tell people how others are behaving and correlate that with their own behaviour.

Example of an experiment: in a neighbourhood, people were told how much their household energy consumption is in comparison with houses nearby. This led to people lowering the energy bills. Here social psychology comes into place and people's need to be part of the herd, and the way we are biased and tend to trust that we need to be part of the "better half of the population" (Selinger, 2001).

Another experiment focusing on behavioural psychology and small nudges was done in buffet restaurants. Here the result showed that reducing the size of the used plates was enough to make people discard less food and sequentially decrease food waste by 19.5 % during the experiment period (Kallbekken et al., 2012).

In Sweden, a design team from a car company remodelled the stairs from a subway station to resemble a piano keyboard. When walking up or down the stairs, each step would play the corresponding note from the piano. In this way, they engaged people and increased the use of the staircase by more than 66% during their experiment (The fun Theory, 2009).

Examples of using nudge

1. *"Make it easy – even the little obstacles can sway us towards procrastination or make us postpone important decisions"*

3. *"People tend to rely on the default option, so make it the desired option"*
(Irrational Designers Group at the IIT Institute of Design, "Brains, Behaviour & Design: Tools to understand and influence decision making")

5. *"We are less benevolent, prone to careless and antisocial behaviour, and more selfish when we feel we are alone and that no one is watching our actions"*
(Krukow and Andreas Jespersen, inudgeyou.com)

7. *"To encourage one behaviour or selection over another, emphasize its associated gains rather than its associated losses"*
(Artefact Group's Niki Pfarr in her "Applying Behavioural Economics and Cognitive Psychology to the Design Process")

9. *"Draw attention to and praise the sensible behaviour of "neighbours" or members of the same "community" in order to make ecological behaviour a social norm that consumers will adopt spontaneously"*
(Centre D'Analyse Strategique in their "Green Nudges": New Incentives for Ecological Behaviour)

2. "Design your system to engage people's emotions, or make them emotionally connected to their behaviour" (Dan Lockton's "Design With Intent Toolkit)

4. "Priming is one mechanism to influence behavior outside awareness. It involves presenting a stimulus that activates or inhibits an associated mental representation (a concept, action, or goal)" (Theresa Marteau's "Changing Human Behavior to Prevent Disease: The Importance of Targeting Automatic Processes")

6. ""The identification and removal of 'external barriers'. External barriers are constraints that make the logistics of completing a desired activity difficult"
(Stephen Clune in his "Design and Behavioural Change" from the Parson School of Design's Journal of Design Strategies Spring 2010 Issue)

8. *"Reduce complexity – good nudge designs should reduce technical complexity for the user, through the development of objects, and also when designing encounters, systems and Communications"*
(Sille Krukow and Andreas Jespersen, inudgeyou.com)

(Galbraith, 2013, p. 13)

Ethics considerations

Scepticism and criticism are natural reactions among many when it comes to nudging due to the fact that its purpose is to alter someone's behaviour. Some authors see nudging as being "patronising and condescending". Especially when used on a political level, nudging results in an invasion of people's privacy, affecting their autonomy and integrity (Oliver et al., 2012).

Other criticism refers to the fact that nudging undermines people's intelligence and considers them unable to act in their own best interest. Selinger and Whyte question also if our freedom of choice is diminished by using these behavioural alterations and how much someone is obstructed to build his own moral character. If society is always driven towards the right path at every moral crossroad, how will people be able to make their own decisions and understand what's best for themselves and for society? People that are "morally lazy" might become even more dependent on society to hold responsibility for all their important decisions. They also talk about how a nudge might be understood differently, for example, in other countries, where the final outcome might actually not be in the best interest of that culture. Their paper also addresses the issue of the choice architect, which might cast his own thoughts and values upon what is wrong or right in the design (Selinger et al., 2011).

Conclusion

The most basic, or simplest, solutions are often the most efficient and elegant ones, and nudges should be characterised by the following traits: "(1) they are voluntary, (2) they are avoidable, (3) they are passive/easy, i.e. require little effort and work on mindless choosing, (4) They are low cost, to both the person targeted and the government or organisation utilising them (consequently, they are highly cost-effective)" (Galbraith, 2013, p. 13).

In general, a person knows how to react when put in different situations. Many end up making the wrong decisions even though their intention was to do the right thing. In situations like this, a nudge is applicable, helping the person to easily overcome the obstacles for a positive outcome.

When people find themselves in difficult and unique scenarios, where it is hard for them to rationalise and they have troubles in easily figuring out a decision, this is where a well-designed nudge finds its place (Thaler et al., 2008).

A designer should never underestimate the impact of a nudge and should always see

both its good and possible bad parts. Reducing welfare with a nudge that drives people to waste their money and time is easy (Sunstein, 2015).

In the times we live in, many important reasons and choices are made by people in digital environments. When we talk about digital nudging and how to use it (Figure 7), we think mainly about the UI (user-interface) because this is what guides people's behaviour. The structure and workflow of an application or website might impact someone's decision-making in ways the designer never intended to, so it is essential that he first analyses all the possible consequences (Schneider et al., 2016).
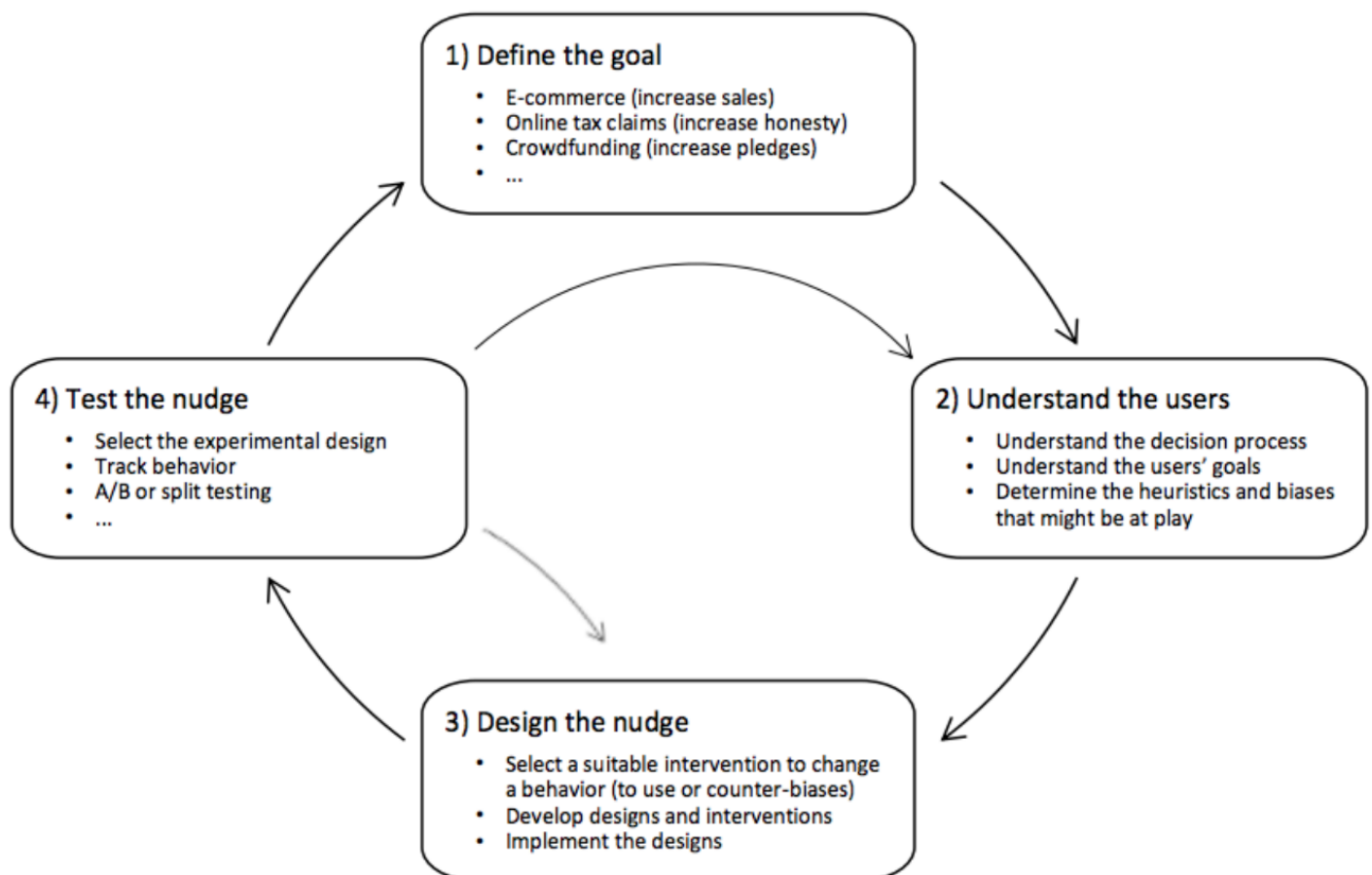
Figure 7. Illustration presenting the cyclic design process for digital nudges (Schneider et al., 2018).

2.5. Research question

The literature review was focused on presenting service design's capabilities to encompass nudging mechanisms. Deep diving into understating behavioural design methods for constructing a good nudge allowed us to enhance our knowledge of how the human decision-making process works first. The research showed that exploring and understanding the basics of how our brain is organised and how it reacts in different circumstances is the key to creating a nudge. This specific knowledge in human psychology can empower service designers in developing user-centred solutions that manage to offer the needed positive outcomes. Addressing our identified problem area within a more sustainable way of living by increasing adoption of electric vehicles, the literature research proved itself to be vast. It provided us with a good understanding of the existing factors influencing the slow adoption of EVs and barriers that we, as service designers, need to take into account when creating our concept solution. By exploring and analysing the literature suggestions for creating a good nudge, we aim to use them together with our service design skills, tools and methods available in our toolbelt, to address the below-framed research question: "How can service design be used to nudge people towards more sustainable lifestyles?" This research question will be used to guide us through our design process.

3. Theoretical approach

The chapter introduces the Framework for Innovation used throughout the project as a basis structure for our design process. Processes that were suggested by the Double Diamond design methodology—helped to plan in advance and predict the possible flaws in the process or underestimates that would occur throughout the project. Throughout the project, most workflow principles that guided the design process were also based on the framework, helping the team stick to similar practices when it came to working separately.

This chapter is divided into the following sub-chapters:
3.1. Double Diamond;
3.2. Framework for Innovation;
3.3. Overview of the design process.

3.1. Double Diamond

The Framework for Innovation has evolved from Double Diamond. This methodology has been created to visually represent the standard design phases and create an overview of the design process itself (Design Council, 2019a). Referred to as a common design process representation, Double Diamond visualises two diamonds that combined have 4 design phases and represent an overview of the design process (Figure 8).
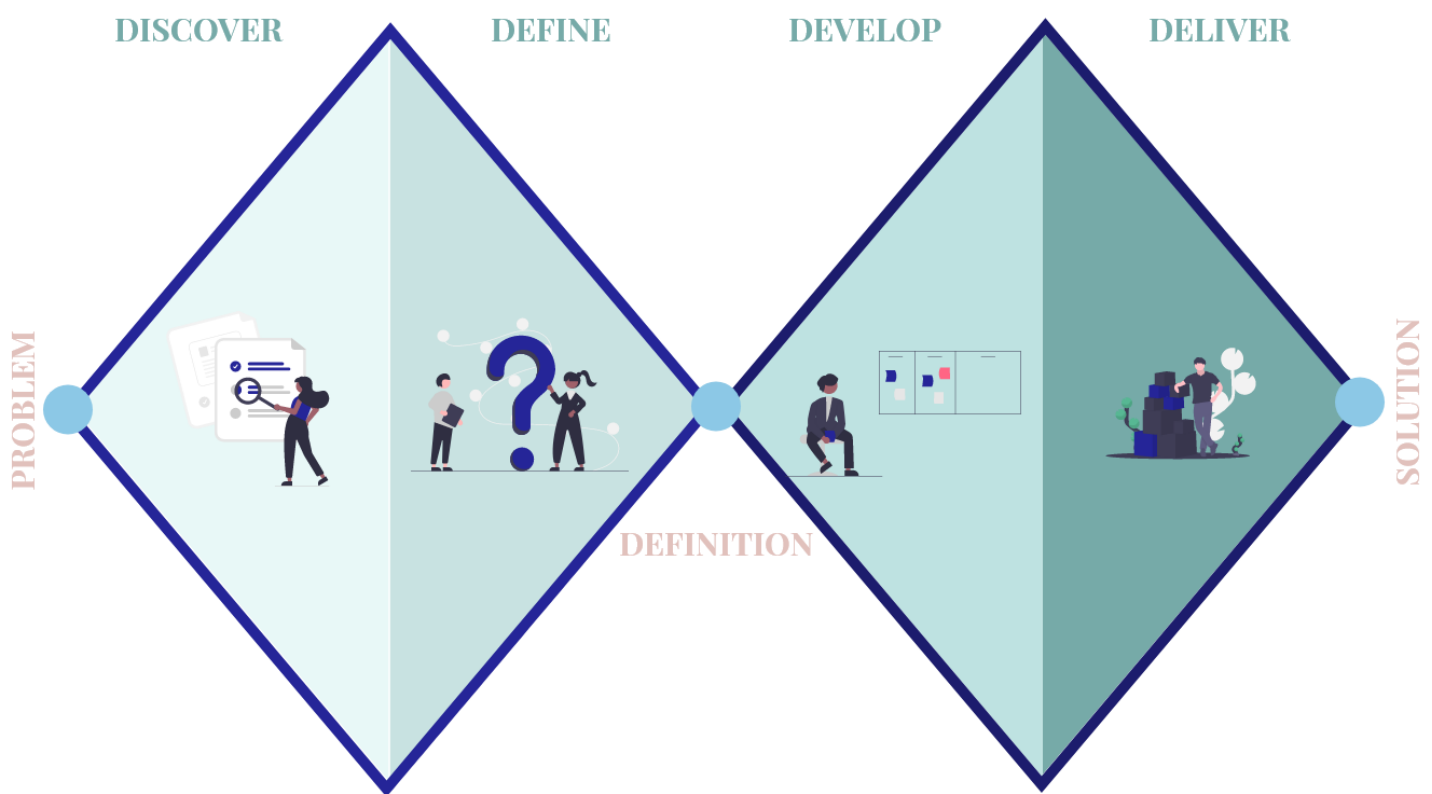
Figure 8. Modified visual representation of the Double Diamond model that encapsulates the design process.

Each diamond has two phases: (1) divergent that represents exploration processes and (2) convergent—representing a focused action on the findings. The first diamond (representing the design process beginning) has Discover (divergent) and Define (convergent) phases. The bridge between the first diamond and the second one is marked by a milestone, representing the process continuity that takes shape in knowledge about the problem(s) and its definition. The second diamond has Develop (divergent) and Deliver (convergent) phases, representing processes that are meant to ideate, create and test the solution that is based on gathered knowledge (Design Council, 2019b).

3.2. Framework for Innovation

Framework for Innovation introduces additional design principles to the existing Double Diamond model and emphasises the non-linear design process approach (Figure 9).
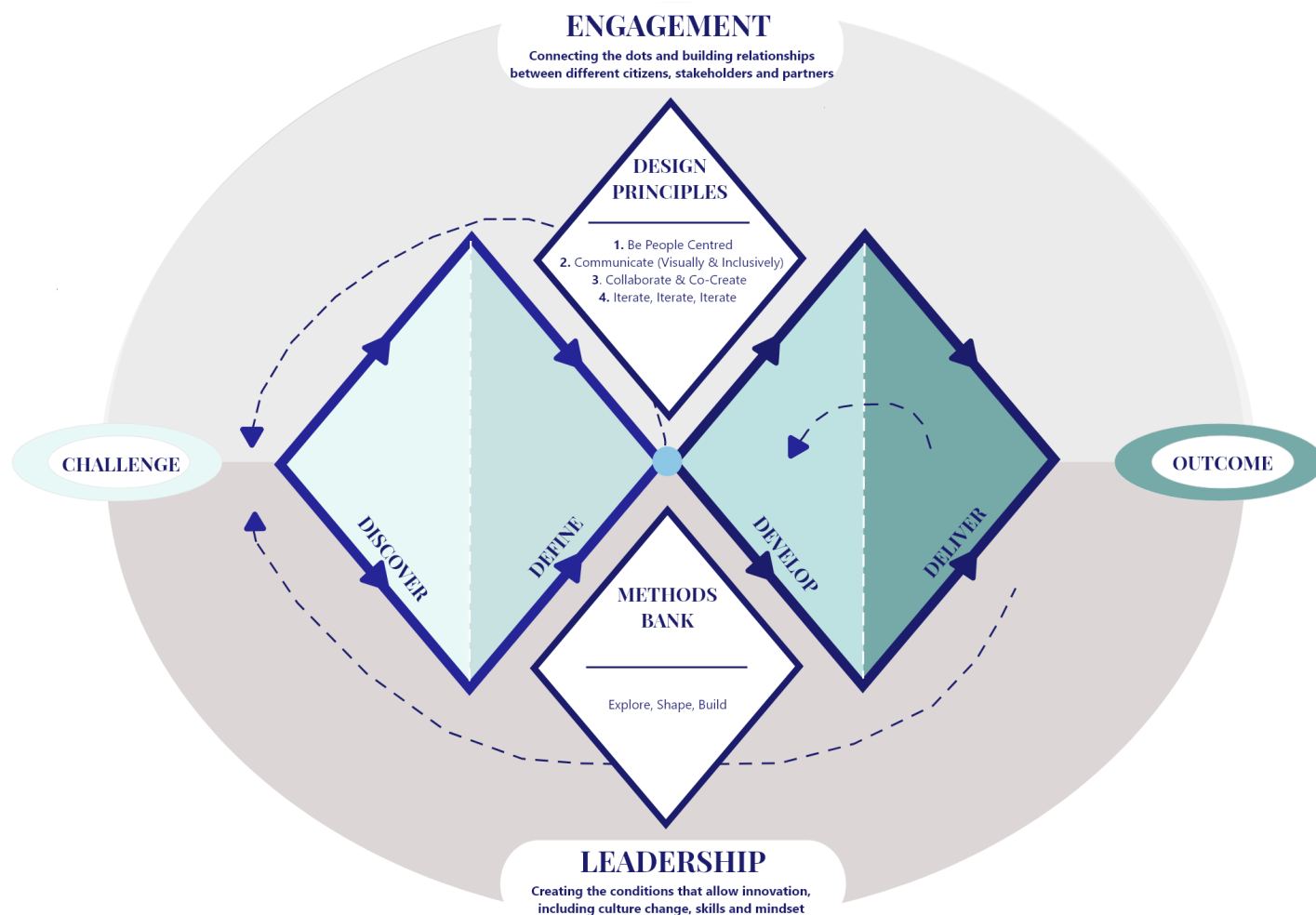
Figure 9. Modified visual representation of Framework for Innovation model, showcasing process steps, iteration and reflection cycles.

The framework introduces core principles that are meant to enhance the problem-solving processes: (1) Put people first—encourages to start with understanding the user; (2) Communicate visually and inclusively—promotes sharing the gathered knowledge with the users; (3) Collaborate and co-create—proposes to work with users to achieve a common goal and (4) Iterate, iterate, iterate—stresses the need of reflecting on the work done and improving it. The framework also comes with propositions for method categorisation: (1) Explore—methods meant to discover user challenges, needs and opportunities; (2) Shape—methods for prototyping, insight or vision creation and (3) Build—techniques to raise ideas, plans and expertise. The framework promotes creating the "culture of success" by taking into account leadership and

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engagement. The previously mentioned concepts are presented as factors that foster the innovation process (Design Council, 2019a).

In this project, the framework was used as a base to: (1) divide the design process into phases, (2) agree on a need to reflect and reiterate; (3) define the role of a user and (4) set a vision that the final outcome of the process should be a positive one that engages users and is perceived as leading in comparison with other products or services. We considered the framework to be promoting values that are also associated with service design discipline, making it easier to understand the reasoning behind the proposed principles.

However, the Framework for Innovation seemed too abstract for "Creating a culture of success", making us question if the proposed leadership and engagement values are the most important to us when considering developing a new service. The Methods Bank categorisation seemed to be irrelevant since we saw it conflicting with the original process phase categorisation, making us see it as an inspiration rather than an actual approach.

3.3. Overview of the design process

As mentioned previously, the Framework for Innovation helped to have a visual overview of the project's process (Figure 10).

February	March	April	May
DISCOVER	DEFINE	DEVELOP	DELIVER

PROBLEM — SOLUTION

DEFINITION

DISCOVER
Expert interview
Data gathering
Nudging research
Interviews - first wave
Literature review
Research question
Project context
Service Safari

DEFINE
Target audience
Personas
Journey mapping
First written draft
Interviews - second wave
Scenarios

DEVELOP
Ideation
First service concept
Pretotype
Prototype
Testing
Critical reflection on solution

DELIVER
Final service concept
Business Canvas Model
Stakeholders value map
Service architecture map
Journey map
Blueprint
Discussion

Figure 10. Illustration showing used methods in each Double Diamond's phase through the project.

At the beginning of the project, there was a discussion on what methods the project should be based on, which was especially important for the Discover phase. As we followed the Innovation framework's core principles—Put people first and Collaborate and co-create (Design Council, 2019a)—we have decided to conduct our research with more emphasis on qualitative rather than quantitative data creating methods. When it comes to academic and theoretical research that is considered "standing on the shoulders of giants", most of the research and analysis was also done in the Discover phase. It was seen as a good practice to discover theories and academic insights from other colleagues while at the same time doing our own research that was helping us to compare the knowledge of other researchers with our own research data. Methods for

other design stages were selected while advancing throughout the project. This was a strategic decision that we took while planning the Discover phase. It was necessary to acknowledge that our project was not based on existing services or products, enabling us to explore what the final result of the project could be. Therefore, choosing all methods at the beginning of the process was seen as a negative impact that could narrow our perspective on the project.

4. Case study

This section of the thesis reflects on the design process conducted throughout the case study. The presented activities also reflect how the academic research question and problem statement were explored and addressed throughout the case study.

In this section, the previously presented Double Diamond methodology (Design Council, 2019a) is used to present the design process carried out throughout the case study. The case study's process was divided into 4 phases. The first phase is called Discovery—mostly dedicated to research. In the Define phase—gathered insights were summarised and converted into synthesised knowledge that was meant to be used throughout the design process. The Development phase was meant for ideating and coming up with ideas that would address the problem statement. The last, Deliver phase, was used to develop the selected solution further and troubleshoot the existing problems discovered during testing activities.

Each previously listed phase has its subchapter that presents the used methods, argumentation, findings and insights. Therefore, the case study design process is divided into the following sub-chapters:
4.1. Discover phase;
4.2. Define phase;
4.3. Develop phase;
4.4. Deliver phase.

4.1. Discover phase

The first phase of the design process was based on divergent thinking and exploration principles (Design Council, 2019a). The research was seen as an essential and initial step of the design process that helped us to gather data, insights and perspectives while refraining from stereotypes and assumptions that we had before working on the topic. By being aware of our biases, immersing ourselves in the unknown subject and gaining in-depth knowledge was seen as a correct approach to become context-aware of the matter. Being familiar with the context, the gathered data helped us empathize with our target audience and understand research participants' motivations and behaviours (Stickdorn et al., 2018).

The sub-chapter was divided into separate sections following the chronological order:
4.1.1. Actor-Network Mapping;
4.1.2. Exploring vehicle obtaining services using Service Safaris;
4.1.3. Collecting vehicle owners' opinions with an Online Survey;
4.1.4. Interviewing vehicle users and industry experts;
4.1.5. Concluding Discover phase.

4.1.1. Actor–Network Mapping

At the beginning of the research phase, we have noticed that there are many sources and information when it comes to the automotive industry. By examining information publishers and their interests, we have realised that there are many actors with different functions revolving around the car purchasing and owning experience. To have an overview of the discovered actors and their functions, we have decided to develop an actors network map (Morelli & Tollestrup, 2007). The approach was also meant to look at the working topic from another viewpoint while discovering actors that might not be even considered to be related to the problem area in the first place (ServiceDesignTools.org, n.d.).

Method

The Actor-Network Mapping process was started by listing down found actors and noting their main functions in the network. Later on, actors were placed into categories. With actors categorised, we have decided to incorporate visual mapping elements from the stakeholders mapping method, acknowledging that the stakeholder map is also meant to create an overview (Stickdorn & Schneider, 2010). We have decided to place stakeholders into 3 separate layers: "essential", "important" and "other" layers (Stickdorn et al., 2018). In this way, we have created an overview that clustered the actors by their functions and placed them into several layers of presumed importance in regards to our project.

Findings

During the mapping process, we have categorised discovered actors into the following categories: (1) EU-level organisations; (2) State-level organisations; (3) EV/PHEV-related manufacturers or businesses and (4) Upcoming/existing car owners (Figure 11). Throughout the mapping process, we have discovered that many European Union organisations are taking part in EV/PHEV adoption and advocating processes in Europe. By identifying their functions regarding our project's context, we have come to the impression that most of the listed European Union organisations will not be influencing our service directly, rather than providing guidelines into the future tendencies and regulations.

State-level organisations were considered to be more important in our context. By listing down actors and their most important functions to our project, we have realised that a created service would have to comply with the state's law's and see existing regulations and subsidiaries as an opportunity to increase the EV/PHEV adoption.

Discovered actors for the "EV/PHEV related manufacturers or businesses" category had a broad range of functions: from EV/PHEV manufacturing to disinformation about EV/PHEVs. These mapped out actors and their functions helped us understand that there is a large network of business-related actors and deals between them that ensure that the EV/PHEV industry is growing and sustaining itself.
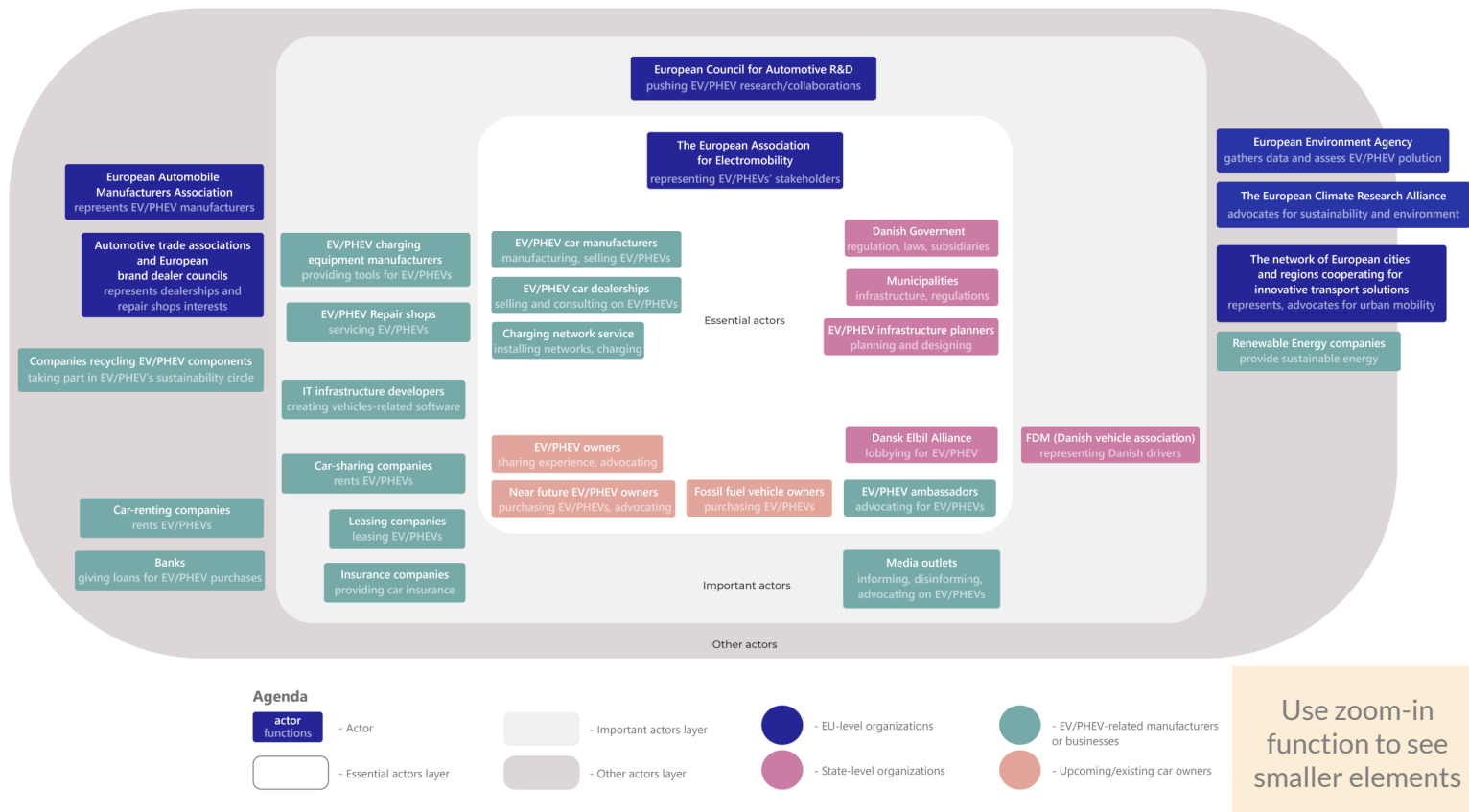
Figure 11. Visualisation of Actor-Network map used to present and categorise identified actors in Europe's automotive industry.

The upcoming/existing car owners category has helped us to make basic distinctions between various car owners. The most important assigned functions lead to understanding how actors could have different roles in increasing EV/PHEV adoption. Furthermore, the created distinctions were seen as a foundation for the target audience and its segments forming.

Conclusion

Actors Network map was used to categorise and assign a level of assumed importance to discovered actors. During the process, actors were divided into 4 categories and 3 levels of perceived importance. The method was essential for our research process since it was hard to establish a research direction without knowing what actors exist in the industry and what influence they could make on our upcoming service.

4.1.2. Exploring vehicle obtaining services using Service Safaris

Service safari was used to discover existing services at the beginning of our research and gather first-hand experiences (Design Council, 2015). Using gathered insights from Actors Network Mapping, it was decided to look into services that enable existing or upcoming EV/PHEV owners to purchase a car. Due to a COVID19 pandemic and physical closure of car dealerships in Denmark, we have decided to investigate if car dealerships and other vehicle providing services are accessible online. The gathered insights also helped us to identify what makes a positive experience while exploring a wider range of services that offer various EV/PHEV acquisition models in Denmark (ibid.).

Method

For each service safari, the method has been conducted in writing, noting down the steps taken, commentary on explored service and experienced pain or love points (Lewis, 2019). Each service's exploration was done separately. The separation during safari has ensured that researchers' experiences were not identical and led to different shared insights while forming a collective knowledge on the explored services (Design Council, 2015). Even though the separation during service safari was important, the common agreement for safari goals and questions to explore was necessary to ensure that the safari evaluation process relied on principles agreed previously (Johnson, 2020). Safari documenting process has revolved around 2 topics: (1) interpretations how users would use the service in the selected environment (Lewis, 2019) and (2) our experiences as first-time users during the safaris (Design Council, 2015).

Findings

While searching and deciding what services and companies we will explore, it was decided to set research scope on organizations offering traditional or alternative ways to acquire an EV/PHEV as a regular customer. Our approach helped us discover different service types and form an impression of what helps to make a good service experience while searching for an EV/PHEV owning options (Design Council, 2015).

As the safaris were meant to explore services that are closely related to our problem area, all chosen companies were: (1) operating in Denmark; (2) offering EV/PHEVs and (3) had a somewhat of online experience incorporated into their service or product selling journeys.

To go through service safaris completely, we had to purchase or subscribe to services that were offering vehicles. Because of the large amount of money required to do at least one service safari entirely, we have decided to focus mostly on the pre-purchasing and purchasing phases of the safaris. Other service phases were also taken

and researched. However, they were not as complete or detailed as the phases that we were able to go through without finally committing to own a vehicle.

Dribe.dk

Throughout our search for actors offering alternatives to a traditional car purchasing, we have found a service that offers car ownership based on a subscription model. Dribe.dk is a service that each month charges its users a membership fee (499dkk) and a car subscription fee that is based on the chosen vehicle, for example, having a daily vehicle "VW up!" costs 3499dkk per month (Dribe.dk, 2021b). In exchange, users receive: (1)a "daily car"; (2) access to "special occasion cars"; (3) have taxes related to vehicle ownership covered; (4) participate in a loyalty program that lets them use some of the service's features free of charge and have other, less important, but nice-to-have perks (ibid.). Dribe.dk seemed to be a service that offered the best practice for vehicle ownership flexibility and vehicle owner's onboarding. The service was considered fast, transparent and with the least needed human interaction (Figure 12).

Service Safari: Dribe.dk

Membership and subscription-based car rental service offering EV/PHEV/ICEVs in Denmark

Objective: What services and processes exist to acquire a EV/PHEV in Denmark?
Goal: understand how service works, research as further as possible without starting subscription.
User: person with driving license and interest to have a daily EV/PHEV.
Documentation perspective: High-level, basic customer journey:

Use zoom-in function to see smaller elements

Getting acquainted with the service, benefits
Website

Be introduced to service concept, benefits, rules
- 👍 Explained service onboarding journey
- 👍 Overview of value proposition & benefits
- 👍 Service has a well-covered FAQ section

Browse through showcased vehicles
- 👍 Cars can be browsed without login or registered account

Consider subscription, car payment and package
- 👍 Breakdown of what is included in the membership and car subscription
- 👎 Membership and car subscription charged separately

Being convinced to try the service and download app
Website + iOS/Android system

Download & install app
- 👎 Smartphone is required to use the service

Registering, providing information & booking vehicle
Mobile Application

Provide basic user information
- 👎 Registering and log-in can be done only via app

Accept rules, identification
- 👍 Good overview of the requirements to use the service

Browse and reserve car for a selected date
- 👍 Chosen car gets reserved for 2 hours
- 👎 Can be picked-up after 14 days
- 👎 Can only choose from 3 "free" days

Acquiring vehicle
Mobile Application + Dealership

Be guided how to pick-up vehicle
- 👍 Vehicle acquiring flow is done without human
- 👎 Cannot be delivered to required destination
- 👎 User has to inspect car damage by himself before acquiring the vehicle

Agenda

| Safari phase | Getting <...> | Touchpoint | Website | Safari step | Accept rules, identification | Love point | 👍 Service has <...> | Pain point | 👎 Can be <...> |

Figure 12. Service Safari steps and positive/negative pain points discovered while exploring Dribe.dk service.

Most of the service's onboarding takes place in a digital environment. Service's website is used as an introductory and informational hub. Service's mobile application is where users can log in, use self-service and do most service-related actions. During the user journey, users enter the service's physical environment when picking up a vehicle, driving it, having it parked, serviced or returned.

Dribe.dk delivers value to its customers by offering a flexible car ownership experience with everything included. By starting a car subscription, most car-ownership related activities are taken care of. For example, for the subscribed vehicle, the user is exempt from vehicle taxation or other ownership-related processes as the service provider is responsible for covering and managing it (Dribe.dk, 2021a).

While exploring Dribe.dk, we have noted down love points that, from our perspective, were making our onboarding journey positive: (1) Service's onboarding journey was presented by the service itself, making it easier to understand what steps have to be made through the user journey; (2) Dribe.dk had listed out the benefits of using the service, making it easier to decide if the service is worth trying out; (3) Drive.dk had a well developed FAQ section where most of the service-related questions were answered, enabling the user to better know rules, procedures, owning process and so on; (4) Service's car park was accessible without registering, making it more accessible and transparent; (5) Dribe.dk had a detailed breakdown of what is included in the membership and car subscription; (6) While registering for the service, the onboarding process had an early checkpoint to ensure that user is meeting the service's requirements; (7) The user's chosen car would be reserved for 2 hours to ensure that it is still available while deciding its subscription; (8) The service seemed to be dehumanised, leaving only several steps of the service where the human encounter would be necessary.

On the other hand, we realised that the service is also relying on several principles that might be considered to be negative: (1) Dribe.dk membership and car subscriptions had to be paid separately, making the user be bounded to the service for at least half a year even if the user is not subscribed to the car; (2) To use the service, it was necessary to have a mobile application for the smartphone, limiting service's self-service scenarios; (3) Registration and log-in to the system was also only possible via phone application; (4) The chosen vehicle was available for a pick-up after 14 days of ordering it; (5) The pick-up date had a narrow time frame pick-up; (6) Service did not offer delivery to the requested location, forcing the user to visit only two existing physical locations; (7) User has to inspect the car's state by conducting its inspection before acquiring the vehicle.

As we were taking our first safari steps in Dribe.dk onboarding journey, it was agreed that, at first, it was confusing to understand what is the difference between the membership and car subscription cost. That mystery was solved only by visiting the selected car's page, where everything has been explained in detail.

While reflecting on what could be improved in the service, we have realised that a lot of our pain points might be connected to the fact that the service is bonded with partnerships with other services and organisations. Without knowing how the partnerships work, we have decided to avoid assuming how certain things work and could be improved. Thus, we considered that the service could be enhanced by enabling the user to have the whole onboarding process on the website and not only on the mobile phone application. Such improvement seemed to be possible since it does not involve partnering with car or insurance companies.

Through the service safari, we have started assuming that Drible.dk is heavily bounded by partnerships with other services. This assumption seemed to be correct considering that only European car manufacturers were offering their vehicles, also taking into consideration the fact that car insurance, road help and other car-related formalities were included in the package. As a result, we have listed several questions for ourselves: "What stakeholders are necessary for Drible.dk to operate? and "Are users ready for such car ownership service providers?".

Dribe.dk has been considered the most progressive and advanced service while comparing it to other, below-listed services.

GoMore.dk

While choosing companies to explore, GoMore.dk seemed to be the right service to continue the service safari with, especially as it was offering EV/PHEV vehicles as well. As GoMore.dk offers several services, we have decided to focus on its leasing service. We saw leasing to be in the centre between subscription-based car ownership and one-time car purchase approaches. GoMore.dk leasing was built on a longer vehicle ownership process, making it possible to lease a car between 12 to 36 months. For each leased car, the user pays monthly payment (e.g. 5000dkk), biannual green owner tax (e.g. 540dkk) and one-time car receiving (e.g. 15000dkk) and returning payments (e.g. 600dkk). In return, the user gets: (1) Liability and insurance coverage; (2) Free servicing and (3) The ability to co-share his car with GoMore.dk users for money. Other service's perks are paid with a monthly fee (GoMore.dk, n.d.).

GoMore.dk was providing several services and offering its users to use a combination of them for their own benefit (i.e. co-sharing the leased car with other GoMore.dk members), this fact has encouraged us to explore a service that was an interesting crossover between EV/PHEV leasing and co-sharing services (Hougaard, 2020). Another argument to explore GoMore.dk was the fact that the service had an easily accessible and well-explained leasing process that was documented on the service's website.

GoMore.dk onboarded its users online, whether it was a website or a mobile phone application. In the online environment, users were able to do the self-service activities. When ordering a car for leasing, most of the purchasing steps were done online: from a GoMore.dk agent giving a follow-up call to a car providing partner sending an email asking for a credit history. The interaction with the service changes to the physical environment when retrieving the ordered vehicle, servicing, using or returning the vehicle to GoMore.dk (Figure 13).
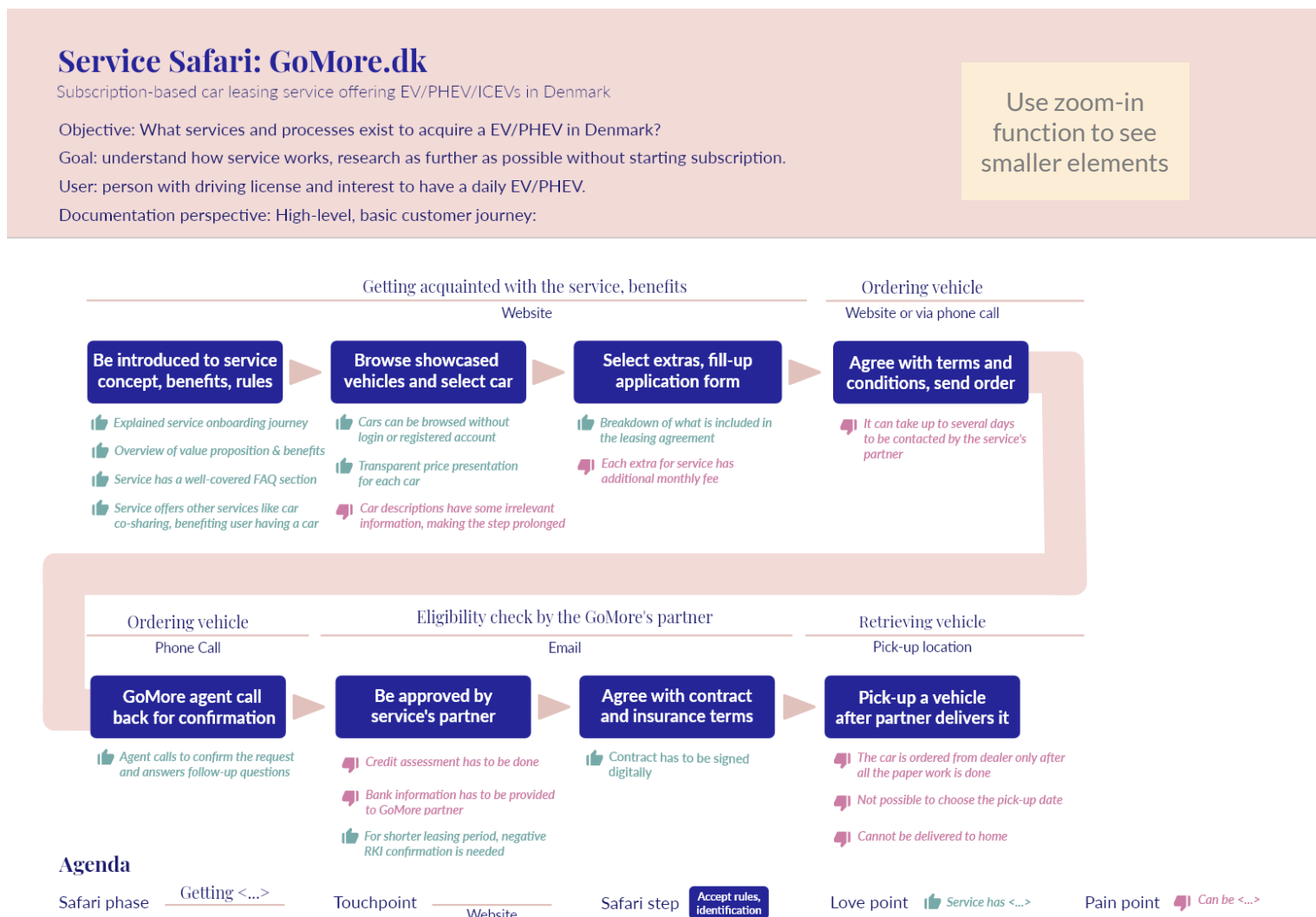
Figure 13. Service Safari steps and positive/negative pain points discovered while exploring GoMore.dk.

GoMore.dk delivers value to its customers by offering a platform for online leasing and co-sharing. As Service's Communication Manager Ellen Hougaard explains: "There is money to be saved by exchanging ownership with access. With a leasing car, you avoid losing value on the car and the risk of large workshop bills. When you lease through GoMore, service and insurance are always included in your monthly payment" (Hougaard, 2020).

While exploring GoMore.dk, we have collected a list of love points that, to us, made the service more appealing and motivating to use: (1) Service had its onboarding journey explained; (2) GoMore.dk had a brief and straightforward overview of value proposition & benefits; (3) Service had a well-covered FAQ section, answering many our questions as if we were users; (4) Service offered other services like car co-sharing that were mean to benefit the user leasing a vehicle (5) Cars were available for browsing and inspection without being logging-in or registered account; (6) GoMore.dk had a transparent price presentation for its cars; (7) Each vehicle had a breakdown of what is included in the leasing agreement; (8) Service had a partner agent following-up with a call to confirm the send request; (9) For shorter leasing period, service was only requiring a negative RKI confirmation from the user;(10) Leasing contract was available to be signed digitally.

While noting down the positive service's attributes, we have also noticed some negative ones: (1) Service's car descriptions have some irrelevant information, making the choosing step unnecessarily prolonged; (2) While filling-up leasing agreement, each extra services had an additional monthly fee; (3) Service's partner had a window of several days to follow-up on the placed order; (4) Customer's credit assessment had to be done before moving forward with the leasing process; (5) Bank information had to be provided to GoMore. dk's partner; (7) The car was ordered from the dealer only after all the paperwork was done; (8) It was not possible to schedule a pick-up date; (9) Ordered vehicles were not eligible for home deliveries.

Browsing GoMore.dk, we appreciated the service's transparency with its existing and upcoming customers. However, acknowledging the fact that the service had several leasing partners that did all the paperwork and vehicle ordering, we considered who was more influential: GoMore.dk or its partners that provided fleet management and leasing services (ALD Automotive, n.d.).

While considering how GoMore.dk leasing service could be improved process-wise, the only thing that occurred to us was the fact that the service's partner(s) had a lot of activities taken care of for GoMore.dk itself.

Throughout the GoMore.dk service safari, we have come up with the following question: "Was GoMore.dk giving its partners a lot of service-related tasks to avoid the responsibilities or did partners or third-party organizations required partners to be responsible for certain areas for other reasons?"

GoMore. dk's value proposition model seemed to be the most diversified and rewarding while comparing it with other explored organizations offering EV/PHEV owning experiences.

Tesla.com

With being aware of the organizations that provide services for EV/PHEV ownership, it was decided to also look at the businesses that are offering their EV/PHEVs products for traditional car-owning. Tesla was a popular EV producing company in the West, making the company's appearance a significant phenomenon in the automobile industry (Teece, 2018). It is known for selling EVs such as Tesla Model S (high-end) or Model 3 (mid-end).

Tesla was seen as a relevant EV car manufacturing company to explore, knowing that the car manufacturer directly sells the cars online to the customers while trying to avoid third-party dealership involvement (Tesla, 2014).

A regular customer interested in owning a Tesla EV can only buy it only online, from Tesla's webshop. In the car ownership journey, only the acquiring, owning and servicing steps are in the physical environment while still being heavily connected with Tesla's set-up digital ecosystem (Figure 14). All other steps such as purchasing, activating insurance or scheduling a servicing are done in the self-service digital environment either via Tesla's website or a mobile application (Tesla, 2021).

Tesla's EV purchasing experience delivers extra value to customers compared to traditional automakers. Since Tesla is selling its cars without the middleman, the customer saves money by avoiding dealerships and the share the dealerships would take. In addition, the company offers its car insurance plan, accessibility to a unique charging network and the ability to exchange the previously owned car (ibid.).

While conducting service safari on Tesla, we have noted down a lot of similar love points that previously reviewed services had, even though we have also found some new ones: (1) Tesla was highlighting the possibility to plan online a touchless test drive; (2) As other two services, it had a well-covered FAQ section, with explanatory videos for each product; (3) EV package specifications were compared visually; (4) TESLA was offering their own, exclusive insurance; (5) EV purchasing was only

possible online; (6) There was availability to have a call/meeting with sales agent; (7) User account was automatically created after placing an order; (8) Order confirmation was indicated to take around 24 hours; (9) All documents involved in the car purchasing, owning were in the digital Tesla's platform; (10) Tesla was offering old car's trade-in for purchased product's price reduction; (11) Purchased EV was possible to be delivered to requested location; (12) Tesla was offering multi-country vehicle servicing and including roadside assistance; (13) Had a platform where most of the brand's services were accessible via TESLA app.

Service Safari: Tesla.dk
Car manufacturer selling its EV only via its website

Objective: What is the customer journey of purchasing an EV/PHEV directly from manufacturer in Denmark?
Goal: understand how service works, research as further as possible without starting subscription.
User: person with driving license and interest to have a daily EV/PHEV.
Documentation perspective: High-level, basic customer journey:

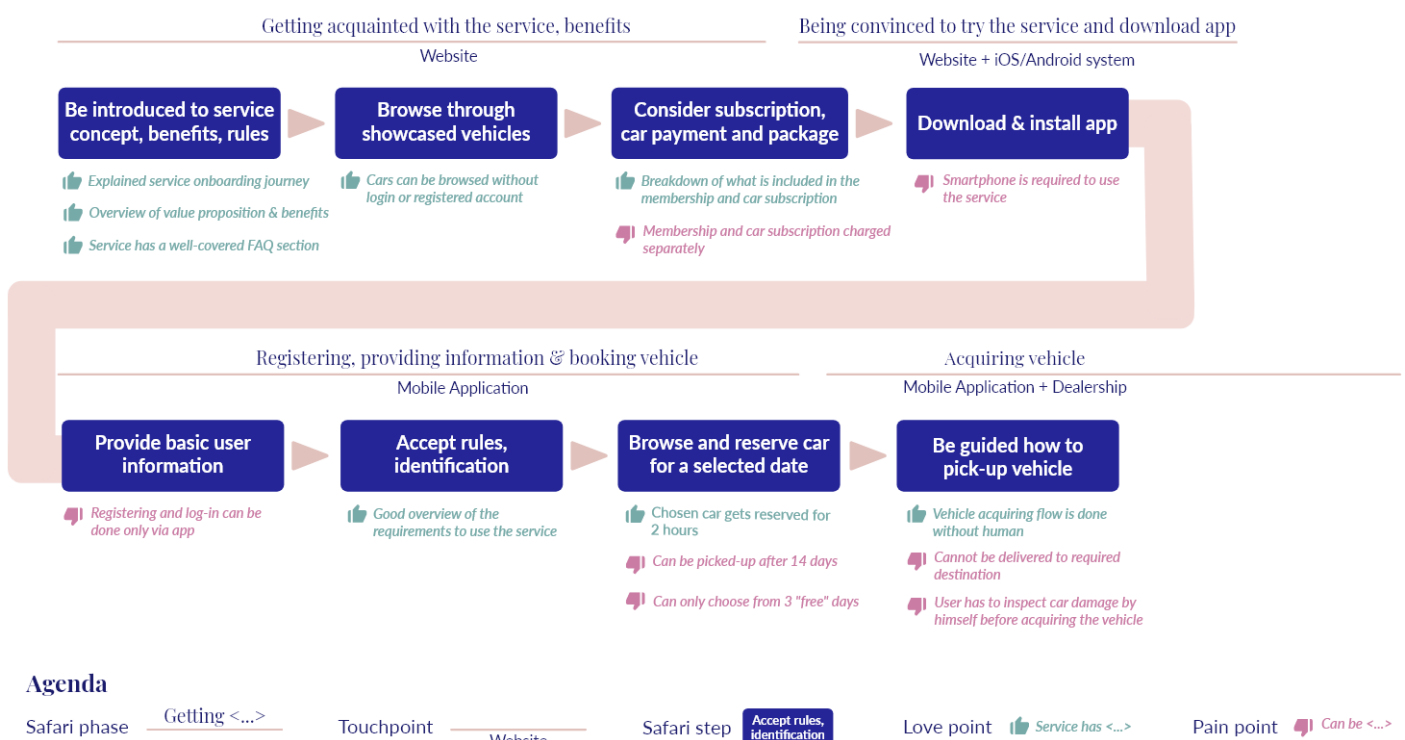Use zoom-in function to see smaller elements
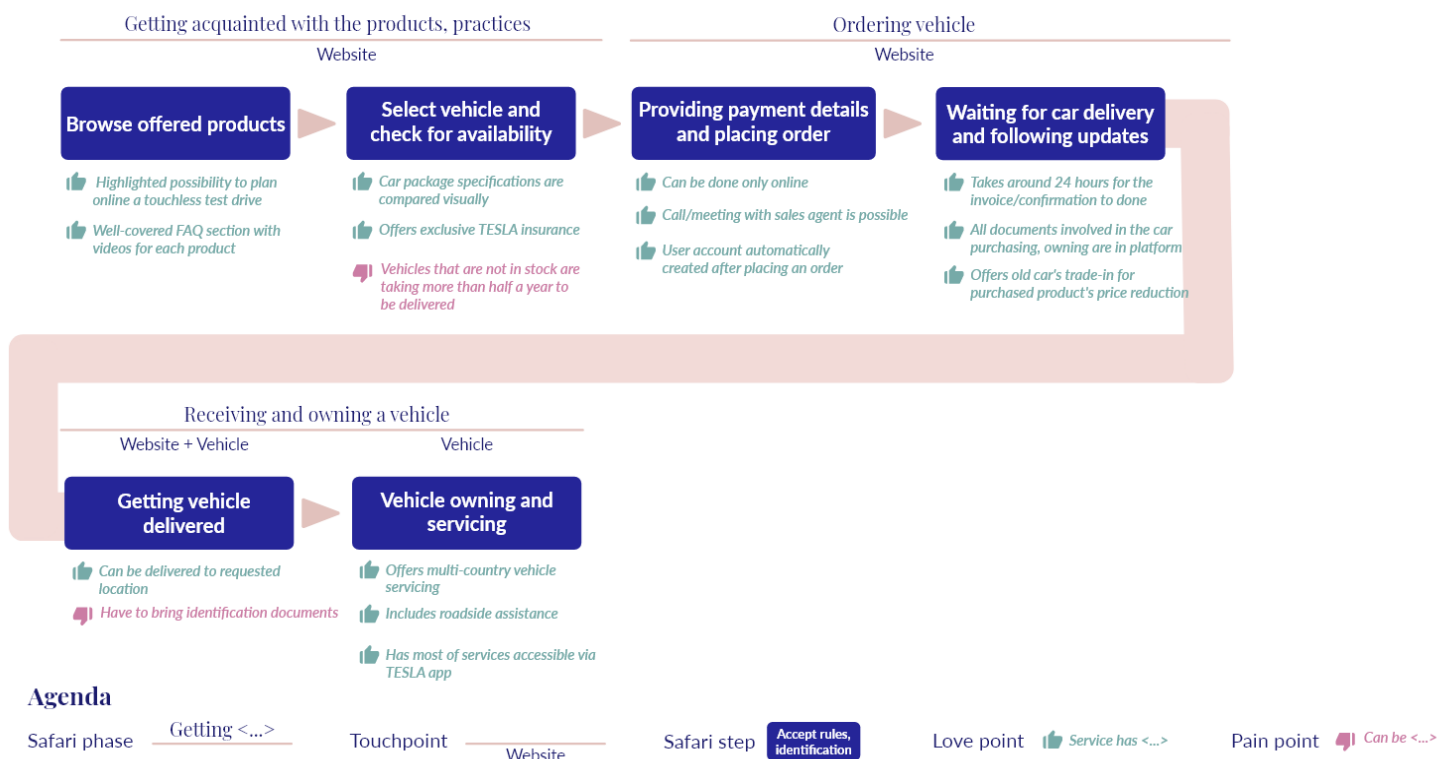
Figure 14. Visualised service safari steps and positive/negative pain points discovered while exploring Tesla.com webshop's vehicle purchasing journey.

With many love points discovered, we also have found out several negative ones. The most important pain point was that (1) vehicles that are not in stock are taking more than half a year to be delivered. Other than that, Tesla also had several pain points that could've been easily solved: (2) Listed EVs had only two stock photos for each car, making it hard to imagine how the car inside looks like before searching it in the

third-party's website and the fact that Tesla required to (3) provide identification document upon reclaiming the vehicle.

During service safari, we have not noticed anything confusing while trying to simulate the purchasing journey. Tesla's support section has served us well, with a majority of our questions answered. However, there was a thought about the vehicle's purchasing experience being oversimplified ahead of time, acknowledging that a majority of auto manufacturers were not offering an online EV purchasing experience that was simple enough to be completed without any assistance from staff.

While exploring Tesla's purchasing and owning processes, we have not noticed any purchasing or owning steps that could be improved. The ordered vehicle's arrival time seemed to be a huge issue. However, it was agreed that this shortcoming is directly related to the production rather than with our explored journeys. It is also necessary to be critical that we have not purchased a vehicle and received it. It could be that receiving and owning processes were overlooked by us due to monetary limitations.

As the company was considered to be innovative with its direct EV online selling approach, there were some questions considering users adapting to such a sales model: "Does an average customer find Tesla's purchase journey more appealing than a traditional dealership-involving one?"; "How important are sales-related innovations when it comes to increasing the general market's adaptation?"

With the previous questions compiled, we have considered Tesla to be an innovative EV selling organization that could be referred upon throughout the project.

Volkswagen.com

To close the spectrum of company types that were offering various car-owning options, it was decided to investigate a car manufacturer that has been in the automobile industry for more than several decades and starting to offer EV/PHEVs. Volkswagen was a great choice as it was a company with a long car manufacturing history (Volkswagen, n.d-b.) and nowadays increasing its range of electricity-powered car models (Volkswagen, 2017).

Volkswagen was seen as a well-established manufacturer of internal combustion engine cars selling its production via car dealerships (Volkswagen, n.d.-c). Due to Volkswagen's entry into the EV/PHEV market with its production, it was important to be aware of how the traditional automaker is adapting to the Danish EV/PHEV market while trying to sell its new line of innovative vehicles.

Throughout the safari, it was discovered that purchasing or leasing a Volkswagen branded vehicle mainly takes place in a physical environment, usually in a dealership partnering with Volkswagen (Volkswagen, n.d.-a). Even though Volkswagen offers its website visitors to "build" their own Volkswagen model, visitors are still referred to car dealerships (Figure 15).

Service Safari: VW.dk

Car manufacturer promoting EV/PHEV/ICEVs via website and selling them in the dealerships.

Objective: What is the customer journey of purchasing an EV/PHEV directly from manufacturer in Denmark?

Goal: understand how service works, research as further as possible without starting subscription.

User: person with driving license and interest to have a daily EV/PHEV.

Documentation perspective: High-level, basic customer journey:

Use zoom-in function to see smaller elements

Getting acquainted with the vehicles
Website

Browse offered products

👎 *Website has a lot information, hard to find what is needed*

Select vehicle and view its presentation

👍 *Highlighted possibility to plan an online test drive*

👍 *Good overview on the prices and available grants*

👍 *Very detailed vehicle presentations*

Choosing the desired vehicle and booking meeting at the dealership
Website

Customize the package that vehicle comes with

👎 *Confusing to understand how to get the desired car from the manufacturer*

👎 *It takes time to understand how the created car customization could be used*

👎 *Cannot purchase vehicle online*

Book a meeting with sales consultant

👍 *Consultation can be scheduled in the website*

👍 *Dealership offers all-in package that takes care of all paperwork*

👎 *Meeting with the consultant is scheduled in the dealership*

Agenda

Safari phase — Getting <...>   Touchpoint — Website   Safari step [Accept rules, identification]   Love point 👍 *Service has <...>*   Pain point 👎 *Can be <...>*

Figure 15. Visualised service safari steps and positive/negative pain points discovered while exploring Volkswagen.dk webshop's vehicle purchasing journey.

Making the physical purchasing journey steps unavoidable. Other vehicle owning processes such as servicing, picking-up are also experienced by arriving physically at the required location. On the other hand, Volkswagen offers its users to create a digital Volkswagen ID, enabling its customers to provide and update their personal information, get relevant deals and have their car personalization options saved (Volkswagen, n.d.-d).

Besides providing a vehicle, Volkswagen offers additional services to ease the customer's vehicle ownership journey. By purchasing a car via Volkswagen's dealership, it ensures that taxes and other vehicle owning-related fees are taken care of by the dealership's staff. In addition, Volkswagen also offers several initiatives that are meant to increase the car owning experience: (1) roadside assistance; (2) seasonal promotions; (3) service and repair subscription; (4) extended warranty coverage (Volkswagen, 2020).

While exploring what Volkswagen has to offer to its customers, we have noted down several love points that were seen as beneficial throughout the purchasing journey: (1) Volkswagen had detailed vehicle and package presentations; (2) Consultation with dealership's representative was possible to be scheduled in the website; (3) Dealerships were offering their help to takes care of car purchasing-related paperwork, easing purchaser's journey; (4)Volkswagen offering a possibility to plan an online test drive.

Although it was noticed that throughout our exploration, a lot of pain points were encountered while browsing, understanding the purchasing and owning process or trying to understand what are the possibilities in the online environment: (1) Volkswagen's website had a lot of information scattered, making browsing experience confusing; (2) Volkswagen car purchases were not possible online; (3) Online car ordering journey was limited to only "building a car", booking a test drive or contacting dealership; (4) Most of the Volkswagen's onboarding, purchasing and owning experiences were connected to dealerships; (5) It was confusing to understand the process of how to get the desired car from the car's manufacturer; (6) The need of online car customisation mode was hard to understand while acknowledging the fact that ordering was done through the dealership; (8) Volkswagen car purchases are not possible online; (9) Consultant meeting was only possible in the dealership.

The most confusing part of the exploration was finding information about the purchasing process, campaigns and understanding what are the possibilities of the manufacturer's website. Even more, Volkswagen had many initiatives scattered across various regions, making some of the campaigns available in other countries, but not in Denmark and vice-versa (e.g. Volkswagen Go available in Denmark, but not in Australia).

Comparing Volkswagen with other explored businesses, it was seen that the car manufacturer is taking a different approach than others when it comes to selling online and empowering customers with more self-service options. This aspect of the customer journey could be addressed; however, without knowing that Volkswagen's chosen

approach is performing poorer than compared businesses, the empowerment of self-service and total customer journey digitalisation should be a consideration rather than a necessity.

Several questions have arisen throughout the exploration: (1) "Is Volkswagen trying to keep customers dependent on the physical environment because of efficiency, better performance or because of slow adaptation of digital services?"; (2) Should EV/PHEV purchasing journey be different from a traditional, car-dealership oriented ICEV one?

Conclusion

After exploring businesses that were offering different EV/PHEV owning options: (1) Dribe.dk—short or long term leasing; (2) GoMore.dk—long term leasing and co-sharing; (3) Tesla.dk—permanent owning or long-term leasing; (4) Volkswagen.dk—permanent owning and leasing; we noted down love and hate points from our first-hand experiences that a regular user might encounter as well. The discovered businesses had an online presence and platforms that were enabling potential customers to use or start their purchasing, onboarding or self-service journeys. Dribe.dk, Go-More.dk and Tesla.dk were seen as more innovative companies, while Volkswagen focused more on adding additional service offerings on their traditional car-dealership sales model. Explored companies had different user purchasing journeys making them unique from each other. Noticing how different purchasing, owning and servicing processes are, we have raised several questions that made us discover that a majority of businesses are based on concepts where partnerships with dealerships are necessary to ensure car sales to regular customers. This leads us to a verdict that in the Danish business context of EV/PHEV adoption, car dealerships are to be considered as gate-keepers that currently dictate the market's trends.

4.1.3. Collecting vehicle owners' opinions with an Online Survey

As we were in the middle of the research phase, our thesis partner—Startup Lighthouse—has drafted an online survey to be shared on a career-related social media platform LinkedIn (LinkedIn Corporation, n.d.). According to Startup Lighthouse, the initial purpose of the survey was to gather quantitative data related to EV/PHEV purchasing from international respondents that were vehicle owners. Even Though we did not initially plan to have an online survey, assisting our project's partner with reviewing and re-designing the survey seemed beneficial to increase our researcher and method triangulation. Data gathered by conducting the additional method has enabled us to have a more sophisticated cross-check on our findings. Besides, by reviewing the online survey draft, we became more aware of our research biases for upcoming question designing and our subjectivity on gathered data (Stickdorn et al., 2018).

Method

The drafted survey was designed to be exploratory. The questionnaire targeted international vehicle owners and focused on discovering their: (1) researching habits; (2) purchasing behaviour and (3) attitude on EVs or PHEVs. The survey was considered more qualitative rather than quantitative since most of the survey's questions were open-ended, making the survey have only a handful of close-ended questions that had predefined answers to help categorise respondents by their demographic and situational input (Toepoel, 2016). While considering questions, we focused on the existing ones and their formatting rather than remove or come up with any additional ones. For example, instead of "Would you rather continue to buy through physical car dealerships or would an online car dealership meet your needs (including scheduling test and purchase)?", we have suggested a simplified and attitude-related question: "Would you feel comfortable to only buy through the physical car dealership, or an online car dealership would also meet your needs?" For improving the questionnaire's layout, we have relied on Teopoel's (2016, p. 21) guides for layout design: "What questions to ask (only the relevant ones!), What form the questions should take (scale, categories, open-ended), … How to sequence the questions (interesting–personal).". By reflecting on the method of designing suggestions, the newly proposed survey was mapped so respondents would only go through questions relevant to them. The audience's segmentation was based on the survey's sections presented to the respondent based on his previously answered close-ended questions (Figure 16).

"About habits and behaviour" survey scheme

```
                                    ┌──────────┐                              ┌──────────┐
                                    │ Owning a │                              │Not owning│
                                    │   car    │                              │  a car   │
                                    └──────────┘                              └──────────┘

  ┌─────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐    ┌─────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
  │ Asking  │  │Asking car│  │Do research│ │Go directly│   │ Asking  │  │Asking car│  │Do research│ │Go directly│
  │ friends,│  │dealership│  │  online   │ │ to car    │   │ friends,│  │dealership│  │  online   │ │ to car    │
  │ family  │  │          │  │           │ │brand's web│   │ family  │  │          │  │           │ │brand's web│
  └─────────┘  └──────────┘  └──────────┘  └──────────┘    └─────────┘  └──────────┘  └──────────┘  └──────────┘

                        ┌──────────┐
                        │Car dealer│
                        │   ship   │
                        │experience│
                        └──────────┘        ┌──────────┐
                                            │ Online   │
                                            │ searching│
                                            └──────────┘
                                            ┌──────────┐
                                            │ Online   │
                                            │experience│
                                            └──────────┘
                                            ┌──────────┐
                                            │Let's imag │
                                            │you are buy│
                                            │ing a car  │
                                            └──────────┘
                                            ┌──────────┐
                                            │Dealerships│
                                            │vs.search  │
                                            │online     │
                                            └──────────┘
```

Legend

| Survey flow elements |

→ Survey element's connection with a following element

```
        ┌──────────┐              ┌──────────┐
        │Choosing a│              │Choosing an│
        │physical  │              │online car │
        │car dealer│              │dealership  │
        └──────────┘              └──────────┘

                   ┌──────────┐
                   │About Elec │
                   │tric & Hyb │
                   │rid cars   │
                   └──────────┘
                   ┌──────────┐
                   │ Almost   │
                   │  done!   │
                   └──────────┘
```

Use zoom-in function to see smaller elements

Figure 16. The scheme used to strategise and show how survey's respondents will be going through survey's sections depending on their given answers.

Findings

The survey had 27 online respondents [Appendix A]. While the demographic-related data showed that the majority of respondents were from Denmark, the other noticeably large group of participants were from the continents of North America and Australia. That made us acknowledge that the findings and insights are to be considered as not necessarily precise or true for the Danish automotive industry. One-half of the participants owned EV or PHEV (48.1% / 13 respondents) while the other was either

owning diesel or petrol engine cars (44.4% / 12 respondents). We found this ratio of car type ownership divide to be beneficial to us, ensuring that critical reflections are shared from both sides. 60% (15 respondents) indicated that they would start their online purchasing experience by searching online, another 20% (5 respondents) indicated that they would go directly to the brand's website and the remaining 16% (4 respondents) indicated that they would ask friends, family or co-workers or directly visit the car dealership (4% / 1 respondent). It was an interesting insight that, at first, instead of relying upon or asking others, the majority of respondents were prone to find information on the internet (Figure 17).
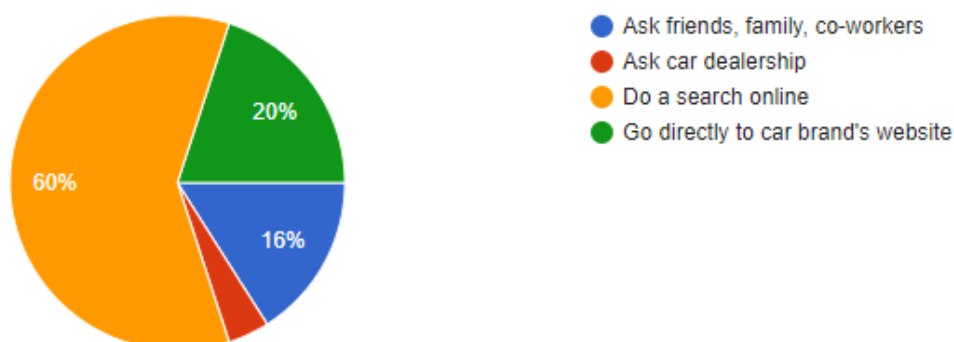
Figure 17. Pie chart showing participants' opinions on how they would start the vehicle purchasing journey.

Input from respondents that considered car dealerships and brand websites as their first vehicle acquiring step

The survey had several sets of questions that were chosen depending on the respondent's answers. This survey design approach has enabled us to only ask participants starting their research journey by visiting a dealership or an official manufacturer's website. By giving them specific additional questions, we received their input about their feelings of being well informed after the visit to a dealership or a manufacturer's website. Interestingly, only 2 (33.3%) participants of the survey felt informed enough in their purchasing journey, while the other 4 (66.6%) respondents had an impression that they needed to do further research after the visit. While evaluating the emotional state at the car dealership amongst the 6 respondents, negative emotion describing

keywords: "frustrated", "disappointed" and "pressured" were most popular among the respondents (8 selected keywords from 6 participants). The positive emotion describing words such as: "confident", "excited", "trusting" and "optimistic" were less popular (4 selected keywords from 6 participants). By answering an open-ended question, participants also shared their thoughts on their car dealership experiences. Two participants have pointed out that car salespeople sometimes might be lacking technical knowledge about the car. Further on, it was mentioned that sometimes pressuring and manipulation from car salespeople was present while trading off customer satisfaction and ethics. On the other hand, one person stated that his car dealership visiting experience was informative. It was noticed that the small segment of participants that considered purchasing vehicles from car dealerships or visiting brand's websites were more prone to associate car dealerships with negative emotions rather than positive ones (Figure 18).

What feedback do you have on car dealerships?

6 responses

-

I bought a Tesla. I don't think I will ever by from a dealership again

Salespeople need to more information about the vehicle - i.e. transmission type, winterized features, etc. Customer satisfaction should come before commission. Pressuring someone to buy a car on the spot when they aren't ready may lead to the wrong purchase. I would say its unethical to try to manipulate someone into taking on the max debt they are allowed.

Learn your product. Electric cars need you to learn before you try to sell them.

Informative

Was not a dealer but a display show room. No comm, just information

Figure 18. Screenshot showing participants' experience and opinions on purchasing vehicles from car dealerships.

Participants input on searching information about cars online

Looking at respondents' input on online research-related questions, it was noticed that a majority of participants felt optimistic (70.4% / 19 respondents) and comfortable (48.1% / 13 respondents) during the online search and were associating searching for cars online with positive rather than negative emotions. Emotional states

describing words: "confused", "frustrated" and "disappointed" were selected only 5 times from 27 participants of the survey (Figure 19).

How did (would) the online search make you feel? Choose all that apply.

27 responses

Feeling	Count (Percentage)
Comfortable	13 (48.1%)
Confident	8 (29.6%)
Excited	10 (37%)
Satisfied	6 (22.2%)
Trusting	1 (3.7%)
Optimistic	19 (70.4%)
Confused	2 (7.4%)
Frustrated	2 (7.4%)
Disappointed	1 (3.7%)
Pressured	0 (0%)
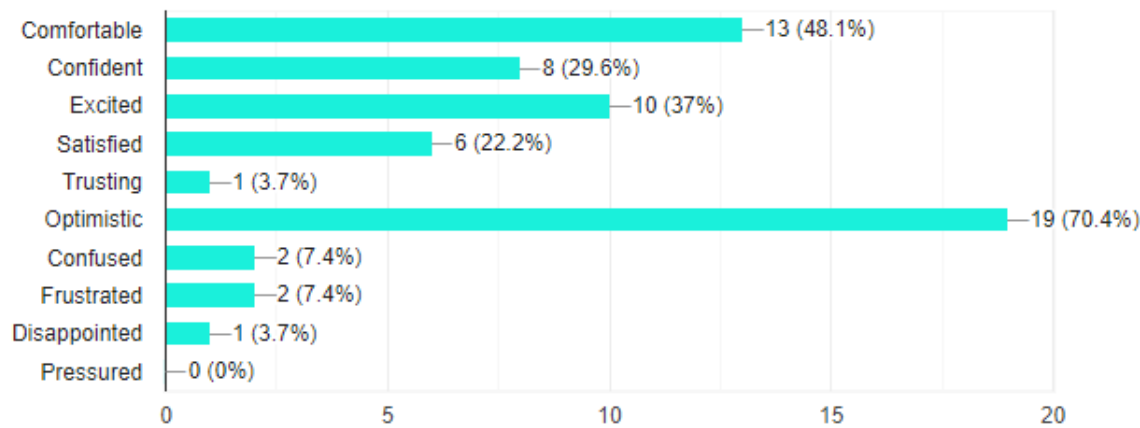
Figure 19. A screenshot of a bar graph taken from a survey showing participants' feelings towards an online search for cars.

 In comparison with the input from respondents that gave feedback on their dealership experiences, it seemed that some respondents preferred their car purchasing experience to be more online rather than physical, even when involving car dealerships. Participants indicated that searching for car-related information online had its benefits and cons. Several participants have pointed out that searching for information online was helping them to find a variety of independent reviews and opinions about the vehicles they were interested in while remaining critical of manufacturers' advertising campaigns. However, respondents were also pointing out that vehicle manufacturers were not providing enough information online, leaving participants with limited technical knowledge on manufacturers' announced or sold cars, especially when it came to EVs. When asked what websites participants were using, three main website categories were identified: (1) car manufacturers' webpages (e.g. Tesla.com, BMW.com); (2) websites/forums specialising in car expertise (e.g. Bilbasen, Reddit) and (3) social networks (e.g. Facebook, Youtube). Responders' input has also indicated that participants were rarely using websites from only one of the previously identified categories and were more prone to rely on an approach to browse websites from several previously mentioned website categories.

Asking respondents to imagine their upcoming car purchasing experience

While asking participants to imagine their upcoming car purchase, it was discovered that 70.4% (19 respondents) of them would choose EVs, while 18.5% (5 respondents) would consider buying a PHEV and only 11.1% (3 respondents) would be purchasing a gasoline engine-based vehicle. Participants also provided arguments for their choices, with most of the arguments being centred around the topic of electricity-powered vehicles. Several respondents mentioned that the environment in which they lived was not ready for electric cars. Some stated that ICEVs were running out of technological potential and indicated that EVs are seeming to be leading the future of vehicles, while others said that they were inclined to consider EVs due to reasons such as sustainability and cost-effectiveness in the long term. For most respondents, the best package deal (85.2% / 23 respondents) was more important than brand loyalty (14.8% / 4 respondents) while choosing a car. The obvious difference in attitudes proposed an impression that the majority of participants thought more about making a cost-effective choice rather than sticking to one car manufacturer's brand and not looking elsewhere. Participants have also shared thoughts about what would make them more comfortable while purchasing a vehicle. To our surprise, some respondents considered good dealership reviews and reputation to be a factor while making themselves more comfortable while purchasing a car. Others stated that reviews about their selected car would make them more comfortable purchasing it. Information about a car's performance and its costs in a real-world setting was also mentioned, implicating that official technological specifications about vehicles were not always correct or based on certain testing environments that might not be feasible in reality.

Participants' take on purchasing a car through a physical dealership versus purchasing a car online

63% (17 respondents) indicated that they would prefer purchasing a car in a physical dealership, while the remaining 37% (10 respondents) stated that they would rather purchase a car via an online car dealership. It was an interesting divide between respondents, keeping in mind that previously given input was more indicative of positive feelings and feedback associated with the online searching and purchasing experience. Respondents have given us their reasoning by answering an open-ended follow-up question. People that chose a physical dealership stated that they would not purchase a car before seeing or test driving it. It was also mentioned that having a conversation with a real human being can help to discover new information and that the traditional purchasing process is safer and can hold a car salesman accountable for any mishappenings. When asked what it would take for the person to decide to purchase a car online instead of purchasing it physically, respondents have indicated that the trust and reputation of the dealer would be an important factor. Previously mentioned, test

driving was also indicated as needed and offering better deals than physical dealerships was mentioned to motivate the choice. Participants that chose online car dealerships as a medium to purchase a vehicle have reasoned that an online purchasing approach could help them with avoiding the possible persuasive salesman whose technical knowledge sometimes might be limited in relation to EV/PHEVs. It was also mentioned that the online purchasing experience is simpler than the traditional car purchasing experience.

Asking respondents about their knowledge of EVs & PHEVs

A majority of participants, 66.7% (18 respondents), have indicated that they felt very well informed about electric and hybrid cars. In comparison, 14.8% (4 respondents) have stated that they are feeling well informed. 11.1% (3 respondents) stated that they feel somewhat informed and 7.4% (2 respondents) have stated that they do not feel informed about EVs & PHEVs at all (Figure 20).
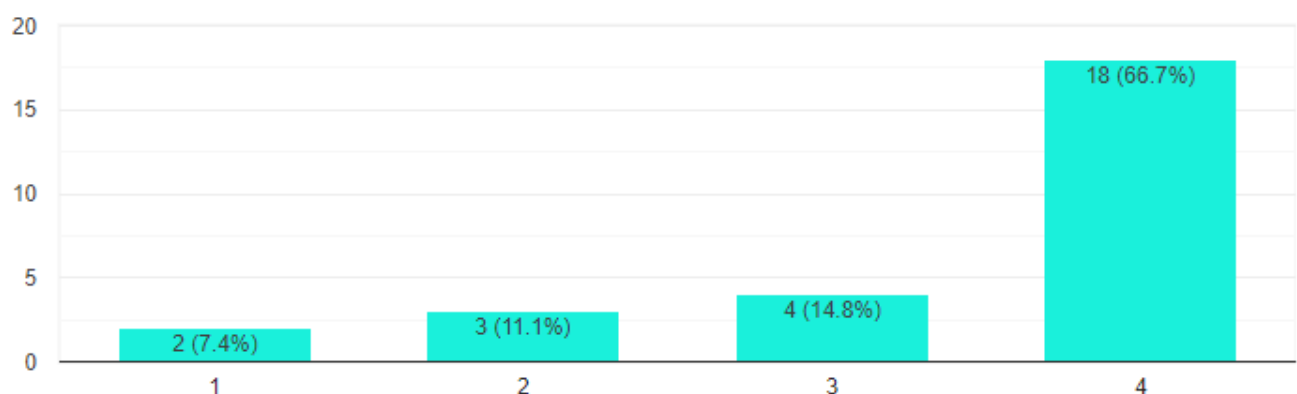
Figure 20. Bar graph showing respondents' opinion of how informed they feel to be when it comes to electric and hybrid vehicles.

This has led us to the impression that a majority of respondents were profound and confident about their knowledge of EV/PHEVs. Thus, their opinion about electric vehicles and hybrids seemed to be a great idea to understand the recipients' point of view on the topic. It appeared that a lot of respondents saw EVs as the present and near-future choice, while PHEVs were seen as a transitional choice that was already passing

its time and not proving to be as cost-efficient as EVs. However, it was pointed out that in some places, the infrastructure for EVs is lacking and that the EV technology in itself is still not fully utilized yet.

Conclusion

The conducted survey proved to be useful for our research. Incorporating our partnering company into research, we have enhanced our researcher triangulation and gained a lot of data. The received input helped us to form first impressions that came from a global community of car owners while the majority of them considered themselves to be at least well informed on the EV and PHEV-related topics. We have gathered insights suggesting that the majority of car owners enjoyed doing online research more than visiting dealerships for information but were sceptical about purchasing vehicles online even though they were not fully satisfied with the car purchasing experience in physical car dealerships either. Another discovery was that people searching for information on EV/PHEVs had to be highly critical of the given information. It was argued that some car salespeople had little knowledge about EV/PHEVs and that car manufacturers were not always providing correct EV/PHEV-related data that would describe the vehicles' technical performance in normal day-by-day usage. These insights made us take into account aspects of customer's: (1) attitude on trusting sellers; (2) behaviour on researching online, but purchasing physically and (3) habit to remain critical throughout the vehicle's purchasing journey.

4.1.4. Interviewing vehicle users and industry experts

To balance, validate and answer "why" questions from gathered quantitative research, we have relied on expert and other stakeholders' in-depth interviews (Stickdorn et al., 2018). It was decided to have several iterations of interview rounds with shifting interview focuses. The first round of interviews was based on exploratory research principles, while the second round of interviews was more confirmatory and narrow, targeting the existing EV/PHEV owners with specific, topic-related questions (Stickdorn et al., 2018)

Method

Expert interviews were conducted to gather facts and industry insider knowledge. While interviewing experts, probing and personal behaviour questions were not considered. The focus was on questions related to offered products or services, users' consuming patterns and essential processes for organizations to function. Meanwhile, in-depth interviews were used to test hypotheses and learn about the target group's attitude, needs, pain points while exploring and identifying problems. In-depth interview questions focused on data collection that could help define segments of the target audience and probing problem areas from the consumer's perspective (Kolb, 2008). Interviews were semi-structured, with a majority of open-ended questions, helping us to receive answers on which we could follow up. All participants were interviewed in a remote, casual-like, informal setting while using digital video calling platforms: Zoom (Zoom Video Communications, Inc., n.d.), Google Meets (Google, n.d.) and Microsoft Teams (Microsoft, n.d.).

First-round of interviews

The first round of interviews was focused on the following topics: PHEV/EV owning, stakeholder relations, perception, and opinions regarding daily use of PHEV/EVs. In-depth interviews were held with 3 car owners from Canada and Denmark [Appendix B]. The participants either owned an EV/PHEV or planned to purchase EV or PHEV in the upcoming future. Expert interviews were held with 2 business representatives [Appendix C] and a representative from a Danish municipality [Appendix D]. Business-related interviewees worked in companies that offered charging services: everything from phone applications to installing a charging station. The public sector's representative was an expert working in the sustainability and green mobility department at Odense's Municipality. The expert shared his thoughts on EV/PHEV adoption from the municipality's point of view and gave his insights on the same topic on what could be presented by the state's government in the upcoming months. All 3 interviewees owned vehicles (2 EV, 1 ICEV); therefore, their given feedback was considered to be credible and coming from personal experience. On the other hand, the business-related stakeholders were also considered biased, considering that the participants

were not only industry experts but also users of the product for which they were catering their services.

Findings

Throughout the analysis of interviews, we have noted more than 60 insights that were transcribed during interviews with upcoming or existing EV/PHEV owners, business-related stakeholders and a municipality's representative. By reviewing documented interviews, we have decided to synthesize transcribed observations to remove recurring insights and create category-related clusters (Figure 21).

Figure 21. A screenshot from Adobe XD board that shows the chosen approach that was used to create an overview of insights gathered from the first wave of conducted interviews.

The synthesised insights were related to the following categories: attitude, needs, problems, ideas and environment. We have decided to pick the 3 most important insights to highlight the research's validated assumptions and new learnings for every category.

The environment-related category was clustering insights that helped to have a better understanding of the existing EV/PHEV market and its factors in Denmark:

1. EV/PHEV-related services sometimes already use nudging to maintain or establish a healthier EV/PHEV using the environment by encouraging its users to create habits benefitting the EV/PHEV ecosystem;

2. Traditional car dealerships' role is crucial in the traditional car purchasing experience. However, it is being challenged by manufacturers and other stakeholders like online car dealerships and shopping sites such as DBA.dk. Thus, the role is slowly diminishing;

3. Globally and in Denmark, the PHEV/EV owning and charging consumer culture is not fully developed but evolving gradually as new services and EV/PHEV manufacturers are setting new standards.

For an Attitude-related cluster, we have assigned insights that were connected to statements and expressed opinions from the upcoming or existing EV/PHEV owners in Denmark:

1. Test driving is an important touchpoint of car purchasing experience;

2. Some ICE car owners consider a transition to PHEVs first and only later purchasing EV;

3. Some upcoming EV/PHEV owners think that it is important to always have a fully charged car. That is why they want a home charging option;

Cluster with insights assigned to Problem category has accumulated issues that had a possible negative impact on EV/PHEV adoption growth in Denmark:

1. Some upcoming EV/PHEV owners do not have technical knowledge in regards to EV/PHEVs, charging;

2. Potential or upcoming EV/PHEV users often have misconceptions, stereotypes and incorrect information in regards to purchasing, owning, maintaining, charging the EV/PHEV;

3. Not all dealerships are interested in selling EV/PHEVs or advocating for EV/PHEV related services due to loss of profit:

Another cluster titled Need was arraying a group of insights representing existing or upcoming EV/PHEV owners needs that are important while purchasing or owning a car in Denmark:

1. Often, human interaction (with car dealer) while purchasing a car is necessary;

2. Car type purchases are often connected with family needs;

3. It is crucial to have a charging point either at work or at work;

Idea-related insights originated from stakeholder suggestions and previously synthesised observations from all held interviews:

1. Car is not only seen as transport to get from A to B. It can also be associated with entertainment, status, hobbies or a statement;

2. ICE vs PHEV/EV: benefits and downsides should be listed down;

3. It could be that collaborations between dealerships, organisations and so on help to have the DK industry flourishing

With the insights prioritised from each group, we have created a list of insights that we would be putting more focus on during the research phase.

Sub-conclusion

The first round of Danish-based interviews helped us to form a better understanding of the Danish EV/PHEV market, while international interviewees helped us to compare their EV/PHEV-related experiences coming from Canada and Lithuania. The gathered user experience-related insights were synthesized and clustered into the following categories: environment, attitude, problems, needs and ideas. Each category had 3 most important insights highlighted as the main considerations for the ongoing research process.

Second-round of interviews

After conducting and reflecting on the first round of interviews, we have noticed that participants were not able to describe how their ideal or, at least, a preferred purchasing or owning EV/PHEV experience could be. Thus, we have adjusted questions and have decided to follow up on them if the interviewees, again, start drifting into answers that are hardly connected with the given questions. Besides, it was identified that a lot of participants had associated their EV-related experiences with car manufacturer Tesla. By taking that into account, we have decided to get a new set of interview participants and broaden our sample pool to ensure that we have participants that had EV/PHEV-related experiences with other car manufacturers besides Tesla. The interviewees were recruited by walking around one of Copenhagen's neighbourhoods and leaving printed leaflets, inviting identified EV/PHEV owners to participate in the research. Along with the invitation to participate, we have included a QR code in our leaflet, enabling potential participants to read the invitation and leave their emails in a convenient and easily accessible manner (Figure 22).

Therefore, the second round of interviews was more focused on EV/PHEV owners' and their: motivations, expectations and purchasing experiences that lead towards EV/PHEV ownership [Appendix E]. To better understand Danish EV/PHEV owners, the interviews were held only with Danish residents that owned one or several EV/PHEVs at the time of interviewing.

Findings

By following the previously mentioned insight processing approach used to analyse the acquired knowledge from the first round of interviews, we have gained more than 50 additional insights. The gathered input was either confirming the previously acquired knowledge or introducing new insights to our research. Per each category, we have, again, selected the 3 most important insights.

Participants from the second round of interviews have confirmed several, previously noted, insights from the first round of interviews:

1. Denmark's infrastructure and businesses are ready to welcome EV/PHEVs, making their owners not excluded from the rest of vehicle owners when it comes to parking, specialised services such as charging port at the hotel and so on;

2. Generally, EV/PHEVs are considered to be more environmentally-friendly. However, some people are thinking or last least heard the argument that ICEV production is less harmful and cheaper in comparison with PHEV/EVs;

3. A part of Danish society and its regulators do not go into detail or make a distinction between EVs and PHEVs, their differences, especially when it comes to using the public infrastructure.

Invitation to interview about hybrid and electrical cars

Hello👋,

We are master students from Aalborg University studying Service System Design.
We are kindly requesting your participation in our interview for our master thesis research.

Our thesis is titled: "Designing a service that attracts people towards more sustainable choices: A case to support the adoption of EV / Plug-In Hybrid Electric vehicles".

The intention of the thesis is to develop a service solution that attracts people to adopt hybrid and electrical cars.

We consider you as an important stakeholder in our research area. Your participation in this interview is of great importance in ensuring the development of a high-quality service solution.

The interview will take around 20 to 30 minutes, in a casual conversation over the phone or video call depending on your preference.

With your consent, we will set up a virtual meeting that fits your time and schedule. During the meeting, we will introduce you to our research and its goal.

*Skal udfyldes

Please enter your email on the below text box and we will contact you🙇 *

Dit svar

⚠ Dette spørgsmål skal besvares

For any inquiries - contact us via email

> jstask19@student.aau.dk
> vstan19@student.aau.dk

Thank you for taking the time to read our proposal and hope we will hear back from you.

Thrilled to meet you👋
Julius Staskunas & Victor Stan

AALBORG UNIVERSITY

Use zoom-in function to see smaller elements

Figure 22. Invitation form used to greet partakers that decided to use the QR code and express their willingness to participate in our session of second-wave of interviews.

To our environment-related cluster, we had identified additional insights that helped to have a better understanding of the context when it came to EV/PHEV ownership or purchasing in Denmark:

1. The second-hand market for EV/PHEVs is starting to grow. However, it is not that popular as the ICEVs' used car market;

2. Regulations and rules for EV/PHEVs are being changed often, making the upcoming and existing owners stressed;

3. It takes time for some EV/PHEVs to arrive in the Danish market, forcing the people to either wait or buy from car dealerships abroad while having car salesmen as a necessary middle man.

Attitude-related insights cluster shows that some people have high hopes and different motivations when it comes to purchasing and owning an EV/PHEV:

1. If someone has knowledge about cars, they will be more prone to skip the hybrid and go for full EV, especially now that their range has increased considerably for most of the EV manufacturers;

2. Not everyone cares for sustainability or puts it in the first place when it comes to motivations for purchasing EV/PHEV. Technological advancements, practicality and monetary gains are often seen as the primary arguments for purchasing EV/PHEVs;

3. People expect EVs to be the future of vehicles and see a lot of potential in future EV development.

The second round of interviews has highlighted several other, high-profile problems that need to be addressed while ensuring that EV/PHEV adoption is growing:

1. People who are purchasing EV/PHEVs due to monetary savings are sensitive to rule/regulation changes and other factors (i.e. charging price) that affect the cost of owning EV/PHEV;

2. Manufacturers and car dealerships often misstate EV/PHEV specifications, usage-related facts that often do not live up in reality;

3. The EV/PHEV public parking and charging experience is starting to worsen as more and more people are getting EV/PHEVs.

The needs-related cluster has uncovered additional needs of respondents that went through a car purchasing journey. It was discovered that:

1. It is important to have an ability to track purchased EV/PHEVs order and shipment journey;

2. Existing state's legislation and rules on EV/PHEVs needed to be communicated in a better, more concise manner;

3. For people who are purchasing high-value items (i.e. EV/PHEVs) or services (EV/PHEV shipping from abroad), the purchasing experience should be more reassuring, especially when it comes to saving money, transferring and trusting dealerships.

Interview participants gave additional propositions for the ideas-cluster by mentioning that:

1. In some situations, EV range restrictions can be presented as positive aspects, making the vehicle driving experience better in comparison to driving an ICEV;

2. For online car purchasing, the sellers should present several pre-configured car purchasing packages that would make the online purchasing journey simpler;

3. For first-time EV/PHEV drivers, the car testing experience should be more tailored and take more time to get used to the driving experience.

Following the first-round interview analysis process, all gathered second-round insights were placed in the same list of insights, helping to better overview the buyers' environment, attitude, needs, problems, and ideas [Appendix F].

Sub-conclusion

The second round of Danish-based interviews has introduced new insights into the existing insight categories. As the second wave of interviews was only held with Danish EV/PHEV owners, the gathered insights were more representative of Danes that own one or several EV/PHEV per household.

Conclusion

Held interviews were used to systematically explore, validate, and understand stakeholders' needs, relations, attitudes, and problems (Stickdorn et al., 2018). As we held two interview conducting rounds, we were able to have a phased process with international and Danish participants representing business, government and consumers' sides. In the first round, we interviewed stakeholders that we were able to reach, regardless of their living location. With more than 60 insights gathered, we have formed

an impression of the current market situation and processes related to EV/PHEV purchasing and owning. The second round of interviews was focusing on Danish residents that own at least one EV/PHEV. With more than 50 insights noted, the purpose of the interviews was to confirm some of the previously acquired insights and gather new ones about participants' experience and perception when it came to aspects of purchasing or owning EV/PHEV. Through the interviews, we had collected a lot of opinions about Denmark's charging infrastructure and regulations, its effectiveness and shortcomings when it came to supporting EV/PHEVs adoption. We had noted positive and negative aspects when it came to car dealerships, salespeople and online platforms. And we had identified some business' and consumers' needs and problems when it came to selling, purchasing or owning an EV/PHEV in Denmark.

4.1.5. Concluding Discover phase

Throughout the initial discovery phase, we have obtained in-depth knowledge about the automotive industry and the Danish automotive market.

Industry and market research was led by using Actor-Network mapping, Service Safari and Online Expert interview methods. Using the previously mentioned methods, we were able to compare, reflect and validate our gathered knowledge with industry experts and a representative from a government's institution. Furthermore, we gained first-hand knowledge about consumers' motivations, perspectives, needs and problems when it came to owning an EV or PHEV. By being aware of the context, we found input from online surveys and online user interviews to represent some of the consumers' voices when reflecting and sharing ideas on vehicle search, purchasing and ownership experiences. Our used approach also helped us recruit the participants for our upcoming methods requiring further input from the participants representing consumers'.

Due to the pandemic, the Discovery phase has relied on methods applicable to be used in digital, online environments. Nevertheless, the limited selection of methods and conducted research in an online environment did not have a noticeable negative impact while gaining an in-depth understanding of the topic or getting participants' input. With the newly discovered insights and explored industry, the next step was to synthesize the knowledge and use other methods to put the comprehension into further use.

4.2. Define phase

After conducting initial research in the Define phase, our findings had to be synthesised and reconsidered with the current problem statement in mind (Design Council, 2019a). In the design process, the Define phase was converging, used for sensemaking—creating an overview of the collected data. Chosen phase's methods visualised and clustered gathered data enabled us to navigate faster between our findings and insights throughout the design process (Stickdorn et al., 2018). The conducted research synthesis and re-evaluation helped us identify problem statement-related user issues and narrow down our focus area. By tightening our focus area and prioritising user's needs, we have reflected on and adjusted our problem statement, making it more thorough.

Define sub-chapter was divided into the following sections:
4.2.1. Considering target audience and creating Personas;
4.2.2. Mapping vehicle purchasing journeys;
4.2.3. Developing vehicle ownership-related User Scenarios;
4.2.4. Concluding Define phase;
4.2.5. Redefining problem statement.

4.2.1. Considering target audience and creating Personas

We have started the Define phase by developing Personas. This method was used to represent user types who are potential or existing EVs owners. That is why personas were seen as a method to highlight our target audience's needs, motivations and other personal traits. Several created archetypes helped us define our service's customers and establish a common perception of our target audience (Stickdorn et al., 2012).

Method

By acknowledging the fact that user personas are not always correctly used in design processes, we have begun our process by looking into the controversy around the method. According to Bowman (2021), personas were often misused, relying on attributes closer to marketing than design disciplines. Creating personas based on demographics rather than psychographics was presented as a wrong approach in persona creation for design purposes. The idea was followed by the argumentation that when developing a user's persona, usage of demographic data helps uncover what the user thinks, but not why the user thinks like that, which is an important aspect of understanding and empathising with the user (Bowman, 2021). Considering the previously mentioned considerations and relying on industry experts' persona definitions, we have decided our personas to be design-oriented and based on our collected research data. Our personas have been designed by taking into consideration the following attributes: (1) Needs; (2) Motivations; (3) Problems; (4) Scenarios, (5) Goals (Stickdorn et al., 2018). To make personas more engaging and related to our case study, we have also introduced additional persona profile attributes such as: (1) Persona's visual representation; (2) Lifestyle; (3) Vehicle purchasing experience and (5) Keywords represent persona. To represent the main segments of our target audience, we have decided to create 4 personas. Half of the created personas were meant to represent the target audience's extremes, while the remaining personas were designed to represent the perceived average users. Introducing variety and several somewhat radical persona attitudes, we aimed to discover service use scenarios that were more complicated (Stickdorn et al., 2018).

Synthesis

By looking at the research question, desk research findings and input from fieldwork respondents, we have begun to consider traits of people that our research question could impact. We have started narrowing down our scope by taking into consideration that service's users, most likely, would have a driver's license and would be driving a vehicle in Denmark, at least from time to time. It was also seen that a majority of people were keen on saving money and were more prone to look for a better vehicle purchasing offer rather than being loyal to one car manufacturer's brand. Taking into consideration the money-saving aspect, the vehicle customisation process was also seen

as too complicated and a possible limitation of future service. This point of view has led us to a decision that people who were very keen to have a vehicle heavily customised during the purchasing process were not in our target audience. Since the project was focused around PHEV/EV adoption, it was decided to create a solution for people that are somewhat neutral or positive towards PHEV/EV ownership, leaving those who are against PHEV/EV owning behind our project's scope.

The first persona was created to represent a segment of people who were not particularly interested in owning a PHEV or EV vehicle due to monetary and technical reasons (Figure 23).

Madeline Jensen

Status: Married

Kids: 2

Living location: Naerum (suburban area)

Transportation: ICEV (SUV)

Goal: Avoid changing preferred driving habits

Needs
1. Car with long range;
2. Spacious car for family needs;
3. Ability to customize vehicle before receiving it;
4. Avoid range anxiety at all costs.

Motivation
1. Get a good package deal, rather than be brand loyal;
2. Reduce costs for fuelling.

Problems/concerns
1. Legislations for ICEV becoming hasher;
2. ICEV costs related to revisions/reparations are high;
3. Visiting repair shops frequently.

Challanges
1. Information accessibility in regards to EV;
2. Avoiding misinformation about EV.

Keywords
#FamilyOriented #NotTechSavvy
#SearchingFamiliarity #OldFashioned

Purchasing experience
Purchasing a PHEV with the offer she got from her work place, sponsored by the dealership.

Figure 23. Madeline Jensen's persona represents vehicle owners that might not be considering purchasing hybrid or electric vehicles.

The second persona was representing a group of people who wanted to benefit from being first movers while not necessarily being well-aware about EV ownership in general (Figure 24).

Philip Anker

Status: Married

Kids: 3

Living location: Husum (city area)

Transportation: ICEV, EV

Goal: To be a first mover and benefit from it

Needs
1. Has to be perfect larger family;
2. Test drive several cars;
3. Consult with car a related-specialist;
4. Have a charging station at home;
5. Access to public charging;
6. Reassurance on purchase.

Problems/concerns
1. Lack of knowledge on EV charging'
2. Installing home charging takes time;
3. Has no charging option at work;
4. Mistrust high-value online purchases.

Keywords
#Role model   #First timer
#ChangeEnthusiast   #Trend rider

Motivation
1. Be more sustainable;
2. Save money on the long term;
3. Create less noise pollution;
4. Be an example for others.

Challanges
1. Address and change driving habits;
2. Collect trustworthy and critical reflections about capabilities of EV.

Purchasing experience
Experience in buying ICEV and EV in dealership. For EV, waited 11 months to receive the car (due to extra battery option).

Figure 24. Philip Anker's persona was developed to present consumers who are motivated to be first movers because of the "early-bird" benefits.

The third created persona was portraying EV enthusiasts thinking about using greener mobility and better vehicle owning experiences (Figure 25).

Adira Rashidi

Status: Married

Kids: 1

Living location: Lyngby (suburbs)

Transportation: Bike, 2x EVs

Goal: Have green and reliable transportaion

Needs
1. Charging station at home;
2. Ability to charge with green energy;
3. Have good delivery experiences;
4. Trustworthy, EV-related information.

Problems/concerns
1. Avoid charging-related issues, especially during long distance trips.

Keywords
#ExperiencedEVOwner #CarEnthusiast #EnvironmentallyAware

Motivation
1. Be environmentally friendly;
2. Reduce pollution in daily and long driving;
3. Drive pleasantly and silently.

Challanges
1. Depreciation of EV price in short period;
2. Being concerned about range anxiety while driving an older, second hand EV.

Purchasing experience
Has previous experience in buying first a second hand EV from a dealership, new Tesla online purchasing experience for second car.

Figure 25. Adira Rashidi's persona represents Danes considering purchasing electric vehicles due to environmental and sustainability-related reasons.

The last, fourth persona was created to showcase a more progressive segment of people that are not necessarily considering owning an EV but enjoy driving it while using shared commuting or other services (Figure 26).

Mark Prin Suparat

Status: Singe

Kids: 0

Living location: Vesterport (city centre)

Transportation: Public transport, car-sharing

Goal: Commute as sustainable as possible

Needs

1. Easily accessible transportation/car;
2. Be flexible depending on car needs;
3. Leave as a low as possible carbon footprint on the environment;

Motivation

1. Own a car not just for having a way to go from A to B but also as an entertainment;
2. Take advantage of charging station installed near home, use green electricity.

Problems/concerns

1. Long waiting time for a car to be delivered;
2. Inability to own a private charging station;
3. Dealership salesman interaction does not look appealing;
4. Increasing rate of EVs comparing to available charging/parking spots.

Challanges

1. Purchasing an EV is more costly compared to ICEV;
2. Lack of parking availability near home.

Purchasing experience

No purchasing experience. Has a perception that car salesman are pushy. Thinks that cars can be purchased solely online

Keywords

#TechSavvy   #EfficiencyOriented
#SelfAware   #SustainablilyFocused

Figure 26. Mark Prin Suparat's persona exemplifies consumers who are not necessarily concerned about owning an electric vehicle but using car-sharing services and driving electric vehicles.

The listed personas meant to represent identified and selected target audience's segments. However, the created personas were not considered to be the final target audience's representation. This decision was made while taking into consideration that during the Develop phase, created service's concept might be targeting a slightly different or more defined target audience, forcing the created personas to be readjusted.

Conclusion

Having a defined and identified target audience has helped us in our persona creation process. Created criteria for the target audience and gathered input from fieldwork participants has led us to the persona development process. As a result, 4 personas were designed to represent the selected target audience's segments. With each persona having its own needs, problems, motivation and other traits represented, it was easier to understand and emphasize with potential users of the upcoming service. Personas' traits were taken into consideration while designing journey mapping, user scenarios and the service concept.

4.2.2. Mapping vehicle purchasing journeys

With personas defined, we continued the Define phase by mapping out vehicle purchasing paths that research participants have elaborated on during the initial research. The mapped journeys were meant to represent current-state vehicle purchasing steps (Stickdorn et al., 2018). Mapping was also important for having a high-level, visual representation of the customers' journeys. It helped to showcase factors that were influencing customers' vehicle purchasing experiences. Also, the visualisation was a great medium for assigning problems and good examples for each step, helping us be more thoughtful about how each step could be improved, changed or broken down into smaller steps if necessary (Stickdorn et al., 2012). Journey maps have contributed to the scenario development, showing what steps could be taken by personas and how each of them could be perceived throughout the journey.

Method

Customers' vehicle purchasing journeys were based on the research gathered during the discovery phase. The gathered data from the service safaris and interviews was a basis for the journey mapping. To similarly visualise several customer purchasing journeys, a systematic mapping practice was used in chronological order. Each journey's mapping began by selecting the persona, its journey's goal and setting the scope of the journey. With parameters set, steps taken by persona during the vehicle purchasing experience were identified and listed. The listed steps were chronologically showcasing the journey and its continuity. Each step was assigned with touchpoint(s), identifying the mediums that a persona was interacting with while completing the step(s). With a customer journey mapped out, discovered pain and happy points were assigned to individual steps of the journey (Stickdorn et al., 2012). In the end, the mapped journey was divided into stages, making the journey to be more structured and easier to interpret (Stickdorn et al., 2018).

Synthesis

Reflecting on our gathered desk and field data, it was noticed that there are a lot of possible journey variations that can be taken while purchasing or obtaining (leasing, paying a subscription fee) a vehicle. There are several reasons why vehicle purchasing journeys have a lot of variations: (1) There are a lot of vehicle manufacturing companies and some of them have their own, slightly unique customer journeys; (2) Vehicle purchasing/obtaining can be done through various channels: purchasing directly from a manufacturer, purchasing from a car dealership, purchasing from a private person, purchasing from a third-party service; (3) Status of purchased vehicle: purchasing new and used vehicle has several different steps when it comes to researching and purchasing flows.

Being aware that vehicle purchasing/obtaining flows can be different, depending on the previously listed factors, it was decided to create 2 vehicle purchasing journeys. Our approach has aimed to showcase existing purchasing journeys by looking at gathered research on vehicle manufacturers, dealerships and using participant input to identify necessary purchasing journey steps and positive/pain points from their point of view.

Current-state user journey: physical vehicle purchasing from a car dealership

The first customer purchasing journey was mapped with the previously created Madeline Jensen persona. The persona represented vehicle buyers who wanted to purchase a new car while not knowing a lot about vehicles. Therefore, while purchasing a vehicle, Madeline wanted to avoid investing a lot of effort and time into the process. To put gathered research to maximum use, it was decided to map Madeline's purchasing journey around the purchase of a plug-in hybrid electric vehicle. Having a PHEV instead of an ICEV purchasing journey has enabled us to list down more positive and pain points that were found during the Discover phase (Figure 27).
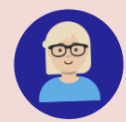
Current-state customer journey: physical vehicle purchasing from a car dealership

Context: Madeline's needs a new vehicle. Even though she does not know much about cars, she is not afraid to put some effort to get one, a PHEV;

Goal: Purchase a new vehicle that fits Madeline's needs without putting to much effort to it;

Documentation perspective: High-level, basic customer journey that looks into research, purchasing and owning stages that are connected with seller:

Customer journey

Stages
Researching

Touchpoints	Internet websites, magazines	Internet websites	Friends, relatives, social media	Internet websites, magazines	Internet websites	Email, phone
Customers actions	Read blogs and other media platforms related to cars	Browse for cars on manufacturer's/ dealership websites;	Asking other people for advice related to cars;	Reading car reviews	Comparing cars, prices, offers and choosing	Scheduling visit to dealership

Positive/pain points

- 👍 Some ICEV owners would transition to PHEVs first before purchasing EV.
- 👎 Manufacturers are not always providing the customers with enough technical information about the vehicle and its real statistics for real environment usage
- 👎 Some people are prone to avoid speaking with others before doing research by themselves
- 👎 People often have misconceptions, stereotypes or incorrect information in regards to purchasing, owning, maintaining, charging the EV/PHEV
- 👍 Searching online helps to get critical and independent opinions/reviews on the vehicles
- 👎 Car selection pool is often limited by criteria that need to match family needs
- 👎 Benefits of owning a PHEV/EV are not clearly listed when comparing it to ICEV.
- 👎 Current EV/PHEV prices are perceived to be high, preventing some from buying/ switching to EV/PHEVs
- 👍 Dealerships often reach out to companies, promoting exclusive offers on selected vehicles

Agenda

Safari phase	Researching	Touchpoint(s)	Website	Usual or optional user actions	User action	Optional user action

Positive point 👍 Service has <...>   Negative point 👎 Can be <...>

Deciding on purchase

Dealership	Salesman	Vehicle, salesman	Vehicle, salesman	Vehicle, salesman, add-on catalogue	Phone, bank representative	Salesman, paperwork	Salesman, insurance company, paperwork
Visiting dealership	Speaking with salesman	Inspecting selected vehicle model	Taking vehicle(s) for a test drive	Customising vehicle, selecting add-ons	Informing bank about the purchase	Signing purchase papers	Getting insurance

- 👎 Some people are prone to associate car dealerships with negative emotions rather than positive ones.
- 👎 Generally, dealerships are not interested in selling EVs since they bring less profit in the long-term
- 👍 Car salesman often seen as middleman
- 👍 Car salesman can be seen as people that are accountable for any mishappenings
- 👎 Some people are prone to perceive salesman as pushy and only sales-oriented
- 👍 A good car salesperson is presenting vehicle's usage cases in real-life scenarios. being critical and not pushy or sale-oriented
- 👎 Some car salesmen have little knowledge about specific car types (e.g., PHEV/EVs)
- 👎 Some people are a bit sceptical and inclined to have several car tests with EV/PHEVs to get a better "feeling"
- 👎 Test drives are often not showcasing a full driving experience, i.e. not giving a chance to test vehicle in several environments: highways, cities, warm and cold weather.
- 👎 Vehicle add-ons and package variety are often confusing people
- 👍 A long-lasting warranty is an important aspect of the car purchase
- 👎 ICEV ownership is becoming more expensive due to introduced taxation on emissions

Purchasing

Use zoom-in function to see smaller elements

Owning

Salesman	Dealership, email, phone	Dealership, salesman, vehicle	Salesman	Dealership
Receiving charging solution recommendation	Waiting for delivery, tracking it	Picking-up vehicle	Giving feedback to salesperson after time	Visiting service point

- 👎 Dealerships are not always recommending or mentioning the possible charging network providers
- 👎 Often, receiving a vehicle takes more than 5-10 months of waiting time
- 👎 Sometimes waiting time gets extended due to internal manufacturer or dealership problems.
- 👍 Often car dealership representatives are the ones who inform users about the car, its maintenance and so on.
- 👍 Some car salesman follow-up to their customers and ask about their experience with purchased car
- 👍 Servicing services often offer replacement vehicles

Figure 27. Madeline Jensen persona's current-state customer journey represents a basic purchasing of a vehicle from a car dealership flow.

The current-state physical vehicle purchasing journey from a car dealership had 4 journey stages: (1) Researching (pre-purchase), (2) Deciding on purchase (pre-purchase), (3) Purchasing (purchase) and (4) Owning (after-purchase). It was counted that our persona that was purchasing a vehicle in a physical car dealership had to interact with approximately 14 touchpoints. The identified touchpoints were in both digital and physical environments. They seemed to supplement each other when it came to obtaining knowledge and communicating with actors related to the vehicle purchasing journey.

The mapped out customer journey had 12 mandatory user actions. Research participants had noted that: (1) comparing vehicles, (2) test driving them and (3) interacting with salespeople were very important steps, often influencing customer's decision when it came to purchasing the vehicle or not. Besides the mandatory user actions, 7 optional user actions were identified. These actions were identified as not always existing in the usual car purchasing journeys. However, the existence or absence of these user steps in the purchasing journey had either a positive or a negative impact on the overall user experience. It was identified that: (1) reading reviews of other people's experiences, (2) deciding to customise the vehicle or not and(3) sellers' follow-up after the purchase was helping people to be more comfortable and reassured about the purchasing choice they have made.

As research respondents have shared their experiences from similar purchasing journeys, a total of 27 positive and pain points were identified throughout the physical vehicle purchasing journey from a car dealership. The previously mentioned purchasing journey had 10 positive points, uncovering that: (1) Car salesmen were seen as gatekeepers that were responsible for user's purchasing experience; (2) Before visiting dealerships, users were doing at least a minimal amount of research online; (3) Dealerships were having agreements with other companies, encouraging company workers to purchase vehicles with special offers. On the other hand, 17 identified pain points have shown that: (1) Traditional vehicle dealerships are not that motivated to sell EVs due to lower long-term profit in comparison to ICEVs,
(2) Salesmen were often perceived as pushy and sales oriented rather than focusing on customer needs and (3) there was a lot of misinformation and rumours about EV/PHEVs that not even salespeople were able to clarify, making customers confused.
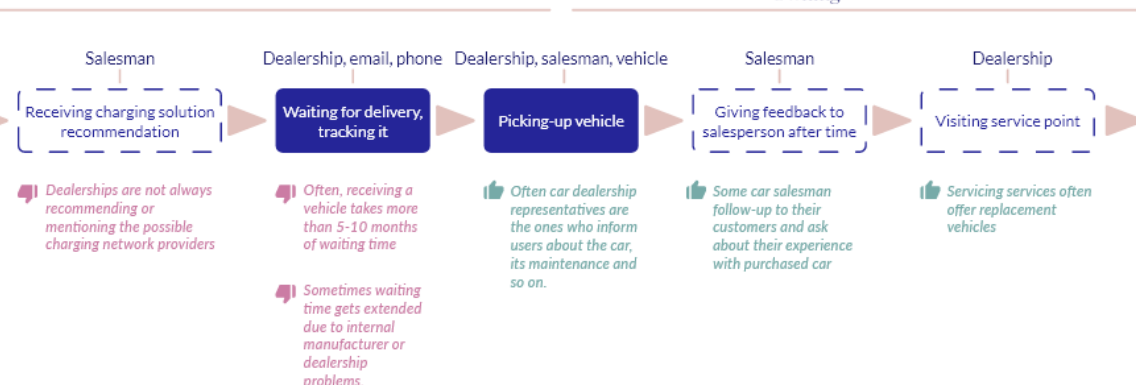
After mapping out the current state of physical vehicle purchasing from a car dealership journey, it became easier to overlook the generalised process of the traditional vehicle-purchasing experience. Even more, the assigned positive and pain points to each user step have helped to create an overview of what problems and joys the customers are facing throughout each specific user step.

Current-state user journey: electric vehicle purchasing from a manufacturer's webshop

The second customer purchasing journey was mapped with Adira Rashidi in mind. The persona represented progressive vehicle owners looking to buy a new EV and prone to try new purchasing journeys were addressing the problems of traditional vehicle purchasing experiences. Before purchasing an EV, Adira has spent some time researching the EV models and knew about barriers that EVs face nowadays. Therefore, the mapped journey was presenting the process of purchasing an EV via an online manufacturer's webshop and looking more into positive and pain points that were related to EV purchasing and ownership experiences (Figure 28).
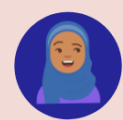
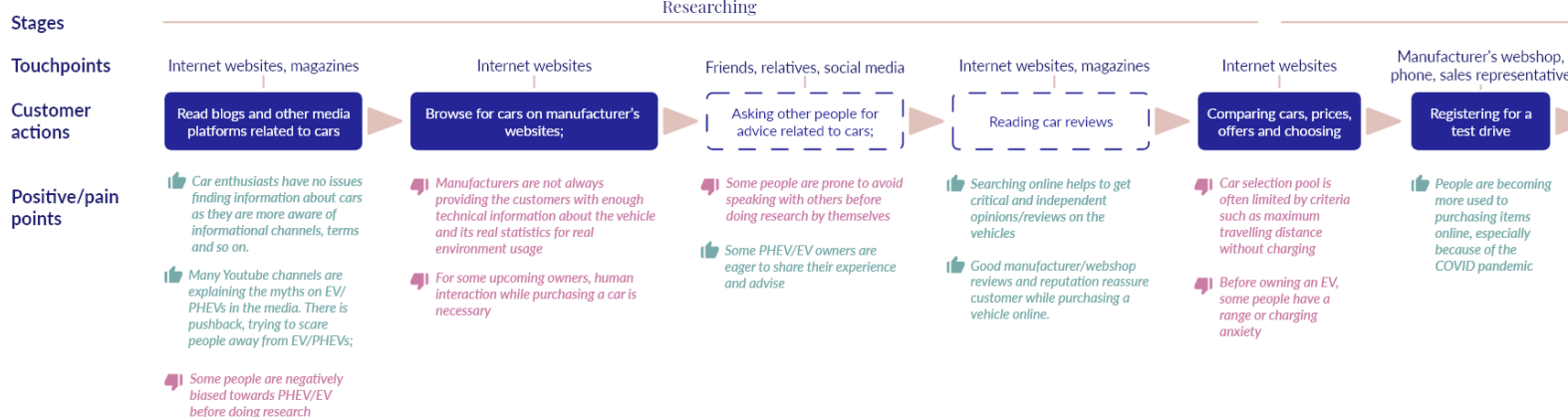# Current-state customer journey: electric vehicle purchasing, from manufacturer's website

Context: Adira has decided to purchase an EV through webshop. As Adira is somewhat experienced with vehicle purchasing, she is not really familiar with EV purchasing online;

Goal: Purchase new EV that fits Adira's expectations - good purchasing and delivery experience while prioritising her EV need - long-distance driving with less charging stops;

Documentation perspective: High-level, basic customer journey that looks into research, purchasing and owning stages that are connected with seller:
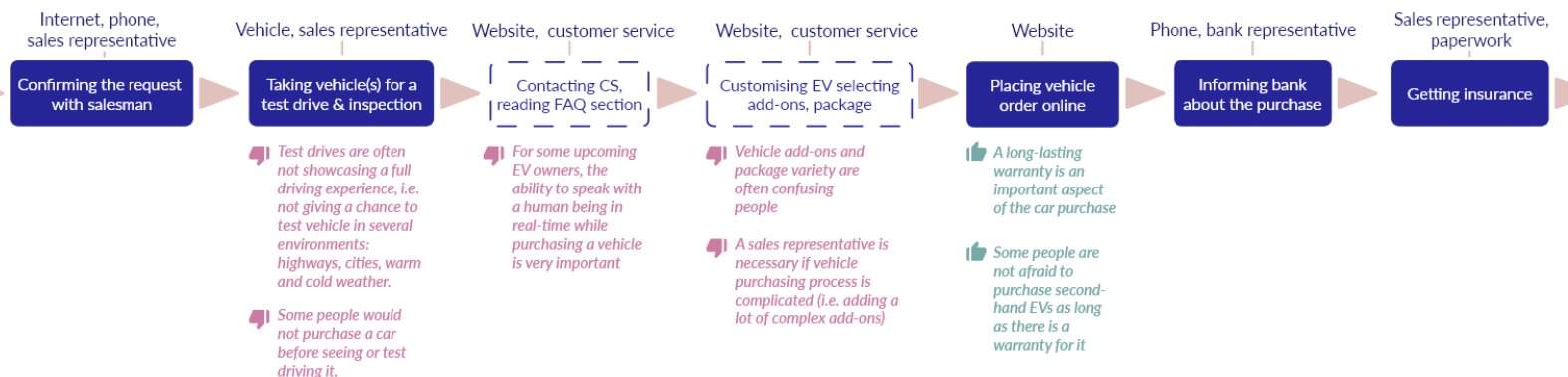
Customer journey

Stages — Researching

Touchpoints	Internet websites, magazines	Internet websites	Friends, relatives, social media	Internet websites, magazines	Internet websites	Manufacturer's webshop, phone, sales representative
Customer actions	Read blogs and other media platforms related to cars	Browse for cars on manufacturer's websites;	Asking other people for advice related to cars;	Reading car reviews	Comparing cars, prices, offers and choosing	Registering for a test drive

Positive/pain points

- 👍 Car enthusiasts have no issues finding information about cars as they are more aware of informational channels, terms and so on.
- 👍 Many Youtube channels are explaining the myths on EV/PHEVs in the media. There is pushback, trying to scare people away from EV/PHEVs;
- 👎 Some people are negatively biased towards PHEV/EV before doing research

- 👎 Manufacturers are not always providing the customers with enough technical information about the vehicle and its real statistics for real environment usage
- 👎 For some upcoming owners, human interaction while purchasing a car is necessary

- 👎 Some people are prone to avoid speaking with others before doing research by themselves
- 👍 Some PHEV/EV owners are eager to share their experience and advise

- 👍 Searching online helps to get critical and independent opinions/reviews on the vehicles
- 👍 Good manufacturer/webshop reviews and reputation reassure customer while purchasing a vehicle online.

- 👎 Car selection pool is often limited by criteria such as maximum travelling distance without charging
- 👎 Before owning an EV, some people have a range or charging anxiety

- 👍 People are becoming more used to purchasing items online, especially because of the COVID pandemic

Agenda

| Safari phase | Researching | Touchpoint(s) | Website | Usual or optional user actions | User action | Optional user action | Positive point | 👍 Service has <...> | Negative point | 👎 Can be <...> |

Deciding on purchase

Internet, phone, sales representative	Vehicle, sales representative	Website, customer service	Website, customer service
Confirming the request with salesman	Taking vehicle(s) for a test drive & inspection	Contacting CS, reading FAQ section	Customising EV selecting add-ons, package

- 👎 Test drives are often not showcasing a full driving experience, i.e. not giving a chance to test vehicle in several environments: highways, cities, warm and cold weather.
- 👎 Some people would not purchase a car before seeing or test driving it.

- 👎 For some upcoming EV owners, the ability to speak with a human being in real-time while purchasing a vehicle is very important

- 👎 Vehicle add-ons and package variety are often confusing people
- 👎 A sales representative is necessary if vehicle purchasing process is complicated (i.e. adding a lot of complex add-ons)

Purchasing

Website	Phone, bank representative	Sales representative, paperwork
Placing vehicle order online	Informing bank about the purchase	Getting insurance

- 👍 A long-lasting warranty is an important aspect of the car purchase
- 👍 Some people are not afraid to purchase second-hand EVs as long as there is a warranty for it

Use zoom-in function to see smaller elements

Owning

Website, sales representative	Website, email, phone	Sales representative, vehicle	Website, sales reprentative	Manufacturer's servicing partner
Receiving charging solution recommendation	Tracking manufacturing and delivery process	Receiving vehicle	Leaving/sharing feedback	Visiting service point

- 👎 Dealerships are not always recommending or mentioning the possible charging network providers

- 👎 Often, receiving a vehicle takes more than 5-10 months of waiting time

- 👍 Often sale representatives are the ones who inform users about car, maintenance and so on.

- 👍 Some car salesman follow-up to their customers and ask about their experience with purchased car

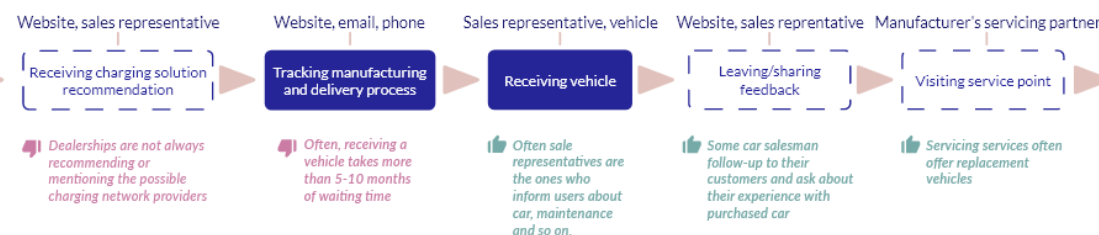- 👍 Servicing services often offer replacement vehicles

Figure 28. Adira Rashidi's persona's current-state customer journey represents a basic purchasing of a vehicle from a manufacturer's webshop.

The current-state electric vehicle purchasing from the manufacturer's webshop journey had the same 4 journey states that were identified in the previous physical vehicle purchasing journey. The previously mentioned journey stages: (1) Researching (pre-purchase), (2) Deciding on purchase (pre-purchase), (3) Purchasing (purchase) and (4) Owning (after-purchase) had differences when it came to user action categorisation.

Throughout the electric vehicle purchase from the manufacturer's webshop journey, it was counted that Adira's persona would be interacting with approximately 13 touch-points. With the majority of touchpoints being digital, the remaining physical touch-points were necessary for the purchasing journey to be completed.

There were 11 mandatory user actions for the electric vehicle purchase from the man-ufacturer's webshop journey. Besides previously mentioned important user actions like vehicle comparison and test driving, research respondents have pointed out addi-tional steps. These user actions were either different or seen as more important while purchasing an EV online: (1) placing an EV order online via the webshop and (2) track-ing vehicle's manufacturing and delivery progress. The mapped out journey also had 7 optional user actions that were mostly identified as steps that would be helping the customer through the online purchasing experience. Besides the optional user actions mentioned in the physical vehicle purchasing journey, we have found that: (1) contact-ing webshop's customer support or reading FAQ sections and (2) receiving a recom-mendation for EV's charging solution were helping upcoming vehicle owners to be more informed and prepared for EV ownership.

Gathered input from research respondents turned into 24 positive and pain points. 11 of them were positive, showing that: (1) EV owners were eager to share their owner-ship experiences, (2) upcoming EV owners were becoming more accustomed to using the internet when it came to vehicle purchasing (especially due to the COVID19 pan-demic) and (3) sales representatives were also seen as a go-to person when support regarding EV was needed. The remaining 13 pain points had shown that: (1) there was a lack of reliable information when it came to EV vehicle performance indicators, (2) online vehicle purchasing process was not ideal and lacking steps that were similar to the often experienced ones in physical purchasing and (3) unfamiliarity with EV tech-nology and long vehicle delivery times were making customers doubt their choices.

By mapping online and physical current state vehicle purchasing experiences, it was possible to compare discovered user actions and positive or pain points. The ability to compare the journeys helped to understand better which are their shared aspects and what other details are more important for one, but not the other customer journeys.

Conclusion

Mapping vehicle purchasing journeys from the customer's side have created visual overviews of 2 purchasing journeys that were based on research data and created personas. The physical vehicle purchasing from a car dealership journey has mapped out the more traditional purchasing experience. The mapped out journey was also correlating with the selected persona—Madeline Jensen. Madeline's needs, motivation and goals were taken into consideration while identifying and deciding on mandatory and optional user actions and selecting what positive or pain points have to be listed. Another—electric vehicle purchasing from a manufacturer's webshop—the journey was focusing on representing leading EV manufacturers and their offered online vehicle purchasing experiences. For this journey, progressive vehicle buyers were represented by the Adira Rashidi persona, which had its goals, needs and motivations reflected in the purchasing journey. With mapped existing customer journeys, it became easier to assign and find research insights while having a visual overview of the context in which the insight is placed.

4.2.3. Developing vehicle ownership-related User Scenarios

Previously described persona and journey mapping methods helped to embody research data into tangible and visual outcomes. To add additional depth to research analysis and strengthen bonds between defined personas and their purchasing experiences, current-state user scenarios were introduced. The scenarios method helped to connect and adjust participants' experience purchasing stories with previously defined personas and vehicle purchasing journeys (Livework, 2017). The method was also used to briefly describe how purchasing experience was perceived and carried out from the customer's side within the environment where the customer was purchasing the vehicle (The Interaction Design Foundation, 2020). Brief and broad descriptions of each persona's journey were important since only 2 out of 4 personas had their purchasing journeys visually mapped out. Therefore, creating hypothetical stories with sufficient detail was seen as a good method to use when it came to exploring, connecting research findings and describing how people are purchasing vehicles in Denmark (Stickdorn et al., 2018)

Method

Scenarios represented brief user vehicle purchasing stories in writing and were implemented to the previously designed persona profiles (Stickdorn et al., 2012). Scenarios have highlighted each persona's motivations and factors that influenced the completion of vehicle purchasing task (Scenario Mapping for Design Exploration, 2019). The scenarios' structure was based on reflecting the following traits: (1) motivation, (2) intent, (3) action and (4) resolution (ibid.).

Synthesis

Relying on research participants' shared experiences, desk research and personas profiles, 4 EV purchasing scenarios were written. The scenarios were presented as stories that were written in a way to share as much gathered knowledge about the vehicle purchasing experiences as possible.

Madeline Jensen persona's vehicle purchasing experience

Madeline has noticed that for the past 2 years, she spent a lot of time servicing her vehicle. Her 8 years old car kept breaking down and Madeline became aware that vehicle pollution tax has kept going up. After discussing with her husband, she decided that she needed a new family car that could accommodate the family's needs and save some time and money in the long term. After looking at the most popular vehicles of the year and visiting manufacturers' websites, Madeline decided that she was not yet ready for an electric vehicle. Her family's friends were trying to convince her otherwise, but Madeline was unwilling to change her preferred driving habits and wanted to avoid the range anxiety. Not to mention that she enjoyed her gas station visiting

routine where she refuelled, washed the car and used to get a free coffee.

As Madeline was working for a large scale corporation, she was often receiving vehicle offers from car dealerships that had a collaboration with Madeline's workplace. Madeline took the opportunity and visited the car dealership that was offering discounts on several PHEV and ICEV types. Since Madeline was not heavily interested in vehicles and had put only a little of her effort into researching cars, she was heavily dependent on the salesman's expertise. By telling the salesman that the vehicle had to accommodate family activities, be reliable and have a reasonable price to offer ratio, Madeline got offered a brand new PHEV. After inspecting the car, taking the test drive and having a quick talk with her husband, Madeline has decided that buying PHEV might help to save money in the long term, plus PHEV owning experience seemed to be very similar to ICEV owning experience which made Madeline comfortable with her decision.

After contacting her bank, signing her purchasing papers and getting insurance, all that Madeline had to do was to wait and get the vehicle ready for a pick-up. Since Madeline took a pre-configured car package, her waiting time was relatively low—4 months. After 2 months, Madeline got contacted and informed that she will be receiving the car in the next 5 months and not 4 as she was told previously. After waiting out the requested time and being contacted by the salesman to arrive, Madeline finally picked up the vehicle. After driving the car back home and showing it to her family, Madeline realised that she needed to put some effort to ensure that vehicle could be charged in her garage. After taking care of the unforeseen issue, she later gave feedback to the salesman about her PHEV owning experience and the fact that she did not take into account that she needed extra work to be done to charge her purchased vehicle at home.

Philip Anker persona's vehicle purchasing experience

After owning a few years old ICEV, Philip has decided that it is time for switching to EV. Philip had few friends who drove EVs and spent a lot of time online reading reviews and watching videos about EVs' performance, benefits, and drawbacks. Being considerate about this family's and other's health, Philip saw an opportunity to become a role model. Not to mention that he wanted to own a more technologically advanced and more pleasant to drive vehicle. After researching online and asking around this network, Philip finally found a vehicle that belonged to a luxurious class, had a good driving range per charge and was cheaper than similar category EVs in Denmark. Philip reassured himself about his choice when he got an opportunity to test-drive his sought-after EV and compared it with a few other tested EVs that his friends helped him get a hold of.

The problem was that the vehicle was not up for sale in Denmark and could be only imported with the help of a dealership. To Philip, that did not seem to be a problem since he was used to talking to car salespeople and preferred human interaction rather than doing things solely online. Unfortunately, Philip was being told that he had to configure and order his vehicle via an online platform and then the salesman would help with importing the EV. During the configuration, Philip noticed a lot of settings that could be interacted with, making the process for him complicated and confusing. To get some questions answered, he contacted customer support to have the questions answered about confident vehicle setting choices. As Philip finished configuring his EV, he noticed that the website showed slightly worse vehicle performance stats than what he had calculated and was told by the salesman previously. The situation made Philip even more sceptical about vehicle purchasing online. After another conversation with the manufacturer's customer support, Philip realised that various dynamic factors changed the vehicle's performance because of Phillips's chosen configuration. By taking into consideration that Philip was possibly incorrect with other things as well, he spoke with the salesman about charging solutions and EV maintenance nuances to ensure that his expectations and calculations were not far away from reality. Philip also got informed that he would have to wait for nearly a year to receive a vehicle due to his specific vehicle configuration and best-range battery package.

After confirming the EV purchase and waiting for 11 months, Philip's vehicle was delivered to a Danish car dealership. On his arrival at the dealership, in 1 hour, Philip signed the ownership paperwork, inspected the delivered vehicle and finalised the purchasing process, making him satisfied with the dealership's efficiency and help. During his early days of EV ownership, Philip found himself struggling by getting used to charging the vehicle every few days. However, it did not stop him from sharing his positive opinions about EV ownership with the people in his friends' circle.

Adira Rashidi persona's vehicle purchasing experience

Adira and her husband have previously bought a second-hand EV to change their previously owned ICEV vehicle. The couple was enthusiastic about the rising trend of EV ownership and saw a great opportunity to become a more sustainable household. After a while, Adira has decided that she needs her own vehicle and decided that it is time to purchase a brand new EV since she liked her experience with the second-hand EV. Buying a new EV was backed by the fact that Adira would be able to add an extra battery pack to the vehicle, making her think even less about charging and range anxiety.

As Adira was quite experienced with EV owning and always kept an eye on upcoming EV models, it was quite easy for her to compare several popular EV models and decide

what model she needed. As Adira was confident about her chosen vehicle, she decided to order the car online through a manufacturer's page, confident that the purchasing experience will take less time and be simpler. Before placing an order, Adira also booked a test drive online and took the car for a ride to see how her chosen vehicle and its extra features would perform in real driving conditions. After completing all the necessary purchasing steps online, the web page's automated waiting counter has indicated that Adira would be waiting for 6 months to receive a vehicle. After several weeks, Adira has received an email informing her that the car would be delivered in 8 months due to the global COVID19 pandemic. As Adira was confident and comfortable with her choice, the fact that her waiting time has been prolonged—did not upset her.

Instead, Adira took it as an opportunity to prepare for the second EV in her household. Adira and her husband were aware that EVs were putting a high demand on the electrical grid to sustain charging infrastructure. Therefore, the couple has decided to install a green power supply (solar panels) at their house to use its generated energy for vehicle charging at their installed in-house charging station. After taking care of necessary purchasing steps like informing the bank, getting insurance and completing car retrieval paperwork, Adira was finally able to drive the new EV. The new car was seen not only as a means of transportation to get from point A to B but also to entertain themselves during the pandemic. Driving a new EV with an additional battery package has made Adira less restrained by charging networks and long-distance trips. While travelling around Denmark, Adira has discovered that driving an EV has made her visit smaller and undiscovered cities for charging. This was seen as a great advantage since Adira was aware that charging does not take a long time and planning charging stops also served as a time out from driving.

Mark Prin Suparat persona's vehicle purchasing experience

As recent sustainable studies graduate, Mark was very self-conscious about this carbon footprint and the existing environmental problems. As he consumed a lot of online media advocating for green change, he saw himself as a part of a green trend in Denmark. Living in the city centre, Mark rarely had problems with using biking, public or shared transportation. Due to the new job that required him to be highly mobile around Denmark, Mark needed to get a car. As Mark saw it, the Danish EV market and infrastructure were developed well enough to fit his needs. Even more, having an EV seemed like a good time and financial investment while thinking about low-pollution long-distance travelling.

Mark felt confident about EVs, mainly because he has driven a lot of them using car-sharing services before. As Mark started researching and considering what car he

would like to drive based on his previous driving experiences, he realised that purchasing a vehicle for permanent owning is not the only choice. Leasing an EV could have helped him experience different EVs every few years. Permanently owning a car to Mark was overrated. He saw it as a limitation to get other, more technologically advanced EVs every few years that could help him have an even lower personal carbon footprint. Since Mark was a digital native, he did the shopping and used most of the services online, without leaving the house or spending time and money commuting. Therefore, Mark was searching for webshops to purchase an EV solely online, without a need to travel to a dealership and keep the purchasing experience as casual to him as possible. When it came to Mark and his casual purchasing experience, he wanted to avoid the salesmen who were often perceived as pushy and focused only on their profit gain.

After finding an EV that matched his criteria and had good online reviews by EV bloggers, Mark scheduled a test drive. After receiving the car next to his living place for a test drive, Mark inspected the car and drove from the city to the suburbs, having some highway driving as well. After an hour of driving, he handed off the vehicle and by comparing it with his previous EV driving experiences, he decided that the car was fitting his needs. As Mark visited the online webshop, he found himself with only a few customisation options for the offered EVs, making him pleased that he did not have to overthink EV about the customisation. After doing the mandatory online purchasing steps, Mark placed an order for leasing a second-hand EV for the next few years. Because Mark was purchasing a second-hand vehicle, he got the vehicle in less than a month and finalised his purchase and ownership related documents online. Since Mark did not own a garage and had difficulties installing a charging station in his flat, he decided to buy a charging station subscription and rely on public charging spots throughout his EV owning experience.

Conclusion

Relying on research participants' experiences, desk research and defined persona profiles, the method was used to include remaining research. 4 scenarios were developed to represent each defined persona's story that focused on the main key activity—vehicle purchasing. Madeline Jensen's persona scenario was meant to showcase a standard PHEV purchasing journey without doing in-depth research. Philip Anker's scenario described how a persona was purchasing an EV from abroad with the help of a local dealership while experiencing issues with an online vehicle purchasing process. Adira Rashidi's persona was representing an EV enthusiast that has previously owned a second-hand EV and has decided to purchase another EV solely online. The persona of Mark Prin Suparat has defined an alternative approach to owning an EV by leasing a second-hand EV from a webshop and using already existing infrastructure to

accommodate vehicle's charging needs. The method defined various vehicle purchasing experiences. It also kickstarted the ideation process, helping generate ideas on how previously described vehicle purchasing experiences could be improved or redesigned with a new service concept. The scenarios method connected the Define phase with Develop phase, showcasing the plausible scenarios meant to represent current state experiences that customers took while purchasing vehicles.

4.2.4. Concluding Define phase

The define phase was mainly used to analyse, categorise and allocate gathered research data into tangible and refined synthesis, evidencing challenges that we will have to address during ideation.

Initial considerations about the target audience were kickstarted by planning what traits persona profiles should have and what possible people groups those personas could represent. After analysing research participants' backgrounds, experiences and their given input from survey, interviews and desk research—4 personas were created to represent existing and upcoming Danish PHEV/EV owners. Later on, persona profiles and their described attributes were used for mapping purchasing journeys and creating scenarios. After analysing gathered research from service safaris, actors-network mapping and previously mentioned survey and interviews, 2, PHEV and EV purchasing journeys were mapped. Both journeys were based on a persona per each mapping, showcasing the persona's purchasing goal and chronological chain of events that needed to be done for purchasing a vehicle. Journeys maps had several persona's representation layers, showing purchasing stages, touchpoints, user actions and positive/pain points. With persona profiles defined and purchasing journeys mapped, the remaining parts of research data were put to use while writing scenarios. Scenarios told each previously described persona's purchasing story, mentioning persona's needs, motivations, problems and challenges while also making the stories more compelling by incorporating real purchasing experiences from the interviewed research participants.

Initial insights gathered from the Discovery phase and new findings discovered from the processes of analysis and allocating during the Define phase were listed out on the digital whiteboard. Listing out synthesised and defined data has set foundations for an upcoming ideation process planned to take place in the forthcoming Develop phase.

4.2.5. Redefining problem statement

The previously presented initial problem statement "How might we design a service to help change peoples' perception towards EV/hybrid vehicle adoption?" has been redefined Discover and Define phases.

The problem statement has been redefined to the following: "How might we design a service that nudges Danish consumers towards the adoption of electric vehicles". The following problem statement introduces nudging, narrows down the target audience, and sets the scope for one type of vehicle that the solution will consider.

4.3. Develop phase

After creating an overview of findings and reviewing the problem statement after finishing the Define phase, the following process was to ideate and test solutions that address the user's needs. Develop phase's purpose was to ideate, test and later refine promising solutions designed to challenge the problem statement (Design Council, 2019b). In this project, the Develop phase represented a case study's process where divergent thinking was used for initial solutions' ideation, pretotyping and prototyping.

To make the process of ideation controlled and systematic, it was divided into 3 steps: (1) Pre-ideation was meant for finding and preparing the synthesised material and methods that would be used to generate ideas. (2) The next step was idea generation—ideating solutions that addressed the problem statement based on synthesised research data. During idea-generating, it was agreed to come up only with concept sketches. (3) These rough sketches were challenged with the solution's feasibility-related questions, helping to decide if the solution was promising or not, avoiding further time investment. With several ideas selected, it was decided to work on them further, adding more details and depth (Stickdorn et al., 2018).

With another round of concept deselection, a few ideas were kept to be pretotyped to decide on what solution the service will be based on. In the Developing phase, pretotyping was used for minimising risk and uncertainty in the early stages of concept development. Having prototyping at the beginning of the concept development helped us to identify new service's important aspects quickly, reconsider the solution's feasibility in reality and create a shared understanding of the developed concept (Stickdorn et al., 2018). Early concept prototyping helped to decide on selecting the solution that would be developed in-depth to address the problem statement.

The Develop sub-chapter was split into the following divisions:
4.3.1. Preparing for ideation with "How might we…?" questions;
4.3.2. Using 10 plus 10 for service concept ideation process;
4.3.3. Reviewing, selecting and merging ideas to create a fundamental concept of service;
4.3.4. Initial service concept pretotyping;
4.3.5. Creating service concept's prototype;
4.3.6. Using pretotype to communicate, explore and evaluate service concept;
4.3.7. Develop phase's conclusion.

4.3.1. Preparing for ideation with "How might we...?" questions

The Development phase started with a pre-ideation "How might we...?" method used to systematically prepare for an upcoming ideation session (Stickdorn et al., 2018). Insights and user scenarios from previous design phases were used as inspiration to generate questions. Raised questions focused on improving or creating new services that addressed customer's issues of the current-state purchasing experiences.

Method

"How might we...?" is a systematic preparation method consisting of the following steps: research and insights allocating, examining the synthesised knowledge, questioning it and sorting solution-seeking and problem raising questions to clusters. The research and insights allocating step was meant for listing out synthesised research, user stories and remaining insights on the same board. Examining the synthesised knowledge step focused on inspecting each user stories and insights individually. The questioning step was the core of the method. Reviewed material was used with "How might we..." sentence basis to provoke thoughts towards improving current-state vehicle purchasing experiences or creating a new one to spur EV adoption in Denmark. Sorting questions to clusters was the last step where questions were placed into newly formed clusters, depending on topics that questions were touching upon (Stickdorn et al., 2018).

Outcome

During the "How might we..." question formation process, 59 questions were raised and assigned to 11 clusters. Each cluster had its theme that arose from questions that revolved around similar topics. For showcasing reasons, maximum 3 questions per cluster were mentioned.

"...promote the positive sides of EV?" cluster

— How might we make people think about purchasing EV and feel safer about their decision?

— How might we present EV in a much favourable position compared to ICEV?

— How might we present the EVs' driving habits as a positive change towards daily life?

"...address the negative sides of EV ownership?" cluster

— How might we (re)design a vehicle purchasing service that is not making the customer feel pressured while browsing/purchasing?

— How might we present the advantages of EV/PHEVs without overwhelming the non-tech-savvy customers?

"...promote online purchasing experiences?" cluster

— How might we enforce the perception that online purchasing is more straight-forward and safer?

— How might we make the user feel a higher and more personalised human interaction when purchasing online and EV?

— How might we interest/convert customers to try an online purchasing experience instead of a traditional physical one?

"...partner up with other EV-related services?" cluster

-- How might we incorporate or partner up our service with existing EV service solutions for a complete EV user experience roadmap by creating additional offerings for the consumer?

— How might we introduce new business approaches making EVs more appealing?

"...challenge the current dealership model with our service?" cluster

— How might we present ourselves as better experience providers when in comparison to car dealerships?

— How might we simplify the whole car purchasing experience?

— How might we offer a more tailored and in-depth onboarding experience while testing for first time EV-owners?

"...create stakeholder's trust in our solution?" cluster

— How might we create a service that is transparent enough for customers to trust it?

— How might we ensure the integrity of facts concerning EV's specifications during actual life usage?

— How might we create another "expert" actor in people's perception instead of dealerships?

"...engage potential EV owners?" cluster

— How might we ensure that customers are feeling 100% included in all car-related purchasing processes?

— How might we ensure that the customer is being answered all his questions while being offered additional information related to them?

—How might we prepare the customers for the possible waiting and delay time when it comes to delivery?

"...use nudging to our advantage?" cluster

— How might we convince people that are not tech-savvy or conservative that EVs are not "spaceships"?

— How might we nudge people to jump straight to EV instead of using PHEV as a transition?

— How might we nudge Danish consumers to buy second-hand EVs?

"...introduce extra features to already existing services?" cluster

— How might we rethink the test driving experience using car-sharing services?

— How might we suggest the introduction of EV buy-back systems to dealerships?

— How might we encourage/develop an EV/PHEV charging and parking culture for public spaces?

"..empower EV/PHEV users?" cluster

—Have a platform/community where people could gather into local groups that are focused on EV/PHEV adoption, encouraging them to plan, initiate change as a local community for the local community?

— How might we enable existing EV/PHEV owners to share their experiences with future/existing newcomers?

— How might we connect car enthusiasts with the non-tech-savvy?

"...address and involve the public sector?" cluster

— How might we raise awareness for the government/municipalities that offering higher tax deductions and incentives for EV car fleets would positively impact the EV market and network charging infrastructure?

— How might we incorporate public charging stations into other charging networks so that people could rely on one platform to access and see all charging options?

— How might we collaborate with local administrations to enlarge the number of parking and charging spots for the upcoming EV wave in the next few years?

Conclusion

Previously listed 31 questions and other, not listed, 28 questions were created as preparation and another data interpretation form that represented our gathered knowledge throughout the design process. During the question creation process, some concept ideas were already starting to occur, even though the created questions were meant to be used in the upcoming 10 plus 10 methods.

4.3.2. Using 10 plus 10 for service concept ideation process

The primary ideation process was done during the process of the 10 plus 10 method. Using gathered knowledge and previously raised "How might we...?" questions, the method's purpose was to generate ideas in various detail levels that could be represented visually (Stickdorn et al., 2018).

Method

10 plus 10 was primarily meant for teams; however, with some execution rules adjusted, the method turned out to be working fine for the duo of 2 people as well. Since the ideation method was modified, 10 plus 10 execution was divided into slightly adjusted phases. The first step was a silent individual idea sketching session within 5 minutes while aiming to come up with 10 concept sketches. With the sketches listed down on the board, a joint review session started where a brief explanation of each other's ideas was carried out. After that, a second silent individual session was carried out. Each participant chose 2 of their proposed ideas and tried to develop 5 additional variations or additions to them, trying to add depth to the ideas. After 15 minutes of working on the selected ideas, another review session was up next. During the second review session, more in-depth ideas and possible execution scenarios were discussed, making the 4 ideas challenged for the near future.

Outcome

Relying on the research synthesis and "How might we...?" questions, 20 rough idea sketches were ideated (Figure 29).

Later on, from the ideated pool of ideas, 4 concepts were selected and refined further to represent possible service concepts that would help to increase the adoption of EV vehicles in Denmark.

The 4 most promising concepts were based on the following topics:
— Introduction to an interactive EV lifestyle tool for existing and upcoming EV owners;

— Collective, in-bulk, EV purchasing agreements with communities;

— Consulting and taking upcoming EV owners through the whole EV purchasing journey;

— Creating a platform that is based on community bonding and knowledge sharing that helps locally-based people groups to adopt EV ownership.

During the second sketching iteration, each selected idea was more thoroughly described and gained additional depth.

Figure 29. A screenshot from Adobe XD board that was used for noting down generated idea sketches and selecting to refine some of the selected ideas further.
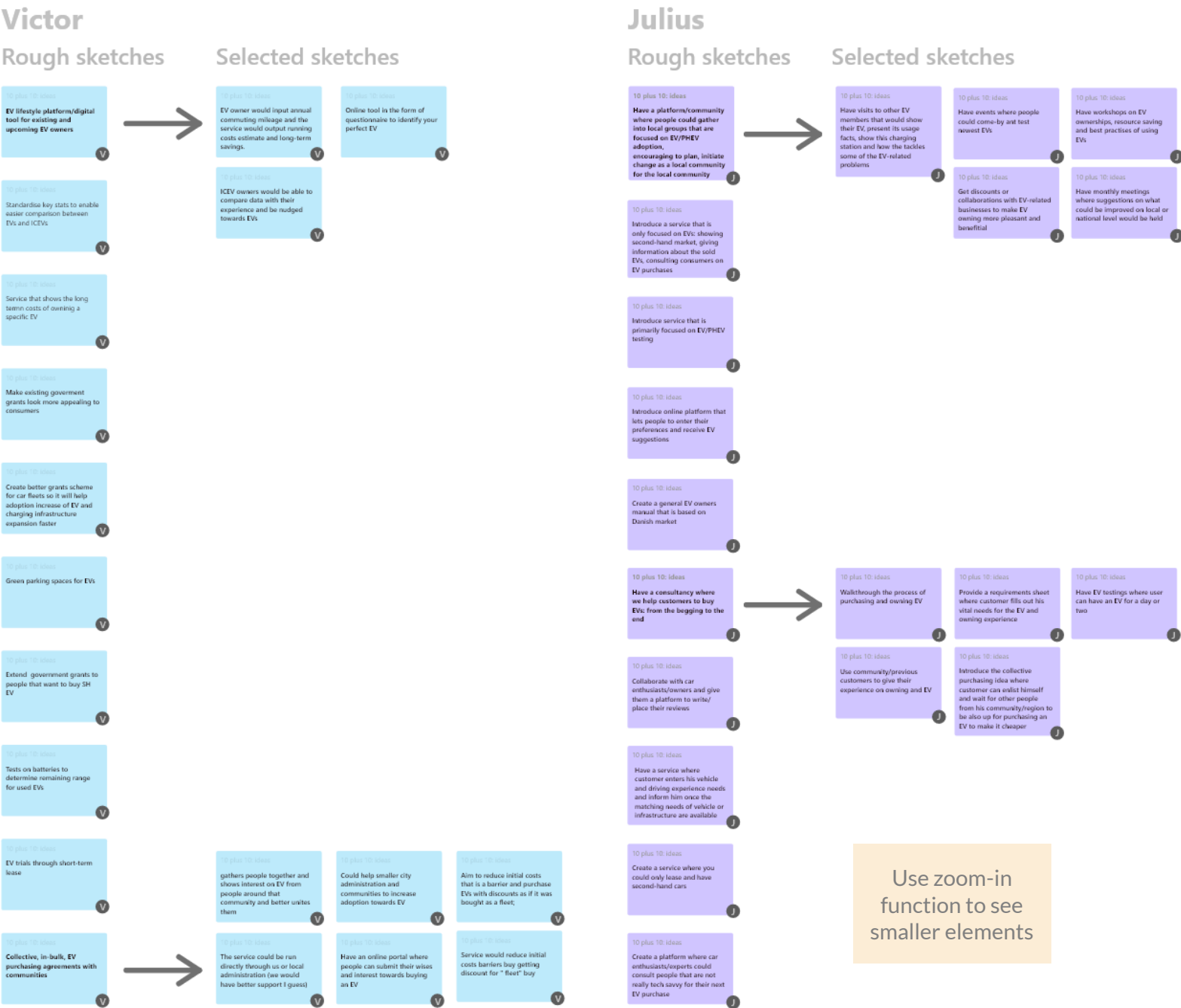
Idea #1

"EV lifestyle platform/digital tool for existing and upcoming EV owners" was updated with the following (Figure 30):
— EV owner would be able to input annual commuting mileage, and the service would output running costs estimate and long-term savings;

— ICEV owners would be able to compare EV ownership statistics with their ICEV stats and be slightly nudged to consider EV ownership;

— Have a feature in the form of a questionnaire where potential EV owner could be matched with EV that fits his criteria the best.
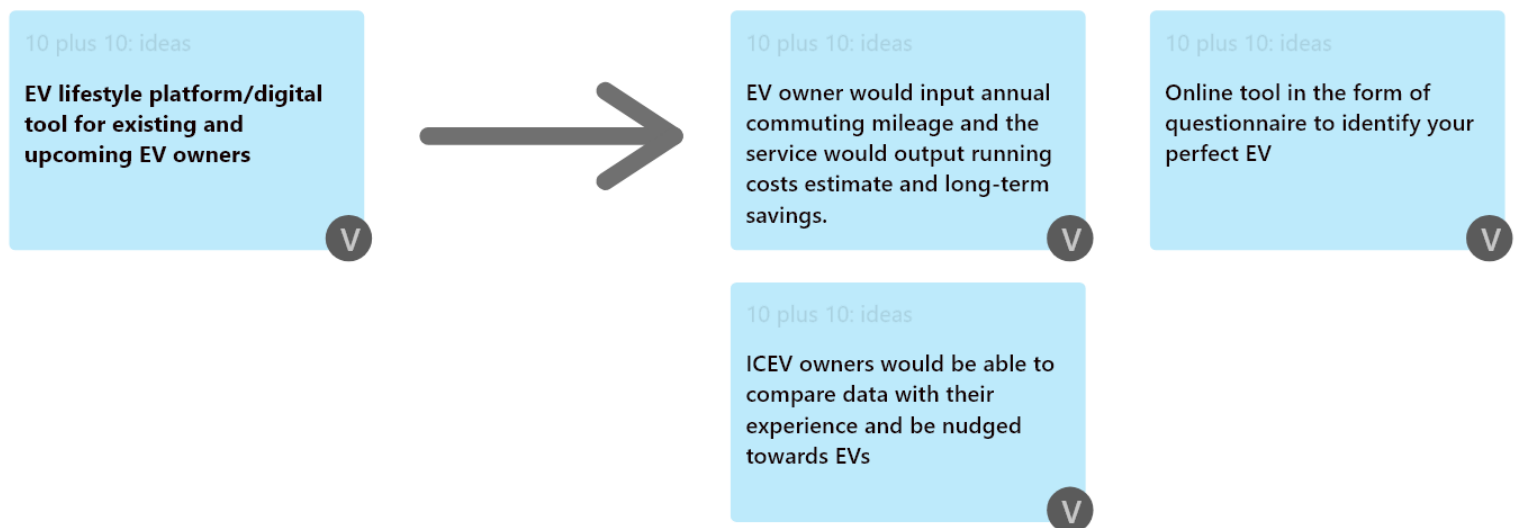
Figure 30. A screenshot from Adobe XD board showing how the "EV lifestyle platform/digital tool for existing and upcoming EV owners" idea was evolved further.

Idea #2

"Collective, in-bulk, EV purchasing agreements with communities" concept had improved with the following ideas (Figure 31):

— Manage purchase agreements with the manufacturer or dealerships helping upcoming EV owners to avoid them;

— Aim to reduce initial costs that is a barrier and purchase EVs with discounts as if it was bought as a fleet;

—Gather people that show interest in EV from local communities to get their needs and voice unified;

—Propose municipalities to adopt the proposed model in local communities;

— Have an online portal where people could submit their wishes and interest towards owning EVs.
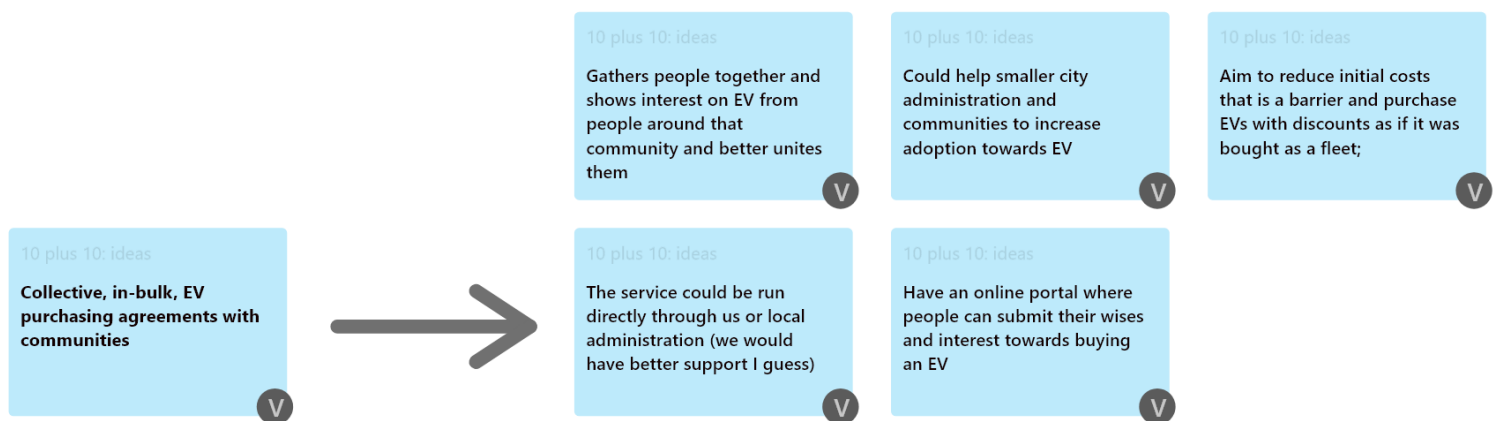
Figure 31. A screenshot from Adobe XD board showing how the "Collective, in-bulk, EV purchasing agreements with communities" idea has evolved further.

Idea #3

"Consulting and taking upcoming EV owners through the whole EV purchasing journey" had the following additions to the initial proposition (Figure 32):
— Use previous customers as ambassadors for promoting EV ownership;

— Ask customers to fill out a form where they would list their essential needs in regards to EV;

— Introduce EV test-drive sessions that would let the customer have the EV for several days;

— Introduce a collective purchasing model where the customer could enlist himself and wait for several other people to join the waiting list so that a larger vehicle order could be placed and vehicle price would become lower;

— Introduce digital courses that walkthrough potential EV owners through the most popular EV ownership steps.
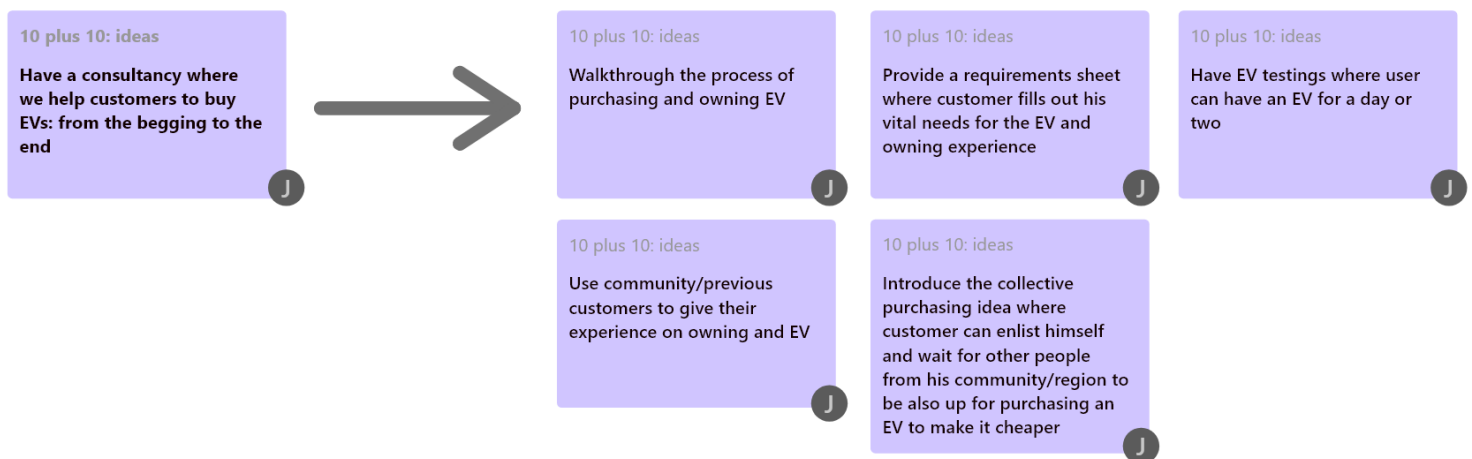
Figure 32. A screenshot from Adobe XD board showing how the "Consulting and taking upcoming EV owners through the whole EV purchasing journey" idea evolved further.

Idea #4

The concept of "Creating a platform that is based on community bonding and knowledge sharing that helps locally-based people groups to adopt EV ownership." was updated with suggestions (Figure 33):
— Have a feature where upcoming EV members could visit the experienced EV members to see how others are experiencing EV ownership;

— Host/redirect to events where people could come by and test the newest EVs;

— Provide customers with discounts coming from service's collaboration partners that are EV-related businesses;

— Have workshops that prepare for EV ownership and share best EV owning practices;

— Introduce monthly community-based meetings to suggest what could be improved on a local or a national level.
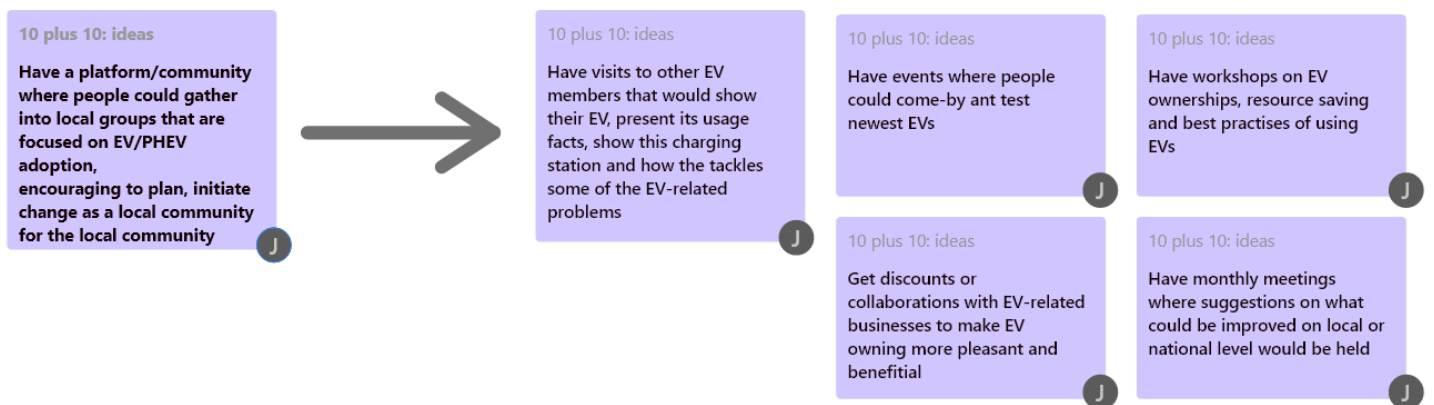
Figure 33. A screenshot from Adobe XD board showing how the "Creating a platform that is based on community bonding and knowledge sharing that helps locally-based people groups to adopt EV ownership" idea was developed further.

Conclusion

The ideation process was based on research synthesis from previous Discover and Define phases and the "How might we…?" pre-ideation method. The 10 plus 10 method has helped us to come up with 20 rough service concept sketches, from which 4 were selected for further development. The following concepts were selected for further ideation: (1) "Introduction to an interactive EV lifestyle tool for existing and upcoming EV owners"; (2) "Collective, in-bulk, EV purchasing agreements with communities";' (3) "Consulting and taking upcoming EV owners through the whole EV purchasing journey" and (4) "Creating a platform that is based on community bonding and knowledge sharing that helps a locally-based people groups to adopt EV ownership". With at least 3, per each concept, elaboration points described, the service concepts were prepared for the final ideation process where one idea would be selected and prepared for further pretotyping.

4.3.3. Reviewing, selecting and merging ideas to create a funda–mental concept of service

After having 4 ideation concepts explored further with offering and feature suggestions, another idea filtering session took place. The session aimed to start formulating a singular service concept and incorporate the previous ideas that would add depth to the design.

Method

The taken approach was a post-ideation task that was not relying on any known methods but instead taking the already existing resources and considering what could be created. The process started by giving another look at the previously generated service concepts and discussing which could be applicable to designed personas and the current Danish EV market. It was noticed that two service bases had a similar idea—purchasing EVs as a group of people. Similar bases were selected for merging and representing a singular service concept. With a fundamental idea on what principles the service should be based on, previously listed ideas were reviewed, having some of them connected to the fundamental service base.

Outcome

During the process, the following ideas were merged: "A service that offers users to purchase EVs by purchasing cars in bulk, with the collective purchasing agreements " and "Introduce the collective purchasing idea where customer can enlist himself and wait for other people from his community/region to be also up for purchasing an EV to make it cheaper", As different people proposed the ideas, it was seen as a slight confirmation that the ideation process is taking the right path. The fundamental idea of bulk EV purchasing for communities was discussed further by selecting and clustering 10, previously listed, suggestions around the service concept basis (Figure 34).

Idea selection

10 plus 10: ideas

A service that offers users to purchase EVs by purchasing cars in bulk, with the collective purchasing agreements

+

10 plus 10: ideas

Introduce the collective purchasing idea where customer can enlist himself and wait for other people from his community/region to be also up for purchasing an EV to make it cheaper
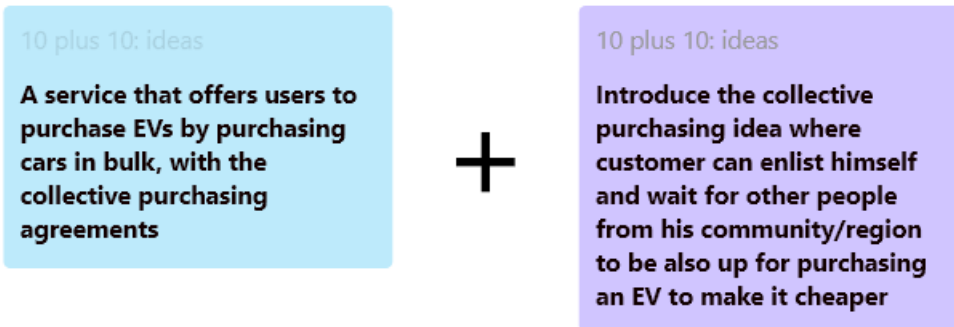
Developing idea further

10 plus 10: ideas

The service could be run directly through us or local administration (we would have better support I guess)

10 plus 10: ideas

The service would manage a purchase agreement with the manufacturer (or dealerships - would be nice if we could skip them)

10 plus 10: ideas

Service would reduce initial costs barriers by getting discount for " fleet" buy

10 plus 10: ideas

Have an online portal where people can submit their wises and interest towards buying an EV

10 plus 10: ideas

gathers people together and shows interest on EV from people around that community and better unites them

10 plus 10: ideas

partner up with chagrin station solutions to install for the new owners - get extra points

10 plus 10: ideas

Could help smaller city administration and communities to increase adoption towards EV

10 plus 10: ideas

Use community/previous customers to give their experience on owning and EV

10 plus 10: ideas

Have EV testings where user can have an EV for a day or two

10 plus 10: ideas

Walkthrough the process of purchasing and owning EV

Figure 34. A screenshot from Adobe XD board that shows the merging of two ideas forming a basis for service concept and ideas considered for its further development.

Conclusion

Using the previously generated ideas from the 10 plus 10 method, the service concept basis was formed by merging two similar ideas that were proposed by separate people. By merging (1) "A service that offers users to purchase EVs by purchasing cars in bulk, with the collective purchasing agreements" and (2) "Introduce the collective purchasing idea where customer can enlist himself and wait for other people from his community/region to be also up for purchasing an EV to make it cheaper" ideas together, the basis for the fundamental concept was formed—bulk EV purchasing for communities.

4.3.4. Initial service concept pretotyping

With a basis service concept formed, it was necessary to know what our potential target audience might think about a similar service. There was also an opportunity to identify additional aspects of the proposed service concept and explore other possible concept alternatives (Stickdorn et al., 2018). To present our developed service concept in an easy to interpret and leave feedback on manner, it was decided to explain the service concept in writing. Explanation of the service concept in writing was a fast and easy way to share the idea with the participants that agreed to give their feedback. Getting feedback from respondents was seen as a way to evaluate if a proposed solution had the potential to work in reality from the target audience's point of view (Stickdorn et al., 2018).

Method

Since the service concept was planned to be presented primarily in writing, it was necessary to ensure that respondents had no technical issues while reading and leaving feedback on our pretotype. Each participant had its own dedicated, online-shared document, where only that participant was able to share his thoughts on the provided file, ensuring that there were no other disturbances from other pretotyping participants [Appendix G]. Pretotype was shared via emails and had a short introduction of what to expect from the pretotyping session. After clicking on the provided link and entering the document, the participants landed on a page with a brief introduction to: the pretotype's purpose, table of content, reading instructions and an explanation of how to comment and leave feedback. The following page has included a short, 1 minute and 33 seconds long video[1] that walked the viewer through the 9 steps of the service that the service's user would encounter. After returning to the reading part, the participant was presented with a service concept explanation divided into sections such as: service's core idea presentation, reflection on the Danish vehicle market, service's advantages compared to traditional vehicle purchasing experiences and other, shorter, sections. After reading and leaving comments on the written service's explanation, the participant was asked to answer written down questions. Questions aimed to get respondents' opinions on the presented service, its feasibility to be introduced in Denmark, and the respondent's consolidation on using the presented service.

Outcome

Before sending out the email with pretotype-related information, participants that previously expressed their desire to participate in the further thesis process were contacted and asked if they would agree to participate in our pretotyping session.

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[1] Video used to introduce the customer's simplified user journey while using the proposed service concept:: https://drive.google.com/file/d/1mxDFvd3QVXVf_1PeUC_s9jclfkwWbI8u/view?usp=sharing

We have received 6 replies from mentioned participants that were willing to participate in the pretotyping session. However, after sending out pretotyping material via emails, giving participants a week to leave their input and following up to them afterwards, it was a total of 3 people that left their input on the document that introduced the service concept [Appendix H].

1 respondent has shared his thoughts that he would not consider using the proposed service and did not see a need for it since he was only interested in buying new EVs and using a manufacturer's website for most of his purchasing experience. While reflecting on our service concept, the respondent has mentioned that: (1) that people's trust is an essential factor for the success of the service, (2) dealerships are often offering good offers on their vehicles, (3), the proposed service concept cannot offer detailed vehicle customisation which is a significant disadvantage. His finishing remark was a suggestion to focus more on providing a research and browsing platform for upcoming EV buyers.

Feedback gathered from the other 2 respondents was more positive and encouraging to adjust the service concept and continue developing it further. The idea of bulk purchasing was received neutrally since both respondents saw a benefit of low purchasing price and a disadvantage when it came to logistics. Service's fundamental idea of community purchasing was generally perceived positively as it was noted that Danes are used with co-ops. However, the concern about challenging individual purchasing was expressed. It was argued that for some people, purchasing a vehicle is an intimate experience that often requires a personalised purchasing experience. Another concern was manufacturers or dealerships that might not be interested in cooperation when providing an ability for bulk purchases due to increased competition and logistical issues. Respondents have also shared a similar opinion that the proposed service concept should help with purchasing and focus on enabling communities to represent their voice on EV-related topics and educate people about the nuances and benefits of EV ownership.

Conclusion

The service concept's written explanation, used for the pretotyping session, has served as an additional ideation process that has improved the definition of the service. Contacting potential service users and having them participate in pretotyping sessions has helped identify the service's weaknesses and explore how the service could be more feasible in the Danish EV market. Input from the pretotyping session's participants was analysed and used for an upcoming service concept iteration session to adjust the service concept and its written definition.

4.3.5. Creating service concept's prototype

With gathered feedback on the initial idea of the service concept, it was decided to re-adjust the service concept and address the issues that there pointed out during the pretotyping session. After updating the service concept in writing (to be introduced fully in the Deliver phase), it was decided to create a prototype representing one of the service's touchpoints, helping the upcoming participants of the testing session understand the service's concept better. Pretotyping was also seen as another method for service concept iterating and discovering additional service opportunities and shortcomings. Considering that physical prototyping sessions were heavily limited because of the ongoing COVID-19 pandemic, it was decided to create a digital touchpoint that could represent a majority of the service's concept in a medium that is already well known to our previous research and pretotyping participants. To address all the previously mentioned criteria for digital touchpoint, it was decided to create a website representing the service.

Method

The existence of web-based designing and prototyping platforms allowed creating an interactive website prototype easily accessible by participants of an upcoming testing session. Therefore, all activities regarding the prototype were designed in a web-based design and prototyping software Figma (Figma, Inc., 2016).

Service's website prototyping has started by reflecting on the service concept and deciding for what purpose the website is created. Considering that the service concept planned to educate, inform, enrol and enable users to be part of the purchasing experience, it was decided that the service's prototype should have only several pages since the process of creating an entire site's mockup could take weeks. Therefore, the prototype's site map was laid out to represent the following web pages: landing page introducing the service's concept, vehicle selection page, news page, page for frequently asked questions and contact us page with contacting form (Figure 35).

With the site map created, the service's prototype website was started to be designed. At first, the website was designed using grey colours to focus more on the website's aspects of user experience (Figure 36).

With the first iteration of website designing done, the website was improved again, adding colour and changing several aspects regarding the user interface (Figure 37).

Website site map

❖ Component 1

Homepage	Offered EVs	Community bulk-buys	News	FAQ	Contact us
• Company vision • How it works • High level overview of EV model	• List of car models. With pictures and descriptions	• Information about current, upcoming and previous bulk-buys • Form to register for the onging bulk buy	• Webpage intro • Relevant articles • See more	• Webpage intro • Question/answer sections • Contact form	• Contact form

Selected EV

• EV information
• Assurance points
• Contact form

Use zoom-in function to see smaller elements

Figure 35. The website mockup's site map used to strategise and communicate what web pages and content should be included while designing the prototype.

Figure 36. UX version of website's mockup that shows "Contact us" webpage.
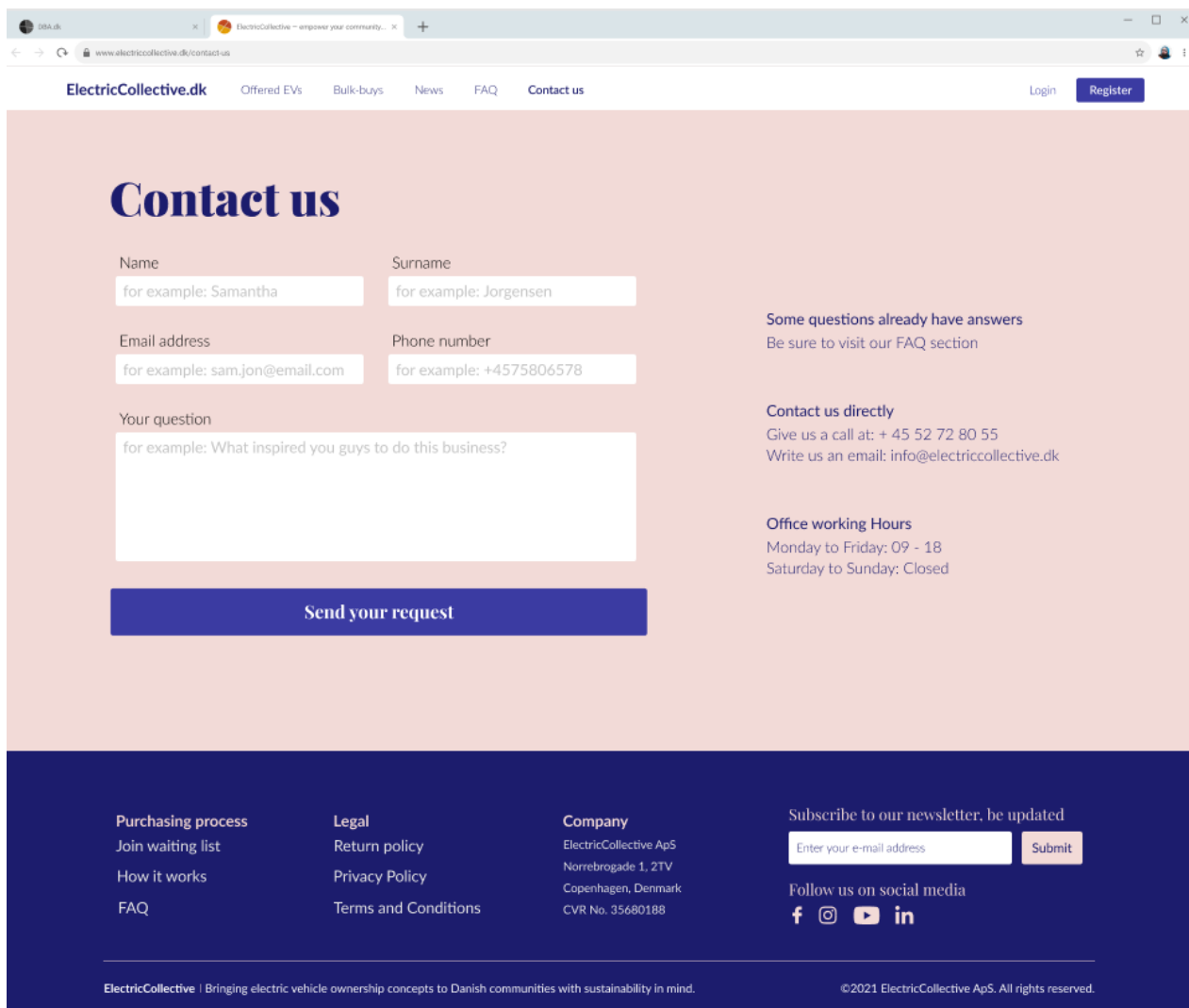
Figure 37. Final design version of website's mockup that shows "Contact us" webpage.

Outcome

Service's prototype resulted in a website with 7 interactive web pages that were meant to create the impression that participants were browsing a real service's website (Figures 38, 39, 40, 41 and 42).
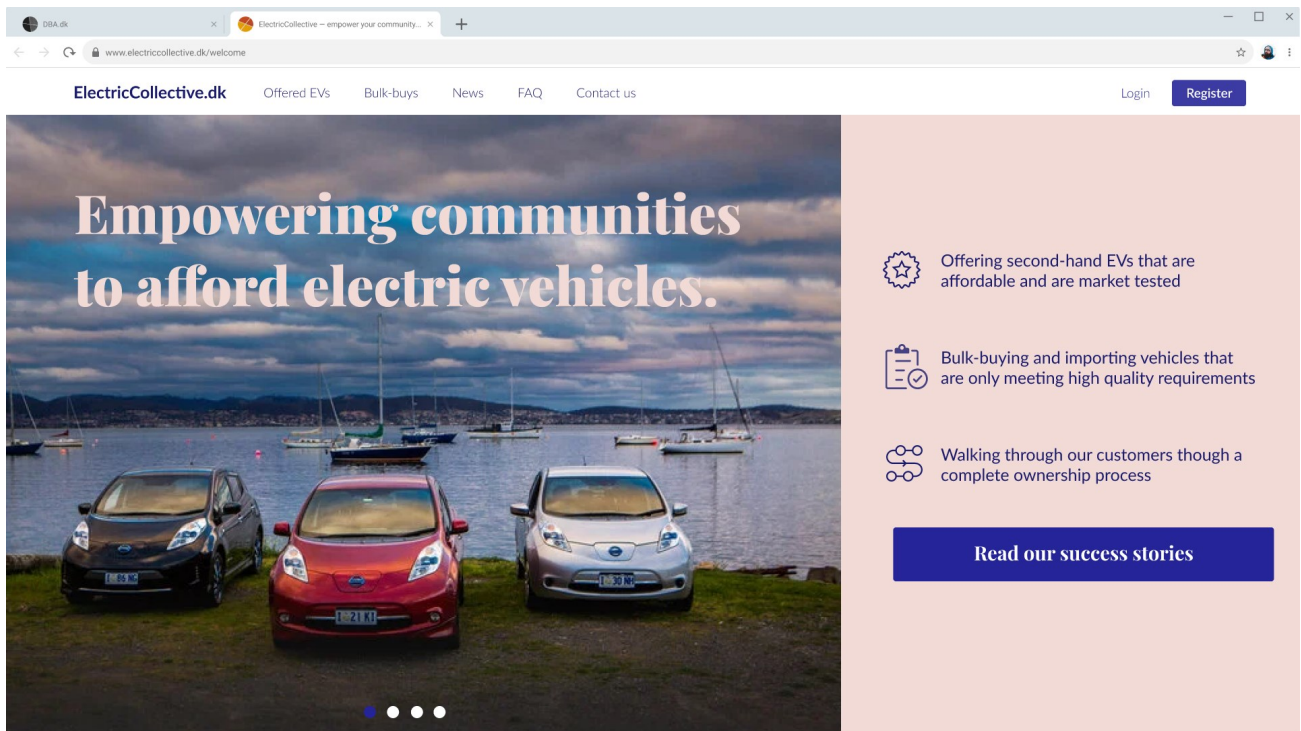
Figure 38. The first section of the designed website's homepage presents the service's mission and lists several service's benefits.
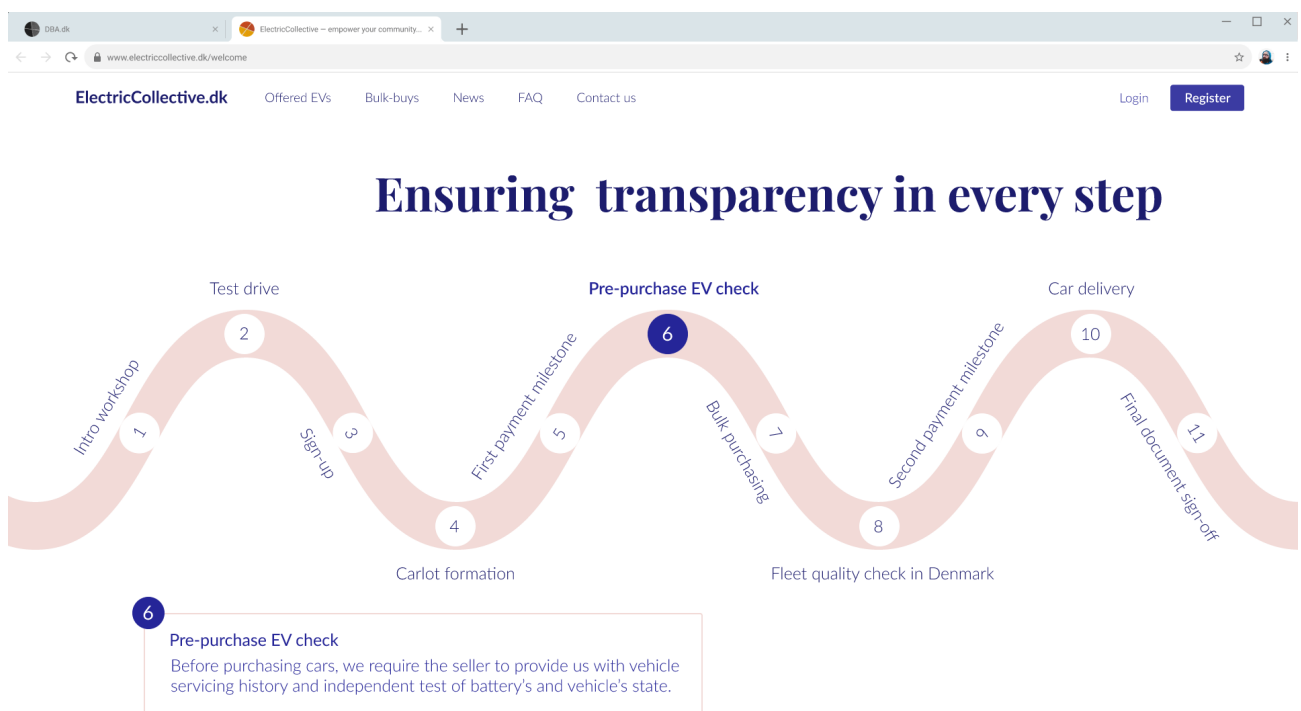
Figure 39. The second section of the designed website's homepage presents a simplified illustration of how service works from a customer's perspective.
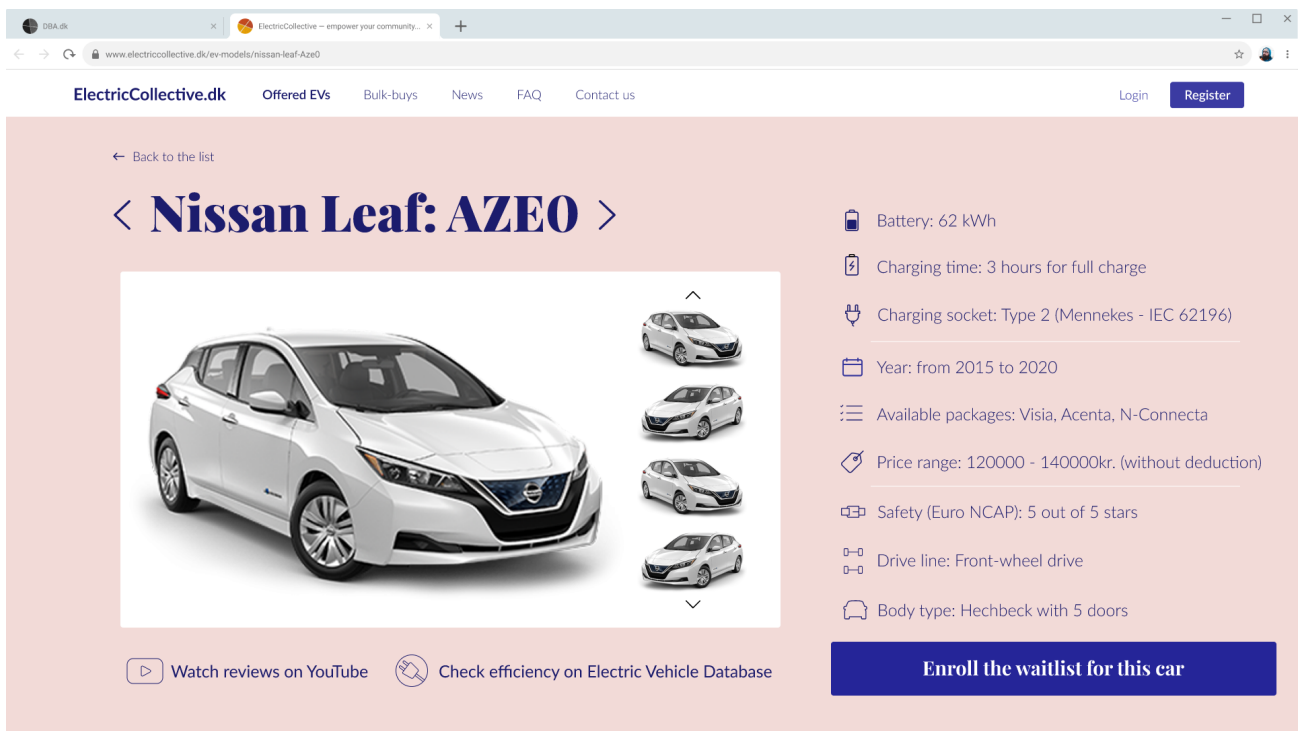
Figure 40. The first section of a selected vehicle's webpage briefly presents the vehicle's specifications and offering additional sources for further details.
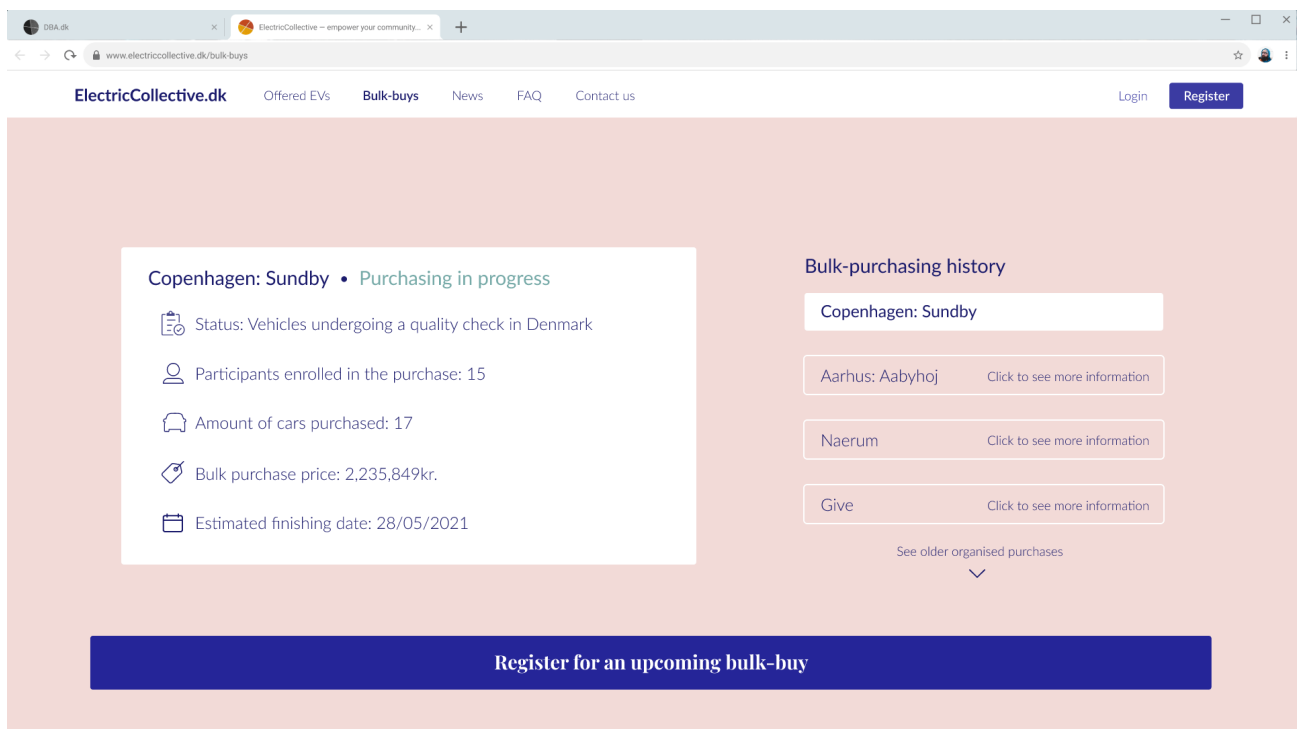
Figure 41. The second section of the "Bulk-buys" webpage briefly presents information about ongoing vehicle purchasing.
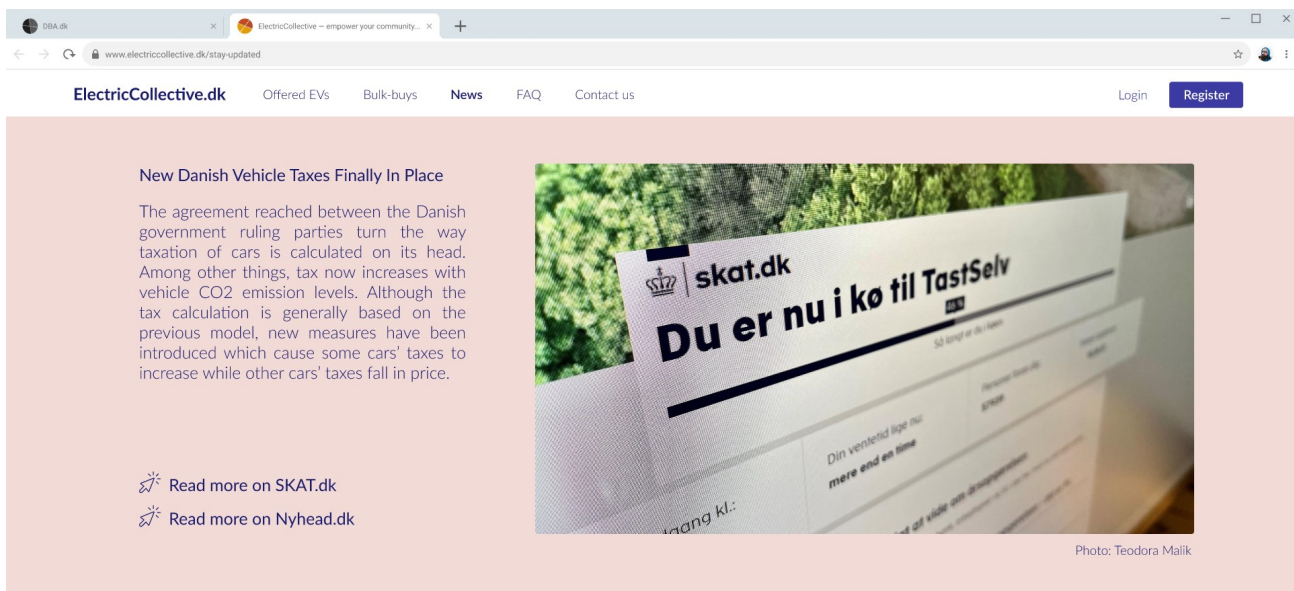
Figure 42. One of the sections on the "News" page, showing that the website would also have a news feed that visitors would visit to see if there is any news regarding the Danish EV market.

As planned previously, the prototype explained the service's concept, presenting its benefits, enabling visitors to directly contact the webmasters and do several other actions that would help the visitors explore the service further[2].

Conclusion

Choosing to prototype a website that was showcasing the service's digital touchpoint was a time-efficient and alternative way to present the service concept. Because of the ability to easily share the prototype with the audience, the touchpoint prototype was shared with the participants of research and pretotyping sessions that expressed their willingness to participate in further project's activities.

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[2] Recorded prototype's walkthrough can be accessed via the following link: https://drive.google.com/file/d/1YJpW0amoS4YNGJuFcVUcitJq49yuOS1B/view?usp=sharing

4.3.6. Using pretotype to communicate, explore and evaluate service concept

The introduced prototype was used to provoke participants' ideas while simulating a staged service experience that represented a proposed design solution. Providing participants with a clickable website mockup, it was expected that interactive mockup would help participants better understand the service concept and make participants more immersed while actively interacting with the mockup (Stickdorn et al., 2012). The activity was meant to communicate the service concept to participants, reveal additional shortcomings by documenting partakers' insights and evaluate touchpoint's efficiency when helping participants understand how the service works (Stickdorn et al., 2018).

Method

The method's goal was to get partakers' reflections on the service solution's feasibility in a "real-world" environment while they were interacting with the website's mockup (Stickdorn et al., 2012). Instead of focusing on a holistic customer experience, the participants were set to learn about the service concept from a single digital touchpoint (Stickdorn et al., 2018). Thus, preparation for prototyping required only several elements: both parties would have an internet connection, a laptop for opening a website's mockup and the ability to have a video call. Prototype walkthrough sessions were conducted via video calls and once by meeting in person with one of the participants. During the video calls and live meeting, we provided participants with access to a prototype mockup. Even Though partakers were able to navigate throughout the mockup freely, it was noticed that participants sometimes needed narration while they browsed the website. Narrating while participants' browsed the website has helped provoke partakers, making them question how the service would work in specific scenarios and reflect on what was unclear or worth considering service-wise.

Outcome

Partakers reflected on a created prototype were: cooperating organisation's Startup Lighthouse representative focusing business and entrepreneurship fields, potential service's customer and a fellow service designer. Each actor's participation and reflections were focused on different aspects of the presented service concept, providing feedback on several service angles [Appendix I].

Startup Lighthouse's representative focused chiefly on workshops, questioning their execution and expected outcomes. It was suggested to consider having workshops in a digital medium (e.g. upload it to YouTube) and use either "pay per view" or "on-demand" workshop steaming models that would be paid. As argued by the respondent,

making people pay for the content presented in workshops could make the viewer/ participant more invested and interested in the presented workshop. Another suggestion was to ensure that hosted workshops are not presented as the service's campaign to convert people into enrolling on a waiting list. It was pointed out that such an approach could make people more sceptical towards the workshop as they could consider that service's representatives are focused on selling the idea and not being objective. Another valuable insight was related to the evaluation of workshops' success. Determining how the workshops' effectiveness could be measured would help improve future workshops and adjust them to better fit audiences and service's needs.

The partaker that was a potential service's customer has proposed how to present the service to the governmental bodies and has questioned the proposed service's EV purchasing process. The participant has proposed to consider other organisations' support since the service concept was proposing a solution related to initiatives aiming to decrease carbon emissions in Denmark's auto park. For example, the service was seen as a potential actor that could help Denmark's government succeed with the released Climate act to reduce greenhouse gases by 70% until 2030 (Danish Ministry of Climate, Energy and Utilities, 2019). Besides the proposal, the partaker was concerned about our service's guarantee that as a customer, the participant does not have to wait for 3 years to get the ordered EV. In addition, the partaker has raised questions about possible options once the request to enrol on the waiting list is submitted. The participant was interested to know: is it possible to quit the waiting list. Are there any repercussions for quitting it, and are there any activities suggested by the service while being on a waiting list?

A fellow service designer who participated in reflecting on our service's prototype has emphasised that the presented service should ensure that the stakeholder should feel safe with the choice once the customer is placing an order. As stated by the partaker, people are often looking for reviews and care about the reputation of the companies that they are planning to use. Therefore, it was suggested to consider using a third-party service like Trustpilot (Trustpilot, n.d.) and have an active presence to represent the service's quality and have it as an additional communication and feedback channel with the customers.

Throughout the reflection sessions, it was noticed that at least 2 of the participants have emphasised that the service has to deliver a personalised experience and yet be able to do it effectively to avoid losing person-hours and money. Such insight has led to a consideration that before the service launches fully, it has to have a somewhat automated process that could save potential person-hours on providing customers with support that could be automated.

After reviewing the previously listed insights and remaining less important ones, reflections have been used to adjust the service concept again and address issues that were not taken into account previously.

Conclusion

The session meant to gather reflections on the presented service's concept while using a website's mockup as a touchpoint representation was considered a success. Prototype served as a communication channel, helping participants explore the service's concept while interacting with the service's touchpoint. Through the interaction with the mockup, partakers got introduced to a service concept and main operating processes. That led them to have follow-up questions and reflections on how service could be improved or what could be taken into consideration. The gathered input has touched upon the service's proposed workshops and their execution and evaluating processes. Another participant has suggested connecting existing car park decarbonisation initiatives with the service for support from organisations. A question was raised addressing the process step when a customer enrols on an EV purchase waiting list and does not know what he can do during that time. A fellow service designer has proposed considering using third-party services that host neutral platforms where users leave reviews on service for others to be aware of the service before using it. Another consideration has been raised regarding the service's quality and resource management: how to provide a personalised experience to each customer while keeping a team less occupied with customer service tasks? These and several other partakers' reflections were listed down to create insights that would help improve and foresee upcoming problems regarding service and its execution.

4.3.7. Concluding Develop phase

Using synthesised research data from the previous phases, the Develop phase focused on service concept ideation and refinement. Thus, the Develop phase's design process has consisted of the following activities: preparing for ideation, ideating service concepts, refining them.

After selecting one of the ideated service concepts as a possible solution, the service concept was tested and refined throughout pretotyping and prototyping activities. The process started with a pre-ideation activity that used synthesised research data to raise "How might we…? questions. 59 questions were generated and divided into 11 clusters used in the upcoming ideation method during the activity. During the ideation activity called 10 plus 10, the previously mentioned "How might we…" questions were used as inspiration that helped generate service concept ideas while thinking about how the listed questions and problems could be addressed. After selecting and refining 4 generated service concept ideas, the post-ideation stage took place, where a single idea had to be chosen for pretotyping and development. After merging the following service ideas: "A service that offers users to purchase EVs by purchasing cars in bulk, with the collective purchasing agreements '' and "Introduce the collective purchasing idea where customer can enlist himself and wait for other people from his community/region to be also up for purchasing an EV to make it cheaper", it was decided to focus on a solution that would offer new EVs cheaper to groups of private residents by purchasing vehicles in bulk.

The initial service concept was pretotyped by describing the service in writing and presenting a simplified customer purchasing journey in a short explanatory video to previous research participants. After receiving feedback on the initially proposed service concept, it was decided to shift focus on presenting service's users with only selected second-hand EV models. The new service concept focused on importing critically acclaimed second-hand vehicles from Germany's and Netherlands' auctions/second -hand markets. The service concept has defined that service would ensure that all imported vehicles meet service's quality standards to decrease owner-related problems and serve as a guiding service that would present customers with all the necessary information, practical knowledge related to EV ownership in Denmark.

With the proposed solution adjusted, prototyping activity took place to get another round of comments on a newly redefined service concept. The developed prototype was a mockup of the service's website that was meant to interactively present the service's concept and provide examples of how service could be used in a digital

environment. Partakers who interacted with the website's mockup have critiqued the service concept, shared their insights about the service's touchpoint, and raised questions for future considerations. Additional participants' input was used to adjust the service's concept again and determine what other concept-related topics should be addressed in the near future. Written service's description has helped create a shared understanding of how the service would operate, making it easier to deconstruct the service's concept in the upcoming Deliver phase.

4.4. Deliver phase

After ideating several concepts, pretotyping to reflect on their viability and refining the potential service concept, the Deliver phase represented a convergent process thinking process. During the Deliver phase, the selected service concept was accredited as the solution had to be developed and refined further for delivery (Design Council, 2019b). Thus, the chapter showcases the deliverables that represent the proposed solution, its use cases and the design of the processes that embody the service. Most of the solution's deliverables are visualisations—meant to help a reader understand how the solution works and tackle the presented problem statement (Design Council, 2019a).

In our case, the Deliver phase would lead towards piloting—a prototyping process that is considered to be used before implementing (or launching) the service. Such an approach would reveal additional challenges for official service launch/rollout and help to spot issues in the previously designed service processes (Stickdorn et al., 2018).

The sections of the sub-chapter are divided into the following order:
4.4.1. Detailed explanation of the service concept that was chosen as a solution;
4.4.2. Developed service's Business Model Canvas;
4.4.3. Developed service's Value Network Map;
4.4.4. Developed service's Customer Journey Maps;
4.4.5. Developed service's Blueprint;
4.4.6. Concluding Deliver phase.

4.4.1. Detailed explanation of the service concept that was chosen as a solution

The core idea of the service

The service concept is based on the idea that by buying already well-established second-hand EV models in bulk, communities in Denmark will be presented with significantly reduced retail prices. The concept will tackle one of the main identified barriers in EV adoption—the higher purchasing costs of EVs compared to ICEVs.

Buying in bulk as a community of private residents will strengthen relationships between community members and help them go towards a cleaner and quieter living environment. The service will also deliver community action on current climate change issues. EV bulk-buying members will become advocates of new and better habits related to driving and raising awareness of the current environmental problems caused by green gas emissions from the transportation sector affecting our planet.

Target audience

The service primarily focuses on communities of private residents who are not either keen or able to spend a lot of money on EVs but need to buy their first car, change an old one or are conscious about the long-term savings and environmental benefits.

At the beginning stages, the service is planned to operate in Denmark. Thus, the service customers are expected to be located in Denmark and have a valid driver's license recognised by the Danish state.

Due to the standardised vehicle purchasing model, the service will not focus on people interested in car customisation before purchasing or looking for EVs considered to be luxurious models or very expensive.

Operation model

Only 1 or 2 EV models will be available to choose from and purchase at the beginning of the service. The second-hand EVs will be imported from larger EV markets like Germany or the Netherlands. Supporting circular consumption by utilising a car's full value is considered beneficial for both—the environment and society. The service's offered EV models are chosen based on in-depth research, taking into account the following factors: market availability to fulfil the bulk-buy, price, battery capacity, range limit, space, compatibility with Danish transportation regulations and Denmark's infrastructure of charging stations. The number of selected EVs to be bought will always be decided, taking into account a margin number of 1 to 3 possible situations in which a person will retract his enrolment. In this way, it will help to ensure that people will not be

affected by any unforeseen price changes for their chosen EV.

Conducted research shows that some people prefer human guidance rather than doing everything by themselves online. Having a friendly, "customer-first" rather than "sales-first" approach will improve the purchasing experience for the customer, making him feel more welcomed. People from individual, location-based communities will be invited to participate in a workshop where the concept will be presented in detail while answering participants' questions and presenting EV models for individual testing. As experienced with the COVID19 pandemic, video calls and online consultations are also possible communication mediums. The ones who will like to consider the offered opportunity will be invited to sign up for the bulk-purchasing list. The availability to join the waiting list for the vehicles will be opened for a limited period. Otherwise, it will be open until a minimum viable number of registered people is reached. The service will initially address one bulk-purchasing list at a time, expanding as the service grows and more resources are allocated.

The service concept is expected to be working for both: urban and rural EV owning experiences, especially in the locations where EV purchasing is withheld due to: economic reasons, not well-developed parking and charging infrastructure or lack of EV promotion for lifestyles that do not seem to be compatible with EV ownership. Collective purchasing will allow the new EV owners to create a community around EV ownership and push a charging infrastructure surge in private households and public or business areas. People will be able to join collective purchases in other communities if spots are available for them.

Service ownership

The service solution presented by the name of ElectricCollective.dk was designed and will be implemented by us, as service designers, that are seen as internal associates for the main stakeholder of the service—service owner. Startup Lighthouse will maintain ownership of the provided service solution, acting as product owner and resources provider.

Service ownership

1. Startup Lighthouse—ElectricCollective.dk service's owner, designer and process operator;

2. Community people interested in purchasing EV—customers using the service and purchasing vehicles;

3. Dealerships in Germany and the Netherlands—auctioneers that are interacted with while purchasing vehicles;

4. Partner(s) for testing EVs compliance— associates that will check if EVs are meeting service's specified requirements;

5. Logistics partner—associate that will take part in EV transportation to Denmark;

6. Insurance companies—associates that will provide insurance for the service and customers;

7. New EV owners—previous customers that will influence other community members by sharing their EV ownership experiences, knowledge and opinions;

8. Charging solution providers—associates that will offer charging solutions to upcoming EV owners;

9. Municipalities—government representatives that will be addressing the increase of EV owners by installing more public charging stations and incentivising the purchase of EVs.

Combining online and offline touchpoints in the service

Besides the physical workshop in which the service and its advantages will be presented to communities, a strong online presence as part of our omnichannel will be needed. By having an easy-to-use online platform, the service will enable customers to place orders for an EV, find all information about regulations, car specifics, et cetera. Running the majority of service's processes online will enable the service to have a good systemic approach to addressing consumers' needs. Providing several information sources and presenting everything in a standardised manner will help to keep and improve the service's quality. Most of the service's features will be accessible anytime and anywhere by the customer visiting the online platform.

The majority of respondents pointed out that they will not consider purchasing a vehicle online due to the inability to test drive and see the vehicle. Therefore, physical test driving of similar car models will be offered before deciding to purchase the EV. During the test drive, the potential customer will get acquainted with the equipped technologies, best EV driving practices and understand how his regular driving habits might be influenced and required to adapt. For example, using 90% of the time just one pedal to take advantage of the regenerative braking technology increases the battery's range

capability. We would offer a 30-day return policy for all the sold cars and give customers a chance to return cars if they did not like driving them. The service will present the return policy as a second test drive, giving the customer the ability to test drive the purchased vehicle, helping the company showcase trust in the quality delivered through the service.

Avoiding traditional dealerships

The conducted research has shown that most of our respondents did not see the vehicle purchasing experience through traditional car dealerships to be positive or satisfying. Furthermore, research showed that most car dealerships are not motivated and prepared for selling EVs as they are gaining less profit from selling cars that require less servicing and technical maintenance. Therefore, collaboration with traditional car dealerships will not be actively sought after at the beginning of the service's launch.

Simplified customer's purchasing journey

Community workshop > Test drive of available EV models > Sign up for community bulk-buy > First payment milestone (around ⬜ of the car's total price) > Car lot is formed > Cars are checked, and battery capacities are tested > Cars are purchased> User receive updates in regards to car's arrival > Cars are checked for quality compliance after arriving in Denmark > Second payment milestone > Cars delivered to the designated pick-up location for customers > Final documents are signed >

Argumentation & reflection on the service concept

Service's advantages

The presented service concept will propose the following values:
— Consumers presented with EV offers will get lower prices compared to other possible EV ownership options in Denmark;

— The service empowers people to become advocates for EV adoption;

— Service encourages sustainable consumption by nudging to purchase second-hand EVs;

— Service's vehicle delivering times are expected to be lower compared to other online EV services;

— The service will introduce a new and more community-oriented perspective for the purchasing experience in comparison to the traditional dealership model;

— The online platform will also be used as an all-in-one digital environment where EV owners will visit to keep up with the practical ownership guiding, industry news, up-dates on regulations and so on;

— Municipalities will be informed on the EV increase level from our side and have bet-ter communication with their residents when it comes to being aware of resident's needs for their EVs and infrastructure;

— The proposed service will evolve to be a significant traffic point for collaborating with charging services which will be recommended by the service, potentially lowering customer's spent research time on charging services and charging station installation;

— Denmark has a well-established energy grid infrastructure with a high percentage of green electricity being delivered to consumers. Increased number of EV owners will help to reduce the import of petrol fuels from other countries and sustain internal en-ergy production.

Service's shortcomings

Also, the service's concept has the following shortcomings and pain points:
— The service concept will be interpreted as "suspicious" at the start. The service will have to spend resources on correctly communicating, showcasing itself as a trustwor-thy and beneficial service;

— The company will not offer a large variety of EV models to choose from;

— Some potential EV owners might be resilient in buying SH EVs due to inability to customise them;

— Some people might have a perception that the company will be "cutting corners" to provide cheaper vehicles;

— Some of the service's customers might be not satisfied with 2-3 month waiting time while getting a second-hand EV.

Foreseen solution's problems

Like any other business, the proposed service concept also has shortcomings that we have tried to identify from the beginning to see if any crucial concept failure points will make our proposed service concept completely unfeasible in reality.

Therefore, we have identified the following problems that our service will face and tried to think about the possible solutions:

Problem #1: Choosing & selling EV models;
Solution #1: Have only a few brands available to choose from depending on what agreements we can get with the international auctioneers;

Problem #2: EV customisation;
Solution #1: Have simple already set packages to choose from as Tesla does;

Problem #3: Relations with local administrations;
Solution #1: It is a significant advantage to be able to collaborate with municipalities as they have many opening for us;

Problem #4: Lack of stakeholder's, especially potential customers, trust in the service;
Solution #1: Advertise and raise the concept from ground level in time;
Solution #2: Use municipalities as a trusted partner, present that they want to help people get more EVs to fight pollution and reach their climate goals;
Solution #3: Have the service on 3rd party review platforms like Trustpilot to increase trust for our customers;
Solution #4: Connect the service's purpose to the existing initiatives like SDG, Copenhagen without diesel and petrol cars before 2030;

Problem #5: How could we prevent people from reselling vehicles to others to earn money;
Solution #1: There will be a limited number of EVs allowed per person and a limit in participating in multiple bulk buys;

Problem #6: How will we handle a more significant number of people interested in buying EVs from us?
Solution #1: If the number of people interested in signing up for the bulk-buy is larger than the offered numbers of EVs, we will offer the possibility of a second collective purchase in that community. The possibility will be presented to the interested community members after ElectricCollective does the necessary research for car models availability from its partners. People will be notified by email;

Problem #7: What happens in case a person decides to withdraw from the waiting list;
Solution #1: He/she/X will have to pay some fees to cover our initial expenses on his regards (e.g. 1000 DKK—actual sum to be later determined);

Problem #8: What do we do if a significant number of people withdraw from the waiting list;

Solution #1: We extend enrolment time for the waiting list and inform the other participants. If the number of participants remains low, we inform participants about price adjustments as the discount level will decrease. If the remaining participants agree with new prices, we proceed with the purchase; otherwise, we cancel the collective purchase.

4.4.2. Developed service's Business Model Canvas

The service concept has been also considered from the business perspective, as this was important for us to identify and present a holistic view of the business correctly.

Method

The Business Model Canvas (BMC) is one of the most accustomed tools in the business world and is used to develop the business model. Osterwalder (2010) developed the tool, and it is composed of 9 elements for which he uses the term 'blocks'. These blocks are: Key Partners, Key Activities, Value Proposition, Customer Relationship, Customer Segment, Key Resources, Channels, Cost structures, and Revenue Streams (Figure 43). The method has been executed using a BMC template and listing down relevant service's attributes in each of the presented blocks.

Key Partners
- Auctioneers (external dealerships)
- Logistic partners
- EVs testing partners
- Insurance partners

Key Activities
- EVs second-hand markets research
- Community workshops
- EVs driving tests
- Communications
- Collecting funds for bulk-buys
- EVs quality compliance check
- Education

Key Resources
- Office space
- Digital presence
- Automations
- Customer service
- EV models for drive tests
- Bank account
- Marketing and communication specialist
- Second hand EV models
- Renting location for workshop, test drive and delivery
- EVs transportation
- EVs testing

Value Proposition
- Affordable EVs
- Lower EVs delivery times
- Engaging communities
- A new way of achieving ownership of a vehicle compared to traditional dealerships experience
- Aiding in speed up development of EVs infrastructure
- Sustaining Denmark's internal energy production and consumption
- Encouraging sustainable consumption
- Service transparency through all stages

Customer Relationship
- Digital & Physical interactions
- Self-Service
- Automated notifications in each stage of the buying process
- Customer service

Channels
- Physical workshops
- Website
- Phone
- Email
- Online marketing
- Local radio ads
- Flyers

Customer Segments
- Communities of private residents
- People looking for an affordable and sustainable private transportation solution
- People in need to change an old car
- People conscious about the environment
- People looking for long-term transportation savings
- EV enthusiasts

Use zoom-in function to see smaller elements

Cost Structure
- Costs to buy EVs are variable depending on the selected models and number of customers in a bulk-buy
- Logistics - variable costs
- Compliance testing of EVs
- Marketing
- Staff
- OPEX (website hosting, phone subscription etc.)

Revenue Stream
- Products sales
- Clients referral for charging stations providers
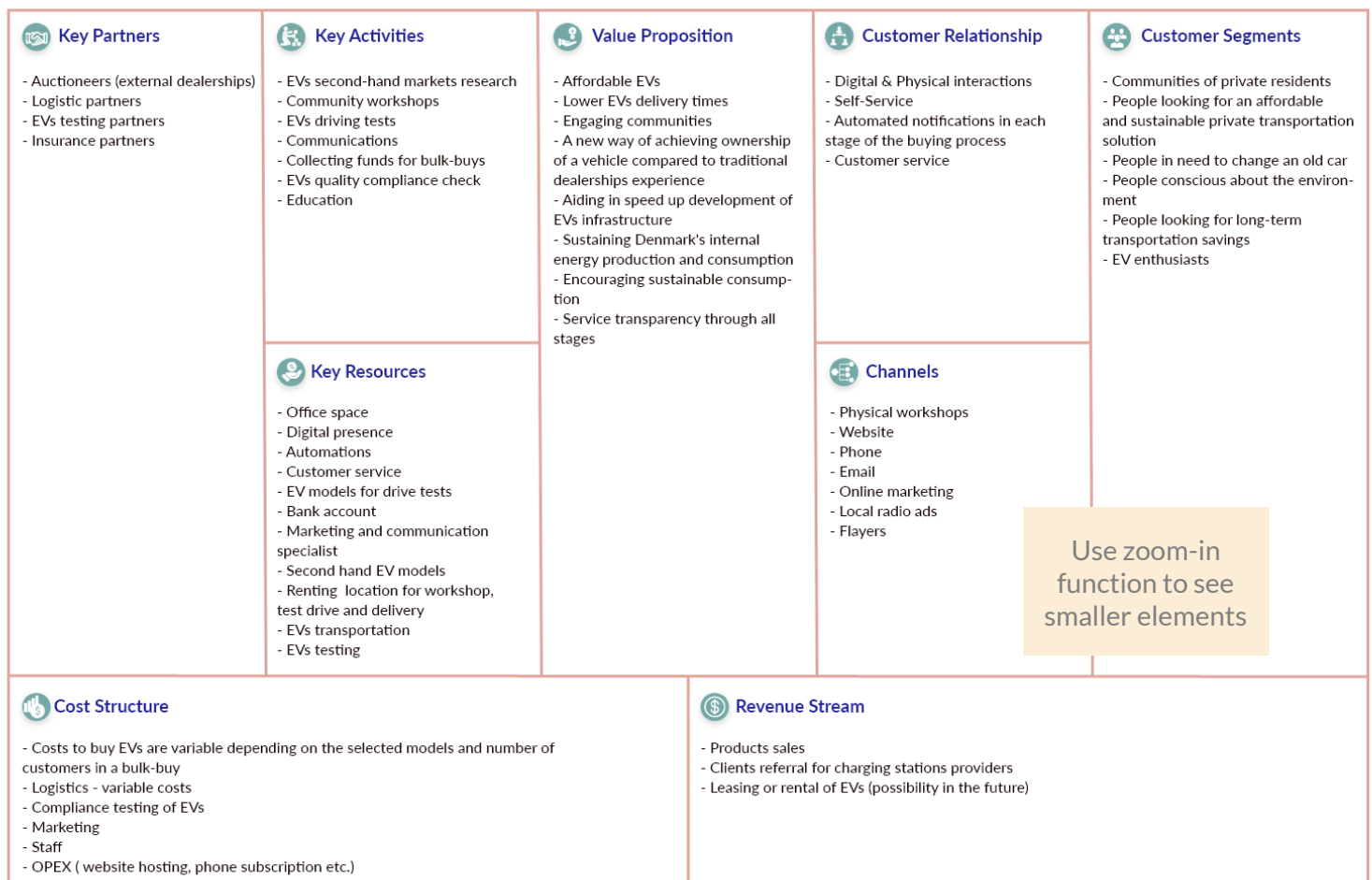- Leasing or rental of EVs (possibility in the future)

Figure 43. Designed service's Business Model Canvas shows service's Customer Relationship, Customer Segment, Key Resources, Key Partners, Key Activities, Value Proposition, Channels, Cost structures and Revenue Streams.

Synthesis

Following the suggested support questions (Appendix J) by Osterwalder (2010) for the BMC template, we have laid down the elements for each block. We have listed our key partners as auctioneers (external dealerships), logistic partners, EV testing partners, and insurance companies. Thinking about what key activities will be needed to deliver our service proposition, we have identified: searching the market for available second-hand EVs, organizing the community workshops, offering EVs for drive tests, communications, collecting the fund for the bulk-buys, checking the sold EVs for quality compliance and education. To carry out our activities, we lined up the key resources required: office space, a digital presence, automation for our systems, customer service, EV models for drive tests, bank account, a marketing and communication specialist, second-hand EV models, renting location for workshop and delivery, transportation and testing for EVs.

Proposed solution's core values aim to offer customers an unique experience that differentiates our service from other services. Our solution focuses on: : EV's affordability, lower EV delivery times, community engagement, a new way of achieving ownership of a vehicle compared to traditional dealerships experience, aiding in speed up the development of EVs infrastructure, encouraging sustainable consumption and service transparency throughout all the stages. The Customer Relationship block reveals how we will interact with the customers, our relationship with them, and what support we will provide. Our proposed service solution aims to offer customers with the following features: : digital and physical interactions possibilities, self-service, automated notifications in each stage of the buying process and customer service.

The customer segments for which we will deliver our value propositions are: communities of private residents, people looking for an affordable and sustainable private transportation solution, people in need to change an old car, people conscious about the environment, people looking for long-term transportation savings and EVs enthusiasts. We will communicate to these segments through the following channels: physical workshops, website, phone, email, online marketing, local radio ads and flyers.

The last two blocks of the BMC focus on the costs in our business model, significant drivers for the costs and how our business will generate revenue. We have identified the following elements that will influence the cost structure: the costs to buy EVs that will be variable depending on the selected models and number of customers in a bulk-buy, logistic costs that will also be variable, prices for EVs compliance testing—also variable, costs for marketing, staff and general OPEX (e.g. website hosting, phone, subscriptions) costs. The revenue will mainly come from product sales and will be

supported in the future by clients referral for charging stations providers and leasing or rental of EVs.

Conclusion

The Business Model Canvas helped to emphasise and showcase the information flow, key partners, and business values. This graphical representation can further help us in brainstorming workshops or business meetings. The presented BMC for Ellectric-Collective.dk (Figure 43) is not a definitive one, and can be used as a base for further development or researching different angles in our business model.

4.4.3. Developed service's Value Network Map

A graphical representation of the critical stakeholders involved in the service and the exchanged values between them was necessary to support the service concept description. The service solution introduces different types of value propositions that stakeholders will share, and mapping this out will more clearly illustrate our concept.

Method

The approach taken was to represent a value network map that is the best fit to communicate and understand the flow of values, such as money, information, goods (Stickdorn et al., 2018) between the service's stakeholders. A value network map is based on a stakeholders map that helps designers explain a system and actively redesign it by either changing or excluding stakeholders and strengthening or weakening their relations (Stickdorn et al., 2018).

Synthesis

The stakeholders have been grouped into 2 categories (Figure 44): primary stakeholders and secondary stakeholders. At the centre of the map is placed the leading service provider ElectricCollective.dk, which interacts and exchanges values with all the listed stakeholders. ElectricCollective.dk acts as a hub in the service system, trading the most significant variation of values. It receives information and products from the auctioneers (external dealerships) through the logistic partners, insurances from insurance companies, compliance certificates from the EV testing partners, and monetary currency from the customers. In exchange, ElectricCollective's offers monetary currency to auctioneers, logistic partners, testing partners, insurance companies and products to customers.

The transfer of values continues from ElectricCollective.dk and the primary stakeholders towards the secondary ones. On this level: the customers receive information from existing EV owners, who also offer valuable feedback to ElectricCollective.dk; Municipalities accept and share information to the core service; Charing solution providers will get information from both ElectricCollective and municipalities and, in return will provide price offers.
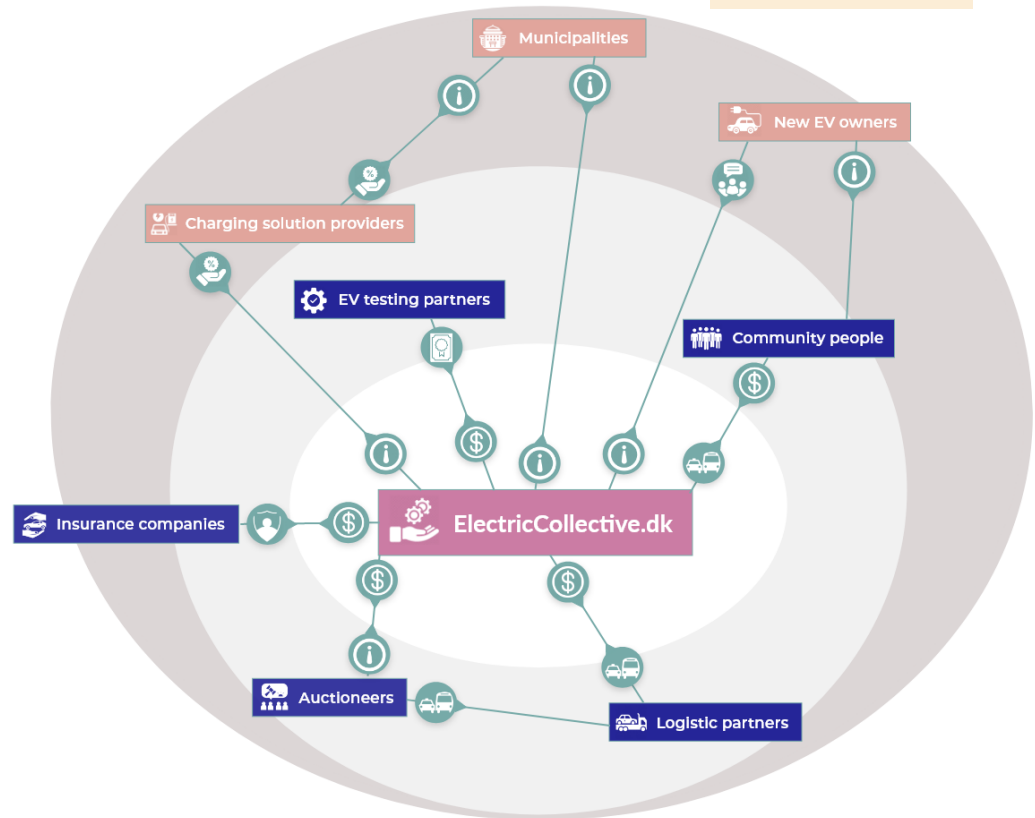
Figure 44. Solution's Stakeholders Value Map links previously introduced service's stakeholders, relations and value exchanges with the service.

Conclusion

The obtained value network map helped efficiently present and describe relationships. The mapping of the system was done from ElectricCollective.dk's perspective and has as placement in time the period after the service will be launched. A further step could be to build upon the existing value network map and achieve an ecosystem map. The ecosystem map would include more actors beyond people and organizations, looking also into human-machine and machine-machine interactions (Stickdorn et al., 2018).

4.4.4. Developed service's Customer Journey Maps

One of the main principles of service design, as Stickdorn and Schneider (2011) presented, is "sequencing". Acknowledging this principle and the importance of illustrating the service experience in a clean manner, we decided to represent the journey of an user interacting with our service solution while purchasing an EV.

Method

For readability reasons, instead of having 1 complex user journey representation, we have decided on splitting it up into 2 visual maps. The combined maps will give a well-structured perspective of the customer's experience while learning about EVs by participating in community workshops, deciding to purchase, and waiting for his order and delivery moment. The customer's interaction points with the service provider portrayed in the 2 representations offer a holistic perspective, where possible gaps in the service delivery can be identified. These gaps can then be addressed to augment the customer's experience with the service positively.

Synthesis

The 1st map depicts a customer's journey throughout the different phases of the purchasing experience and his interactions with the service's touchpoints (Figure 45).

The 2nd map takes a deeper look at the same customer journey, but this time exposes the different relations between the customer and the involved actors in delivering the service throughout the various touchpoints. The desired result of the map is to emphasize the low number of interactions with the service solution needed from the customer's side. As depicted in the representation (Figure 46), most of the interactions will be sustained by indirect ones with the back-end systems. The map also highlights the different roles ElectriveCollective.dk plays as a service provider for the customer. 5 out 6 roles are played by ElectriveCollective.dk. The 6th is played by the 3rd party payment system provider, underlining the low level of actors needed to interact with the customer.

There are some parts of the customer's journey which are not directly influenced by any of the listed actors involved. These parts are also an essential component of the customer experience, and they need to be acknowledged: the waiting period, relatives or friends discussions, 3rd party reviews (Stickdorn et al., 2018).
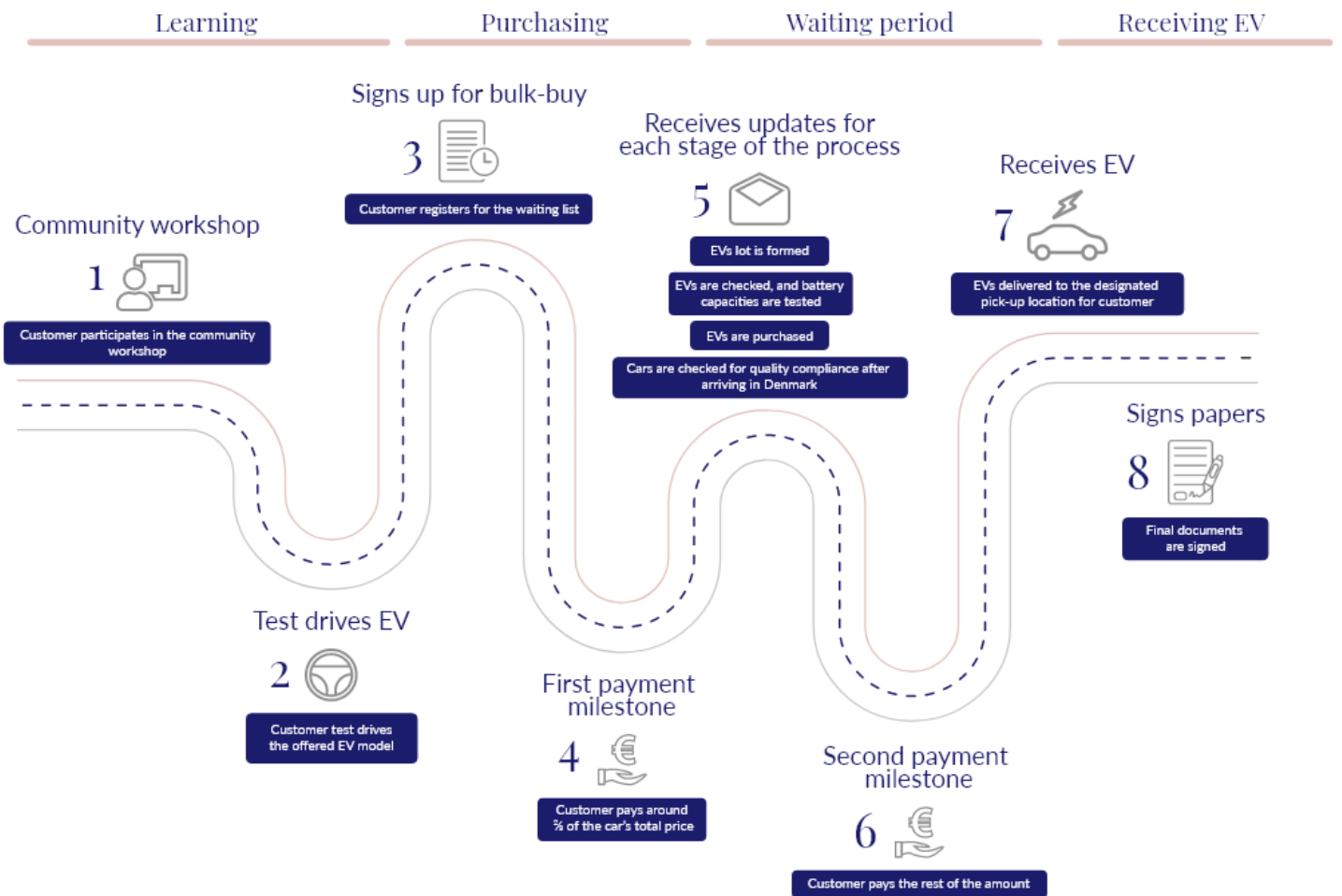
Figure 45. Presented solution's Customer Journey Map is showcasing the EV purchasing process from a customer's perspective.

Actors involved   **Custmomer's service experience**

Customer	Participates in community workshop	Tests drive of presented EV models	Signs up for community bulk-buy	Pays first payment milestone	Checks bulk-buy list	Receives notification on car lot formation
ElectricCollective.dk physical workshop	✓	✓				
ElectricCollective.dk website			✓	✓	✓	✓
ElectricCollective.dk customer service						
Delivery representatives						
Payment system				✓		
Back-end system				✓	✓	✓

Actors involved   **Custmomer's service experience**

Customer	Receives notification on car lot purchasing	Notification on estimated delivery time	Notification on second check up upon arrival in Denmark	Pays second payment milestone	Picks up EV	Signs purchasing documents
ElectricCollective.dk physical workshop						
ElectricCollective.dk website	✓	✓	✓	✓		
ElectricCollective.dk customer service					✓	
Delivery representatives					✓	✓
Payment system				✓		
Back-end system	✓	✓	✓	✓		✓

Figure 46. Purchasing experience map that presents customer's interactions with the involved actors in delivering the service throughout the various touchpoints.

Conclusion

The purpose of the 2 maps was to illustrate the process by which our customers will interact with ElectricCollective.dk in order for them to achieve their goal of purchasing an EV. The customer's journey will be presented in our communication materials, workshops and on the ElectricCollective.dk website to build upon the values we want to share with our clients: trust and transparency.

4.4.5. Developed service's Blueprint

Furthermore we wanted to deliver a more complete mapping of their experience throughout all phases of the purchasing journey for our customers. To do so we needed to represent an even more detailed level of interactions within our service.

Method

To represent these interactions, we chose to use a service blueprint. The service blueprint represents an extension, in our case, of the customer journey map. The service blueprint offers a view of both visible interactions happening on the front-stage and the invisible ones happening in the back-stage needed to deliver the service. Complemented by insights and prototypes of touchpoints, the service blueprint transforms the intangible service into a tangible one for its stakeholders (Stickdorn et al., 2018).

Synthesis

The resulted blueprint visualizes a process scheme that is taking place, from the customers perspective, throughout the EV purchasing phases and the corresponding timeline to execute them (Figure 47). The customer interacts with 3 touchpoints of the service at full length in the front-stage: service representatives, website and EVs. During these interactions, each one happening at various timeline points, the customer executes different actions.

Beneath the line of interaction are the actors with whom the customer has direct contact, and these actors are: service representatives, website and EVs. Each of the actors has one or multiple corresponding actions to the customer's ones. Under the visibility line, in the back-stage, we have the ElectricCollectives's partners: auctioneers (external dealerships), logistic partners and EVs testing partners. Their actions are portrayed during the customer's waiting period and serve as a source of information to update the customer in real-time of their purchase status.

The back-stage is also composed of support processes needed for the service to be delivered properly. These support processes are ElectricCollective.dk's servers, databases and the 3rd party payment processor. The servers process the incoming data and store it in the databases from which it is retrieved whenever needed, either to update the customer or for other internal purposes. The 3rd party processor handles the customer's payment and informs the servers about either its success or failure.
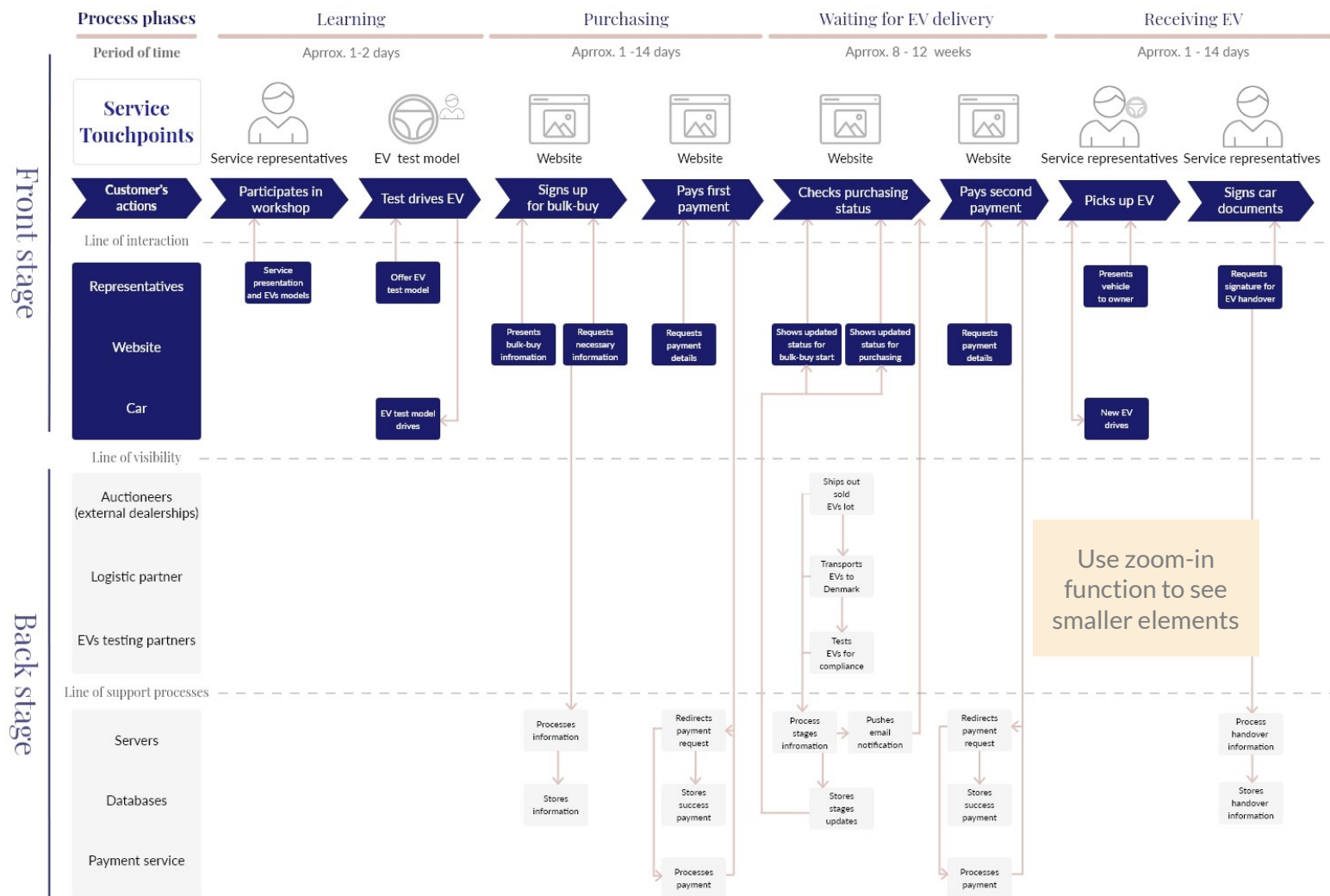
Figure 47. Solution's service Blueprint that focuses on the process of EV purchasing, showcasing how service would operate, for example, process phases, front stage, backstage, user actions and process flow.

Conclusion

The blueprint includes information on internal stakeholders as well as external ones that are key for a successful purchasing experience for our customers. It reveals the requirements for both physical form and digital components of the service .The blueprint can serve as a sound basis for impact analysis and understanding what support, for example, the internal staff will need during the delivery of the service towards our customers (Stickdorn et al., 2018).

4.4.6. Concluding Deliver phase

Based on gathered insights from the Develop phase on the solution's viability, the Deliver phase's convergent process has a detailed explanation of the final service concept and graphical representations of a Business Model Canvas, Value Network Map, Customer Journey Maps and Service Blueprint.

The detailed explanation of the service's concept started by presenting the core idea of the solution, to whom it is addressing and its operating model. As per decided, the named ElectricCollective service's owner and resource provider will be Startup Lighthouse. Primary and secondary stakeholders and their roles are listed and motivation for the service to function using digital and physical touchpoints. Based on the conducted research and gathered insights, both service advantages and shortcomings were identified and presented. The recognised benefits surpass the number of identified weaknesses showing strength in the service concept. Future problems that might counter the service' feasibility have been pinpointed and addressed with either one or multiple solutions.

To communicate our service idea to the relevant stakeholders, we transposed key aspects into tangible deliverables. Deliverables were focused on the business side of the service solution and purchasing experience for the customers. The BMC reflected our view on how the business should run, its key stakeholders, the added values for the customers, resources needed, channels of communication and revenue streams. It will provide a starting point for a future business discussion with our thesis collaborating party and possible investors. With experience in entrepreneurship, Startup Lighthouse will offer us the sparring partner we need to identify gaps in our business model and address them. Service's Value Network Map presents the stakeholders of the service distributed over 3 layers of importance and grouped into 2 categories: primary and secondary stakeholders. Their relationships are illustrated through the exchanged values: information, monetary currency, product, price offer, insurance policies, feedback and compliance certificates. The map is the starting point to develop a service's ecosystem further. An important step was to depict the Customer's Journey through his experience with service during the purchase of an EV. The journey was illustrated into 2 deliverables: a low-detail Customer Journey map and a second, more detailed, map showcasing the customer's interactions during service delivery with the involved actors. These 2 tangible products are key assets in helping the various stakeholders have a holistic view of the service delivery. The service blueprint was designed by building upon the 2 portrayed Customer's Journey Maps, encompassing the learning, purchasing, waiting for delivery and receiving of EV phases. It adds an extra level of

detail by showing internal and external stakeholders involved in the service delivery on the front and backstage, their interactions with customer and support processes.

The challenge of service designers is conveying the intangible aspects of a service. Besides the detailed description of the service concept, the chosen approach was visualization to communicate our solution. The handover deliverables presented in the Deliver phase were developed while relying on previously conducted activities and visualizations that were carried out throughout the design process that encompassed research, define, develop, and test the service concept before delivery.

5. Discussion

The discussion chapter reflects on the thesis' research question by showcasing the used nudges in the developed service concept. It discusses limitations encountered during the design process, overall learning objectives and future research perspectives.

The following chapter is divided into following:
5.1. Limitations;
5.2. Reflections emerging from the design process;
5.3. Reflection on the research question;
5.4. Learning goals / objectives;
5.5. Future research and crisis-management considerations.

5.1. Limitations

We want to take the opportunity in this chapter to acknowledge some limitations, which we believe impacted our research and design process' quality significantly. We will touch upon each of them briefly and explain their impact.

5.1.1. Limitations due to COVID-19

The entire process of our master thesis fell under the 2020-2021 global COVID19 pandemic restrictions and heavily impacted thesis. We hoped that we would have had the possibility to have more physical interaction with different involved actors and stakeholders of our defined service solution. In our pre-planning phase with the collaborating start-up company, several physical workshops were planned to take place on their office premises for the Discover, Define and Develop stages but had to be cancelled and readjusted in the online environment. We encountered numerous delays during interviews, pretotype and prototype testing as our contacts were impacted by the COVID-19 pandemic restrictions prioritising health, family, and work before allocating time to our research. By having the possibility to interact physically, we think the relational co-creative research would have been on a much higher level. Being forced to facilitate activities implicating just one or a maximum of two stakeholders drained the team of precious time resources, both from the organisational point of view and the data processing. COVID-19 made it impossible for us to reach important actors like car dealerships or vehicle manufacturers' representatives as our efforts to contact them were always prompted with answers indicating that resources from their side can't be allocated at the time.

5.1.2. Resources

Also, we have to address limitations regarding necessary resources like sufficient supervision and time allocation for receiving feedback from the start-up side. Our communication with the collaborating organisation was limited to only one representative, making it harder for us to avoid biases from their side when presenting insights, materials or ideas.

Financial resources would have provided to be an incredible asset in our research and prototype stages. Experiencing different existing EV purchasing journeys while acquiring a car or having an opportunity to experience specific touch-points of the purchasing journey would have given us additional valuable insights to adapt better and solidify our service concept. A more in-depth analysis of each touch-point would have shown us different behavioural patterns to improve the nudge used in the service solution.

5.2. Reflections emerging from the design process

5.2.1. Participation in research and testing phases

Participants' involvement was a critical success criterion for our design process. Approaching participants was done through various channels like survey, direct email, Linked-in and other social media platforms. As in specific stages of our design process, we needed to interact with narrowed segments of the target audience, and a more direct approach was needed for us to respect our defined thesis timeline. In this regard, having the current COVID-19 restrictions in mind, we have created flyers placed with the help of our start-up collaborator in the mailboxes of people identified as EV owners during day walks through Copenhagen or the city's suburbs. The flyers contained only a brief description and a QR code directing people to a Google form to trigger people's interest. The form had a more in-depth description of our research goal and offered the possibility for them to leave their email to participate through the various steps of the design process. All personal data processing was done in compliance with GDPR.

Being forced to interact solely online with our stakeholders and because we did not want them to encounter barriers or feeling pressure from our side, we've adapted each time to their desired communication channel. We have allocated special attention to creating detailed but simple user instructions for participants to engage correctly and test both pretotype and prototype as not everyone was either tech-savvy or had knowledge of the tools we've used to present them. As we finalise defining our target audience, we encounter additional complexity in reaching out to it due to time restrictions and the lack of possibility of physically interacting with more community members. Therefore testing phases were done with the already existing pool of participants from our database, limiting the quality and quantity of collected feedback. From the first wave of interviews, many participants agreed to be engaged in multiple phases of the design process if they would fit the scope. We could observe how compared to women, men were more inclined to participate in more in-depth discussions. They tended to feel more knowledgeable and be more secure when it came to car-related questions.

5.2.2. Research phase

The research phase tends to stretch longer than the designer expects. When talking with the client, in our case Startup Lighthouse, we observed how conversations tended to lean more towards the solution and its outcomes. Ideally, we would have preferred to manage the discussions better to avoid initial biases and make the client

more focused on the research phase and its importance in gathering meaningful insights to guide the design process. Avoiding extending the research phase, which for us was prolonged mainly due to the many angles tackled in the client-designer discussions and the vast literature available, is essential. For designers, research is a fundamental step to understand the client-side, the context of the problem and how to best solve it. This process can be shortened, become more organized and precise if, for example, the client has his previous research done and can set some key performance indicators (KPI). It also needs to be acknowledged that too strict KPIs can negatively impact the entire design process. In this case, the designer might need to help in researching the most relevant KPIs.

5.3. Reflection on the research question

At the end of the literature review, we posed the researched question: "How can service design be used to nudge people towards more sustainable lifestyles?". This section presents the leading theory used to produce good nudges by us, service designers, and where these nudges have been applied.

Service design can easily take advantage of the different nudging mechanisms available in today's literature. Developing a good nudge requires the service designer to differentiate between automatic and reflective thinking.

For the service's concept, using nudging theory has resulted in the following approaches: We started by emphasising our selected cars as the preferred option for electric vehicles by offering a limited level of customisations and EV models. Secondly, we incorporated short-term benefits by offering attractive discounts, that in the end, will additionally also provide long term savings. Our would webpage present and promote previous successful community bulk-buys to evidentiate other groups' behaviour. We will make sure to compare our offered prices with those currently offered on the Danish EV market during workshops as often people appraise and take action relying on attractive information.

The nudges that are embedded in our service concept consider 4 out of the 5 key points of interest present by Thaler et al. (2008):
1. Creating a default;
2. Incorporating short-term benefits;
3. Showcasing the group's behaviour;
4. Making it attractive.

The proposed service solution is aiming to nudge communities and individuals towards a more sustainable living by reducing greenhouse gas emissions from fossil fuels. The project's deliverable is a service that enables communities and individuals to reduce pollution levels in the context of where people live, work and the way they travel. The service solution addresses the element of transportation that represents a necessary everyday practice for many people.

5.4. Learning goals and objectives

5.4.1. Official learning objectives

As service designers, we often need to adapt our processes and methods depending on the problem area and service type. Maybe by using another methodology, methods or tools, we could have discovered other aspects of our service solution, but the delivered quality nonetheless would have been at the same level. Putting into practice the design skills acquired so far, in the complex context of sustainability, nudging, and EV adoption, we have managed to polish these skills further and strengthen our ground-based knowledge. We could navigate through an almost endless pool of information around electric vehicles and managed to extract the necessary insights to guide our design process.

Considering the COVID-19 pandemic, the unpredictability of the period and its consequences, as designers, we could plan, adapt, communicate, facilitate and execute the design process solely in an online environment gathering valuable learning for future projects or unpredictable circumstances. We have explored and succeeded in managing our design process professionally and organised with an agile methodology for each of the steps.

5.4.2. Personal learnings

Being our first collaboration with a small start-up, we have learned that we aimed too high expectations-wise. We did not consider the possible lack of experience and available resources, but we have managed to adapt and surpass them. Our experience so far, in previous projects, had us always work around either an existing product or service. This time we were in the position where we had to build up a service solution from scratch. Good management skills and carefully selected methods and tools helped us achieve that.

Research on nudging and how service designers can use it to create impactful and meaningful services gave us a deeper perspective on ethical practices, better identifying the limits of a good nudge and the consequences of bad ones.

Designing the service in the Danish context, interacting with stakeholders, not in their native language and still managing to interconnect with their problems, wishes, visions, motivations, and delivering something meaningful that adds value to people made us optimistic about our acquired skills as service designers. We have now enriched our service designers' tool belts and are ready to embark on new challenges coming our way.

5.5. Future research and crisis-management considerations

By closely following the EV market trends and analysing them, we can forecast and visualise how the Danish market would look in the following years. It is necessary to ensure the longevity of our service concept, knowing how to adapt and strive in an everchanging market with an unstable competitive landscape.

COVID-19 provided an unexpected turn on how people travel to and for work. During this period, many people limited their use of public transportation or car-sharing apps. This will provide in the short-term a surge in demand for cheaper second-cars (Electric Vehicles, n.d.). We see this as good timing for our service solution to enter the market and strengthen its roots while constantly adapting and evolving the concept.

We want to research the implications of having our EV park containing the most sold models from the business point of view, as we see it as a significant improvement in our solution. It would speed up processes and drastically reduce delivery times for our customers.

Further research will be dedicated to examining Danish regulations and how to apply for a dealer license. It would additionally empower us to participate in private auctions restricted to licensed car dealers. Unlike public auctions, we would get access to a broader pool of EVs. Such a pool would include automaker's lease returns, low mileage models from rental companies or EVs, which other dealers couldn't sell quickly.

In the future, we want to research the possibility of extending our concept and explore how we might offer a car-sharing service similar to Drive now or Dribe.dk. As previously analysed in our research, these services are currently offered only in Copenhagen as they are offering new cars and need a more significant market to be profitable. We would be using second hand EVs and serve smaller cities around Denmark with the same purpose.

The core concept of the service applies to other countries across Europe, as the legislation and efforts in achieving climate goals by the European Union are similar for all member states. Cultural barriers, current charging network infrastructure and locally enforced legislation, might need to be researched and studied but should not pose any immediate impediment.

6. Conclusion

The Conclusion chapter converges the key findings that were discovered during the design process. It provides an answer to the thesis's problem statement: "How might we design a service to help change peoples' perception towards EV/hybrid vehicle adoption?"

The thesis presents and explores how Service Design practices can incorporate nudging mechanisms to gently push behavioural changes towards more sustainable consumption and ownership of transportation. Designing a service solution that would nudge people to speed up the transition towards electric-powered vehicles was the case study of this master thesis. Using a robust and well-established framework for the design process has allowed us to examine different Service Design methods through its 4 stages. The Discover phase was where the groundwork for the project was established. In Define and Develop steps, researched data was analysed, synthesised and used in the ideation process, unveiling the service concept and allowing for prototyping and testing stages. Discover and Define phases were the most time-consuming as the vast pool of data available required patience and good organising and synthesising skills. While the Deliver phase took the shortest time, it consolidated our research and ideas in the handed over deliverables.

A solid understanding of the automotive industry and especially the Danish automotive market was necessary. The different methods used to obtain this knowledge helped in comparing, reflecting and validating the gathered insights with the help of industry experts and governmental institution's representatives. They also helped in recruiting participants for upcoming testing stages during the Develop phase. Even though the methods used in the Discover phase were solely in the online environment, no negative impact was depicted besides a longer time frame compared to physical interaction in acquiring input from the participants. The Define phase portrayed the challenges we needed to address during ideation. Gathered insights from interviewed participants, survey analysis and desk research were reflected in the constructed persona profiles, later used in creating customers journeys and different scenarios. With the help of the defined personas and newly synthesised data, we looked towards ideation in the next phase. Before stepping to the Develop stage, the process led us to a narrower scope and improved target audience description that made us redefine the initial problem statement. Ideation techniques, pretotype and prototype tools were used to develop the final concept for the presented service solution. Throughout service concept testing, participants watched our prepared video material for the

pretotyping stage and interacted with a high-level website prototype—representing one of the main touchpoints in the service delivery. During the Deliver phase, tangible materials were prepared as visual representations for the stakeholders to interact with and understand the designed concept and its potential. These deliverables will be used as a starting point for further analysis to identify gaps, improve the service idea, and evolve it later on.

The design process helped understanding people's thoughts and behaviour in regards to electric vehicles. We relied on our design competencies, combining them with the gathered learnings in human behaviour and how the brain reacts in different situations. Using a user-centred approach during the design process and relying on the knowledge of how to affect a person's choice by implementing a series of nudges—we were able to develop the previously presented service solution. The solution tackles different approaches on how to nudge people towards faster adoption of electric vehicles. The nudges were carefully thought and placed in strategic points of the service interaction with the customer to ultimately deliver the positive outcome that any designed service should offer. We have discovered that by giving people information, working on service values or focusing solely on their experience with the service was not enough; the outcome of the service had to be impactful and positive for the long term. With this in mind, the service, with the help of nudges, influences people's behaviour and habits for more sustainable ways of conveying.

7. References

— ACEA. (2021, February). Passenger car sales in selected European countries in 2020, by fuel type. Statista.Com. https://signon.aau.dk/cas/login?service=https%3a%2f%2flogin.zorac.aub.aau.dk%2flogin%3fqurl%3dezp.2aHR0cHM6Ly93d3cuc3RhdGlzdGEuY29tL3N0YXRpc3RpY3MvNTAwNTQ2L3NoYXJlLW9mLWZlZWwtdHlwZXMtb2YtcGFzc2VuZ2VyLWNhci1mbGVldC1pbi1ldXJvcGUtYnktY291bnRyeS8-

— ACEA (European Automobile Manufacturers Association) - Electric vehicles: Tax benefits & purchase incentives in the European Union | ACEA - European Automobile Manufacturers' Association. (2020). Retrieved March 22, 2021, from https://www.acea.be/publications/article/overview-of-incentives-for-buying-electric-vehicles

— ALD Automotive. (n.d.). Who are we? Retrieved 21 February 2021, from https://www.aldautomotive.dk/om-ald/hvem-er-vi

— Broadbent G.H., Drozdzewski D., Metternicht G. (2018). Electric vehicle adoption: An analysis of best practice and pitfalls for policy making from experiences of Europe and the US. Geogr. Compass 12, e12358

— Carlucci F., Cirà A., Lanza G. (2018). Hybrid Electric Vehicles: Some Theoretical Considerations on Consumption Behaviour. Sustainability, 10(4), 1302. https://doi.org/10.3390/su10041302

— Carolin R., George B., Toby P., Neale K. (2020). Driving and accelerating the adoption of electric vehicles in the UK, 239.

— Ceschin F., Gaziulusoy I. (2016). Evolution of design for sustainability: From product design to design for system innovations and transitions. Design Studies, 47, 118-163.

— Danish Ministry Of Climate, Energy and Utilities. (2018, October). Together for a greener future. Kefm.Dk. https://en.kefm.dk/news/news-archive/2018/oct/together-for-a-greener-future

— Danish Ministry of Climate, Energy and Utilities. (2019, December). Denmark's Integrated National Energy and Climate Plan. https://ec.europa.eu/energy/sites/ener/files/documents/dk_final_necp_main_en.pdf

— Design Council. (2015, March). Design methods for developing services. https://www.designcouncil.org.uk/sites/default/files/asset/document/Design%20methods%20for%20developing%20services.pdf

— Design Council. (2019a, September). What is the Framework for Innovation? Design Council's evolved Double Diamond.

— Design Council. (2019b, October). The Double Diamond: A universally accepted depiction of the design process. https://www.designcouncil.org.uk/news-opinion/double-diamond-universally-accepted-depiction-design-process

— Design Council (c)(2014). Design in the Public Sector. Available: http://www.designcouncil.org.uk/projects/design-public-sector

— Dribe.dk. (2021a, January 19). Hvorfor skal du vælge Dribe frem for at lease eller købe bil? Få svaret her. Dribe. https://dribe.dk/fordelene-ved-at-dribe/#sammenligningstabel

— Dribe.dk. (2021b, March 4). VW up! Dribe. https://dribe.dk/garagen/vw-up/?ym=true

— Electric vehicles. (n.d.). Deloitte Insights. Retrieved April 19, 2021, from https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/electric-vehicle-trends-2030.html

— European Automobile Manufacturers' Association. (2020, May). The Future of the EU Auto Industry. ACEA - European Automobile Manufacturers' Association. https://www.acea.be/industry-topics/tag/category/the-future-of-the-eu-auto-industry

— European Environment Agency. (2016). Electric vehicles in Europe. Publications Office. https://data.europa.eu/doi/10.2800/100230

— European Environment Agency. (2020, December). New registrations of electric vehicles in Europe. https://www.eea.europa.eu/data-and-maps/indicators/proportion-of-vehicle-fleet-meeting-5/assessment

— Field C. B., Barros V. R., & Intergovernmental Panel on Climate Change (Eds.). (2014). Climate change 2014: Impacts, adaptation, and vulnerability: Working Group II contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

— Figma, Inc. (2016, September). About Figma, the collaborative interface design tool. Figma. https://www.figma.com/about/

— Fleischmann K. (2020). Designers as change agents in the Circular Economy. Discern: International Journal of Design for Social Change, Sustainable Innovation and Entrepreneurship, 1(1), 99-118.

— Foglieni F., Maffei S., Villari B. (2018). Designing Better Services: A Strategic Approach from Design to Evaluation (1st ed. 2018). Springer International Publishing⹂: Imprint: Springer. https://doi.org/10.1007/978-3-319-63179-0

— Fullerton B.(2009). "FEATURE Co-creation in service design," interactions, vol. 16, pp. 6-9.

— Galbraith. B. (2013). The Designer Nudge: Defining the Role of Design in Behaviour Change

— Girling R. (2012). "21st Century Design. Shaping Behavior for Preferable Outcomes," Artefact.

— Goldstein D. G., Johnson E. J., Herrmann A., Heitmann M. (2008). Nudge your customers toward better choices, Harvard Business Review, vol. 86, pp. 99-105

— GoMore.dk. (n.d.). Privatleasing af Tesla 3 Standard Range Plus. GoMore. Retrieved 20 February 2021, from https://gomore.dk/leasing/11915-tesla-3-standard-range-plusGoogle. (n.d.). Premium video meetings. Now free for everyone. Google Meet. Retrieved February 21, 2021, from https://meet.google.com/unsupported?ref=https://meet.google.com/

— Google. (n.d.). Premium video meetings. Now free for everyone. Google Meet. Retrieved 21 February 2021, from https://meet.google.com/unsupported?ref=https://meet.google.com/

— Greencarlane. (n.d.). LinkedIn. Retrieved February 2021, from https://www.linkedin.com/company/greencarlane/

— Haug A., Busch J. (2014). A framework of Ethical Nudges in the design of consumer goods.

— Hollins G., Hollins B. (1991). Total Design: Managing the Design Process in the Service Sector. London: Pitman.

— Hougaard, E. (2020, December 1). Få en delevenlig leasingbil | GoMore Blog. GoMore. https://gomore.dk/blog/fa-en-delevenlig-leasingbil

— Johnson S. (2020, November 25). Service Safaris: Understand How Corporate IT is Really Used. ITSM.Tools. https://itsm.tools/service-safaris-understand-how-corporate-it-is-really-used/

— Kallbekken S., Sælen H. (2012). "Redusert matavfall - resultater fra eksperimentet".

— Kimbell L. (2011). Designing for service as one way of designing services. International Journal of Design 5 (2): 41-52.

— Kolb B. (2008). Marketing Research: A Practical Approach (1st ed.). SAGE Publications Ltd.

— Kolko J (2015). Design Thinking Comes of Age. Harvard Business Review,

— Leonard T. C., Thaler R. H., & Sunstein C. R. (2008). Nudge: Improving decisions about health, wealth, and happiness. Constitutional Political Economy, 19, 356–360. https://doi.org/10.1007/s10602-008-9056-2

— Lewis M. (2019, October 19). Introduction to Service Safari. IXD@Pratt. http://ixd.prattsi.org/2019/10/introduction-to-service-safari/

— Lilley D., Lofthouse V., Bhamra T. (2005). "Towards instinctive sustainable product use".,

— Lilley D. (2009). "Design for sustainable behaviour: strategies and perceptions," Design Studies, vol. 30, pp. 704-720.

— LinkedIn Corporation. (n.d.). LinkedIn: Log In or Sign Up. LinkedIn. Retrieved February 25, 2021, from https://www.linkedin.com/

— Livework. (2017, March 6). Service Scenarios. Liveworkstudio. https://www.liveworkstudio.com/tools/service-scenarios/

— Lockton D., Harrison D., Stanton N. A. (2009)."Choice Architecture and Design with intent".

— Mager B. (2010). Service Design: An Emerging Field. Designing Services with Innovative Methods, edited by Satu Miettinen, and Mikko Koivisto, 28–43. Helsinki: University of Art and Design.

— McCollum D., Krey V., Kolp P. et al.(2014). Transport electrification: A key element for energy system transformation and climate stabilization. Climatic Change 123, 651–664. https://doi.org/10.1007/s10584-013-0969-z

— Meroni A., Sangiorgi D. (2011). Design for services. Gower.

— Microsoft. (n.d.). Chat, Meetings, Calling, Collaboration | Microsoft Teams. https://www.microsoft.com/en/microsoft-teams/group-chat-software

— Mirsch T., Lehrer C., & Jung R. (2017). Digital nudging: Altering user behavior in digital environments. In Towards thought leadership in digital transformation: 13 (pp.634–648). Internationale Tagung Wirtschaftsinformatik.

— Morelli N., de Götzen A., Simeone L. (2020). Service Design Capabilities (Springer Series in Design and Innovation (10)) (1st ed. 2021 ed.). Springer.

— Morelli N., de Götzen A., Simeone L. (2021). Service Design Capabilities (Vol. 10). Springer International Publishing. https://doi.org/10.1007/978-3-030-56282-3

— Morelli N., Tollestrup C. (2007). New Representation Techniques for Designing in a Systemic Perspective. Nordes 07 Conference. https://vbn.aau.dk/ws/portalfiles/portal/12648391/representation_techniques_for_design_in_a_systemic_perspective

— Moritz S. (2009). Service design: Practical access to an evolving field. Lulu.com.

— NIO To Launch Power Swap Station 2.0: Battery Swapping To The Next Level. (n.d.). InsideEVs. Retrieved March 22, 2021, from https://insideevs.com/news/465195/nio-launch-power-swap-station-20/

— Oliver A., Brown L. D. (2012). "A consideration of user financial incentives to address health inequalities," Journal of health politics, policy and law, vol. 37, pp. 201-226

— Osterwalder A. & Pigneur Y. 2010. Business Model Generation. A Handbook for Visionaries, Game Changers, and Challengers. Hoboken, New Jersey:John Wiley & Sons, Inc.

— Oxford University Press. (2014, 25.11.). Nudge. Available: http://www.oxforddictionaries.com/definition/english/nudge?searchDictCode=all

— Pakravan M. H., MacCarty N. (2020). What Motivates Behavior Change? Analyzing User Intentions to Adopt Clean Technologies in Low-Resource Settings Using the Theory of Planned Behavior. Energies, 13(11), 3021. http://dx.doi.org.zorac.aub.aau.dk/10.3390/en13113021

— Pantazis V., Otrok M. (2020). The Role of Service Design in Startups: Exploring Potential Benefits and Challenges from Service Designers' Perspectives. https://doi.org/10.13140/RG.2.2.11888.69122

—Promotion of Electric Mobility in the European Union—Overview of Project PROMETEUS from the Perspective of Cohesion through Synergistic Cooperation on the Example of the Catching-Up Region. (2021). Sustainability, 13(3), 1545. http://dx.doi.org.zorac.aub.aau.dk/10.3390/su13031545

— Quak H., Nesterova N., van Rooijen T. (2016). Possibilities and barriers for using electric-powered vehicles in city logistics practice. Transp. Res. Procedia 12, 157–169.

— Rainford P., Tinkler J. (2011). Designing for nudge effects: how behaviour management can ease public sector problems

— Reason B., Løvlie L., Flu B. M. (2015). Service Design for Business: A Practical Guide to Optimizing the Customer Experience (1st ed.). Wiley.

— Rezvani Z., Jansson J., Bodin J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. Transp. Res. Part D Transp. Environ. 34, 122–136

— SAE International Releases J2954 Wireless Charging Standard. (n.d.). InsideEVs. Retrieved March 22, 2021, from https://insideevs.com/news/450548/sae-j2954-wireless-charging-standard/

— Scenario Mapping for Design Exploration. (2019, August 23). [Video]. YouTube. https://www.youtube.com/watch?v=dmlFRCZI9gQ

— Schneider C., Weinmann M., vom Brocke J. (2018). Digital nudging: Guiding online user choices through interface design. Communications of the ACM, 61, 67–73.https://doi.org/10.1007/s12599-016-0453-1

— Selinger E., Whyte K. (2011). "Is there a right way to nudge? The practice and ethics of choice architecture," Sociology Compass, vol. 5, pp.923-935.September 2015.

— ServiceDesignTools.org. (n.d.). Stakeholders Map. Retrieved 27 February 2021, from https://servicedesigntools.org/tools/stakeholders-map

— Startup Lighthouse. (2020). The Hub. https://thehub.io/startups/startup-lighthouse

— Statharas S., Moysoglou Y., Siskos P., Zazias G., Capros P. (2019). Factors Influencing Electric Vehicle Penetration in the EU by 2030: A Model-Based Policy Assessment. Energies, 12(14), 2739. https://doi.org/10.3390/en12142739

— Stickdorn M., Hormess M. E., Lawrence A., Schneider J. (2018). This Is Service Design Doing: Applying Service Design Thinking in the Real World (1st ed.). O'Reilly Media.

— Stickdorn M., Schneider J. (2010). This Is Service Design Thinking. Amsterdam: BIS Publishers.

— Stickdorn M., Schneider J. (2011). THIS IS SERVICE DESIGN THINKING: Basics, Tools, Cases. WILEY.

— Stickdorn M. S., Jakob (2011). This is Service Design Thinking. Hoboken, New Jersey, USA: John Wiley & Sons, Inc.

— Sun Q. (2020). Towards a New Agenda for Service Design Research. The Design Journal 23 (1): 49–70.

— Sunstein C. (2015). "The Ethics of Nudging". In: Yale Journal on Regulation 32 ,pp. 413–450.

— Tal G. Kurani, Jenn K., Chakraborty A., Hardman D. S., Garas D. (2020). Electric Cars in California: Policy and Behavior Perspectives. In M. Contestabile, G. Tal, & T. Turrentine (Eds.), Who's Driving Electric Cars (pp. 11–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-38382-4_2

— Teece D. J. (2018). Tesla and the Reshaping of the Auto Industry. Management and Organization Review, 14(3), 501–512. https://doi.org/10.1017/mor.2018.33

— Tesla. (2014, December 11). Sådan gør Tesla: Distribuering og servicering af biler. Tesla Danmark. https://www.tesla.com/da_DK/blog/tesla-approach-distributing-and-servicing-cars?redirect=no

— Tesla. (2021, March 2). Ofte stillede spørgsmål - Bestilling og levering. Tesla Danmark. https://www.tesla.com/da_DK/support/frequently-asked-delivery-questions

— Thaler R. H., Sunstein C. R., & Balz, J. P. (2012). Choice architecture. The Behavioral Foundations of Public Policy. https://doi.org/10.2139/ssrn.1583509

— Thaler R. H., Sunstein C. R. (2008), Nudge: Improving decisions about health, wealth, and happiness: Yale University Press.

— The fun Theory (2009). https://www.youtube.com/watch?v=2lXh2n0aPyw

— The Interaction Design Foundation. (2020, July 31). Design Scenarios - Communicating the Small Steps in the User Experience. https://www.interaction-design.org/literature/article/design-scenarios-communicating-the-small-steps-in-the-user-experience

— Toepoel V. (2016). Developing the Survey: Questions and Answers. Doing Surveys Online, 02–36. https://doi.org/10.4135/9781473967243.n2

— Trustpilot. (n.d.). Anmeldelser på Trustpilot – Oplev effekten af kundeanmeldelser. Retrieved May 10, 2021, from https://dk.trustpilot.com/

— Van Der Straten P., Wiegmans B.W., Schelling A.B. (2007). Enablers and barriers to the adoption of alternatively powered buses. Transp. Rev. 27, 679–698

— Vassileva I., Campillo J. (2017). Adoption barriers for electric vehicles: Experiences from early adopters in Sweden. Energy Volume 120, 632–641.

— Volkswagen. (2017, November 9). ID. CROZZ II and the ID. Family. Volkswagen Newsroom. https://www.volkswagen-newsroom.com/en/id-crozz-ii-and-the-id-family-2608

— Volkswagen. (2020, October). Volkswagen fordelsprodukter - Se hvad du får med. https://www.volkswagen.dk/da/min-bil/Fordelsprodukter.html

— Volkswagen. (n.d.-a). Byg din Volkswagen. Retrieved 21 February 2021, from https://www.volkswagen.dk/da/byg-din-bil.html/__app/%2F30205%2Fpolo-trendline.app?category-app=private&carlineId-app=30205&salesGroupId-app=33415&trimName-app=Trendline Volkswagen. (n.d.-b). History. Volkswagen Newsroom. Retrieved 21 February 2021, from https://www.volkswagen-newsroom.com/en/history-3693

— Volkswagen. (n.d.-c). Sales and Marketing. Volkswagen Newsroom. Retrieved 21 February 2021, from https://www.volkswagen-newsroom.com/en/sales-and-marketing-3699

— Volkswagen. (n.d.-d). Volkswagen User-ID. Volkswagen Newsroom. Retrieved 21 February 2121, from https://www.volkswagen-newsroom.com/en/volkswagen-user-id-3962

— Voss Christopher A. (1992). Measurement of INNOVATION and Design Performance in SERVICES. Design Management Journal (Former Series) 3 (1): 40–46. doi:10.1111/j.1948-7169.1992. Tb00586.x.

— Wagner I. (2021a, March). Number of public electric vehicle charging stations in Europe from 2010 to 2020. Statista.Com. https://www-statista-com.zorac.aub.aau.dk/statistics/955443/number-of-electric-vehicle-charging-stations-in-europe/

— Wagner I. (2021b, March). Size of the global market for electric vehicles in 2019 and 2027 (in billion U.S. dollars). Statista.Com. https://www-statista-com.zorac.aub.aau.dk/statistics/271537/worldwide-revenue-from-electric-vehicles-since-2010/

— Wagner I. (2021c, March). Estimated plug-in electric light vehicle sales worldwide from 2015 to 2020. Statista.Com. https://signon.aau.dk/cas/login?service=https%3a%2f%2flogin.zorac.aub.aau.dk%2flogin%3fqurl%3dezp.2aHR0cHM6Ly93d3cuc3RhdGlzdGEuY29tL3N0YXRpc3RpY3MvNjY1Nzc0L2dsb2JhbC1zYWxlcy1vZi1wbHVnLWluLWxpZ2h0LXZlaGljbGVzLw--

— Walter A. (2011). Designing for Emotion: A book apart

— Weinmann M., Schneider C., vom Brocke J. (2016). Digital nudging. Business & Information Systems Engineering, 58, 433–436.

— Wenar L., "John Rawls", The Stanford Encyclopedia of Philosophy (Spring 2017 Edition), Edward N. Zalta (ed.), https://plato.stanford.edu/archives/spr2017/entries/rawls/.

— Xue Y., You J., Shao L. (2014). Understanding socio-technical barriers to sustainable mobility–insights from demonstration program of EVs in China. Probl. Ekorozw. Probl. Sustain. Dev. 9, 29–36.

— Yong T.; Park C. (2017). A qualitative comparative analysis on factors affecting the deployment of electric vehicles. Energy Procedia 128, 497–503.

— Zoom Video Communications, Inc. (n.d.). Video Conferencing, Web Conferencing, Webinars, Screen Sharing. Zoom Video. Retrieved February 21, 2021, from https://zoom.us/

8. Appendix

Appendix A– Online survey: respondents' answers

Future perspectives on buying a car

27 responses

Publish analytics

What city do you live in?

27 responses
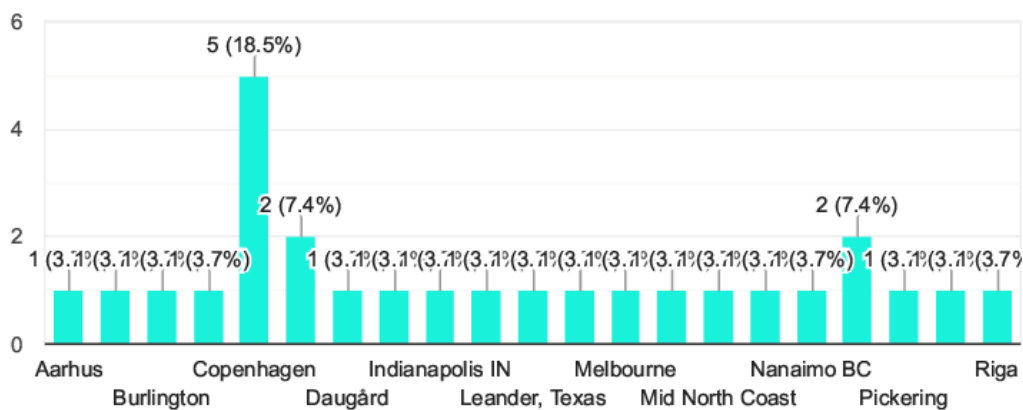
What car do you own today?

27 responses
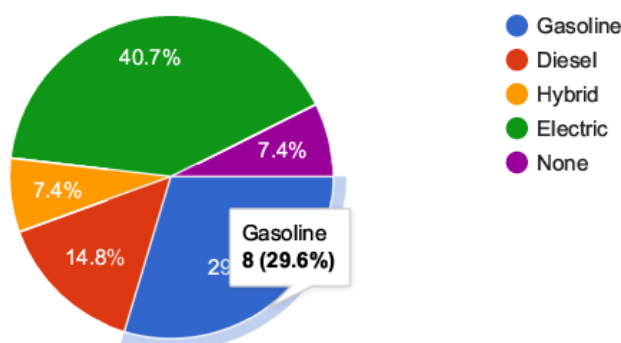
Owning a car

Based on your previous vehicle acquisition experience - if you would need to buy another car - where would you start?

25 responses

- 🔵 Ask friends, family, co-workers
- 🔴 Ask car dealership
- 🟠 Do a search online
- 🟢 Go directly to car brand's website
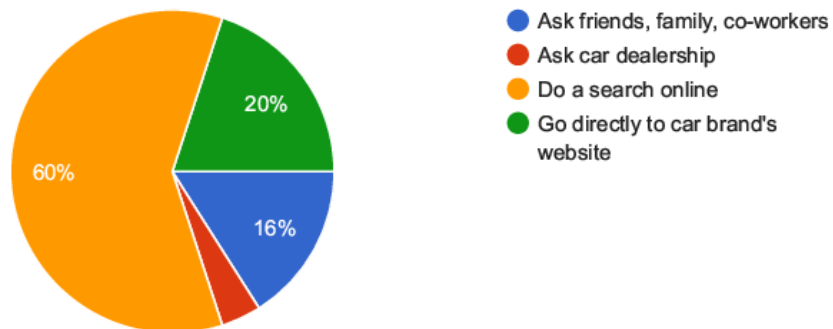
Not owning a car

If you were to search for information about cars, where would you start?

2 responses

- 🔵 Ask friends, family, co-workers
- 🔴 Ask car dealership
- 🟠 Do a search online
- 🟢 Go directly to car brand's website
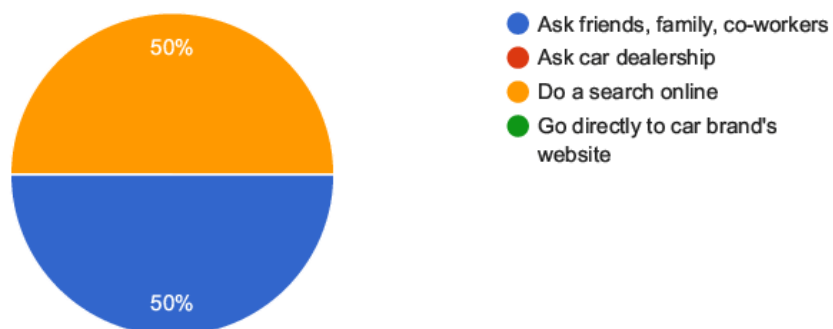
Car dealership experience

If you have tried to get information at a car dealership, did you feel informed enough afterwards to move forward in your search for and purchase of a car?

6 responses
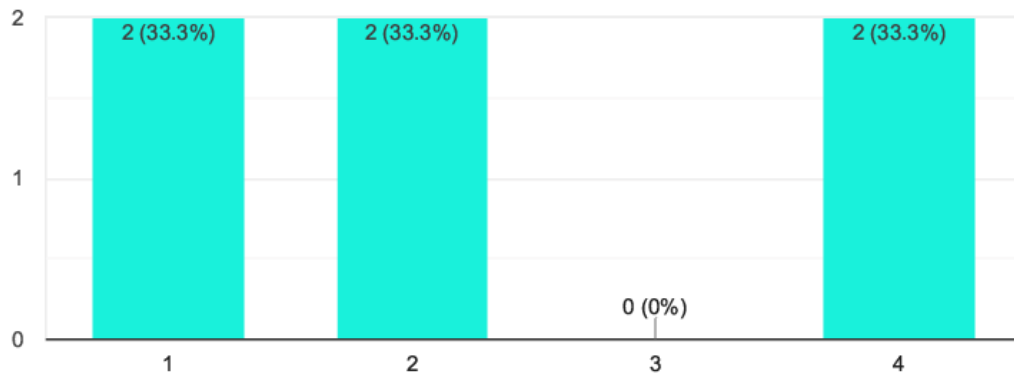
How did the interaction with the car dealership make you feel? Choose all that apply.

6 responses
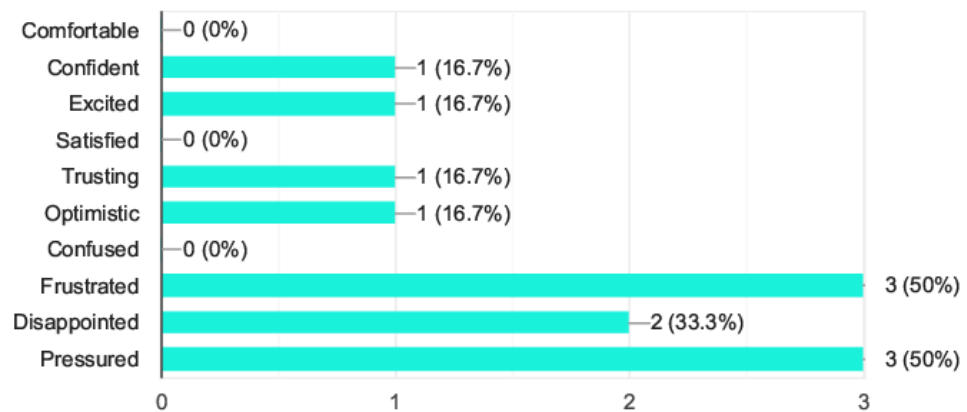
What feedback do you have on car dealerships?

6 responses

-

Was not a dealer but a display show room. No commision, just information

Learn your product. Electric cars need you to learn before you try to sell them.

I bought a Tesla. I don't think I will ever by from a dealership again

Informative

Salespeople need to more information about the vehicle - i.e. transmission type, winterized features, etc. Customer satisfaction should come before commission. Pressuring someone to buy a car on the spot when they aren't ready may lead to the wrong purchase. I would say its unethical to try to manipulate someone into taking on the max debt they are allowed.

Online searching

When gathering information about cars, at what point do (would) you rely on online search?

11 responses

- After asking friends, family, co-workers
- After going to the car dealership
- Before talking to anyone
- After asking friends, family, co-workers BUT before going to car dealership
- Other

27.3%
18.2%
36.4%
18.2%
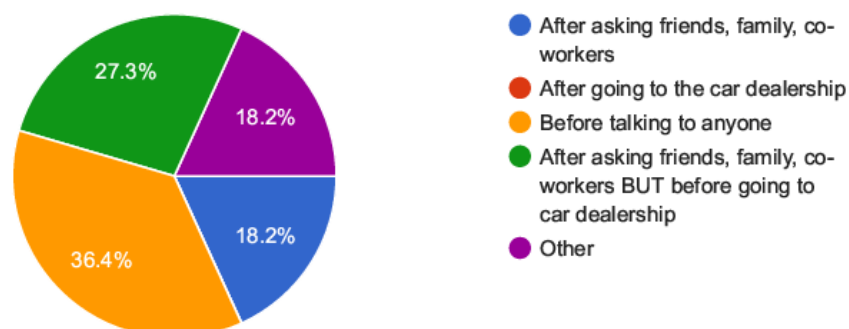
Online experience

If you have tried to (would) search for information online, did (would) you feel informed enough, based on what you found, to move forward in your search for and purchase of a car?

27 responses
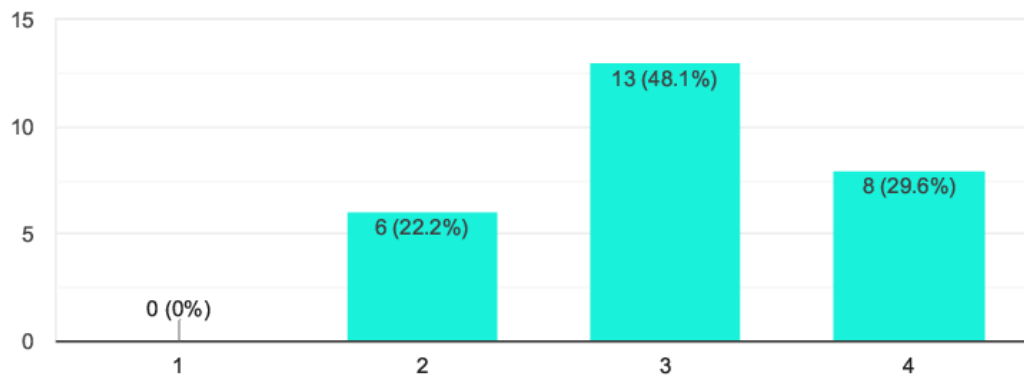
How did (would) the online search make you feel? Choose all that apply.
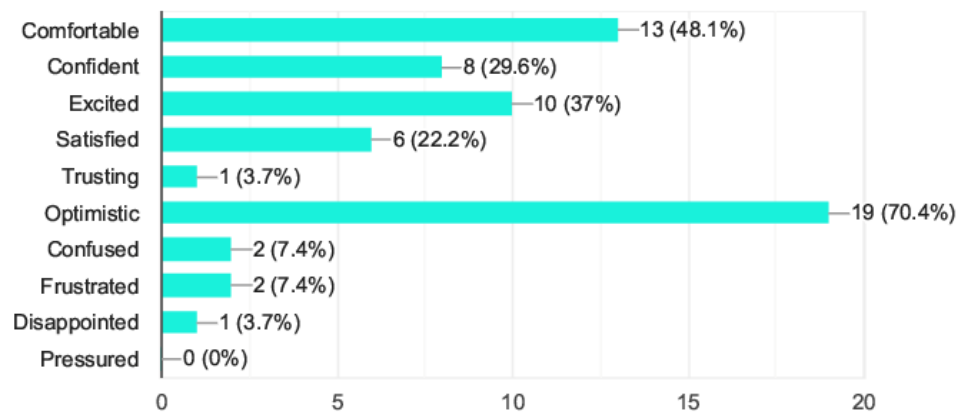
27 responses

What feedback can (would) you share with us about your online search for information?

27 responses

Search, find options try the model

-

Enough information avaiable

Social media posts from real world users carries more weight than press releases and company FAQs

I find the car sales apps frustrating when I can't see the EV battery size or state of health clearly displayed. The apps don't have a spot for that info yet, and few put it in the write up about the car. This is the most important info about a car and it's crazy that they don't have that yet.

Look for range. Kms.. reviews and options.

Attempt to get many independent reviews

What websites did (would) you visit?

27 responses

Bilbasen

-

Youtube, facebook (owner groups), reddit

Carsales.com (its app mostly)

Random search electric cars.

Auto manufacturers, car reviews, forums

Facebook Google

Any that have reliable and current info

FDM.dk

Let's imagine you are buying a car

If you are (or would be) looking to get a car, what type of car would it be?

27 responses

- ● Gasoline
- ● Diesel
- ● Hybrid
- ● Electric

70.4%

11.1%

18.5%
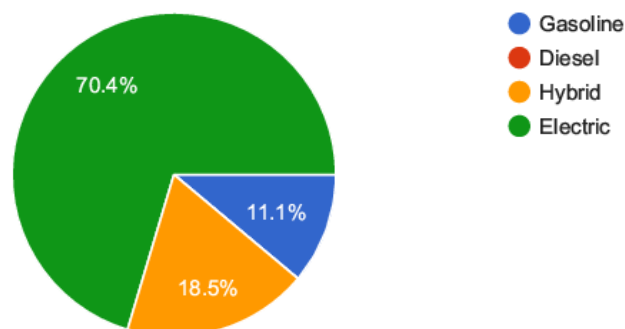
What is the reason behind your choice to the previous question?

27 responses

Environment and now bigger selection

-

To contribute to CO2 reduction

I'm never going to buy a car that takes liquid fuel ever again in my life.

Environmental reasonings, but also long term economic reasons. They are simply cheaper to run. No brainer.

Gas I save driving to work 150Km a day pays for half the vehicle. Then subtract the maintenance because there is none like about 300 a month for my old van and my new car is the same price as running old van with problems each week. No maintenance frees up my weekends now.

Once you go full EV you never go back.

What is most important for you when choosing a car?

27 responses

- Brand loyalty
- Best package deal (car, insurance, car taxes, incentives, fuel/charging price, etc)

85.2%

14.8%
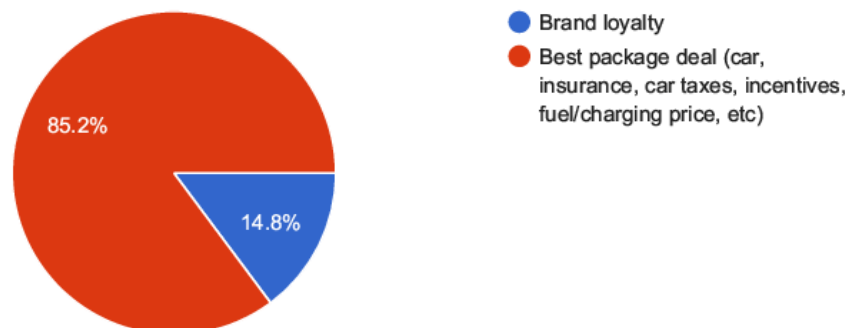
What do you expect to get out of your search for information? What would be helpful to you?

27 responses

Easy comparison

-

Expected life time of the battery

Can it tow? What's it's like to charge on a long trip? Can you add X features?

Battery information is everything to me.

Milage.. issues with car (reviews), options

Facts on performance and reliability

Charging real life range

Unbiased reviews, detailed information on features in an easy to understand format

What information would make you comfortable in your decision when buying a car?

27 responses

Good dealership reviews

-

All-in-all information.

Data to support a Yes to my questions.

I like to feel confident that the person I'm buying from actually understands the car. When I've been to dealerships in the past they have been complete space cadets when I ask them about EV's. I shouldn't have to teach them.

True Price expected to pay biweekly

Positive independent reviews

Real life range

Dealerships vs. searching online

Would you rather buy through physical car dealerships or would an online car dealership meet your needs (including scheduling test and purchase)?

27 responses

- Physical car dealership
- Online car dealership

63%

37%
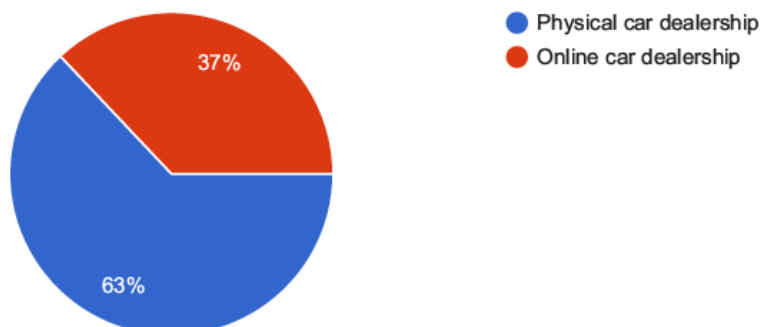
Choosing an online car dealership

What is the reason behind you choosing the online car dealership?

10 responses

-

Avoid the pushy sales people

No pushy sales person

I wish to get around the sales-talk, but I do need to try out before I buy

Ease.

I despise the traditional dealership experience.

Local dealers barely know what an EV is.

There's no real reason to have to pay for a salesman to hold your hand through the
buying process, everything can be coordinated online just as easily

Simplicity and I don't want to talk to anyone

Choosing a physical car dealership

What is the reason behind you choosing the physical car dealership?

17 responses

Want to try the car

Trust

If I can't sit in it before purchase, I won't buy it.

test drive matters. Inspecting the quality of the car, seeing how the driving position and cabin feel to my body.

I can go back them and hold them to their word or repairs when needed.

Inertia

Like to see what I'm buying and have the opportunity to test drive

Nothing can replace the feel of the car

I want to see the car and to sit in it, and drive it

What would it take for you to buy a car through an online car dealership?

17 responses

Don't know

Reputation of the online dealer

If I can't sit in it before purchase, I won't buy it.

Huge financial savings. That's really all I can think off. If it's a bargain, but I hate the car, I can probably sell it in 6 months without losing much money.

Knowledge that after I purchase the dealer can take over warranty repairs.

Trust

Better price, confidence that the product is as advertised

A place to see and test it

That I can try th car

About Electric & Hybrid cars

With the discussions going on about electric & hybrid cars, how informed do you feel about those car categories?

27 responses
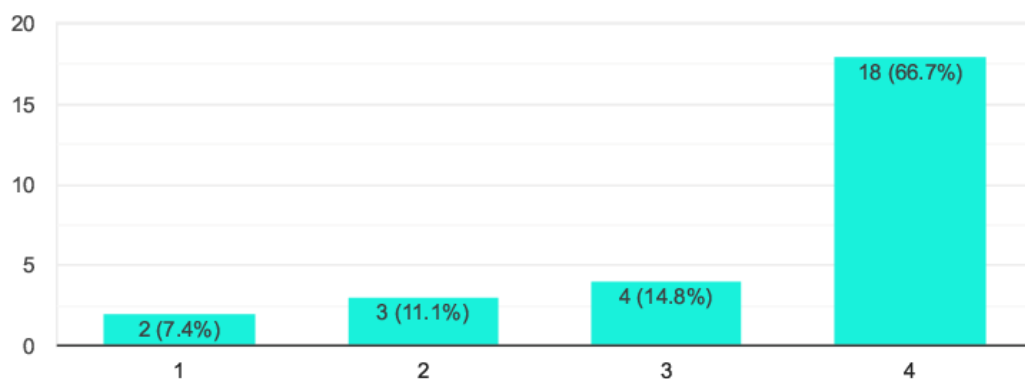
What is your opinion about electric vehicles and hybrids?

27 responses

My next car

-

Cars are ok, but infrastructure (loading possibilities) not good enough, yet.

Gas is dead, hybrids are a joke, electric is the only future.

We shouldn't be selling anything but hybrid and plug in cars. Full petrol cars will become stranded assets sooner than people realise. Usually cars last 20 years. Who's going be paying the running costs of a hilux in 10 years when an EV truck will cost almost nothing to run, and probably be cheap to buy. It's crazy to me that anyone is buying cars that will plummet in value soon.

Hybrids don't save enough gas for the money you pay for them.

Electric is the future, hybrid is not and are not much better than full ICE vehicles.

Almost done!

Please select your age range.

27 responses

- 18 - 24
- 25 - 29
- 30 - 34
- 35 - 42
- 43 - 50
- +51

29.6%
7.4%
11.1%
25.9%
22.2%
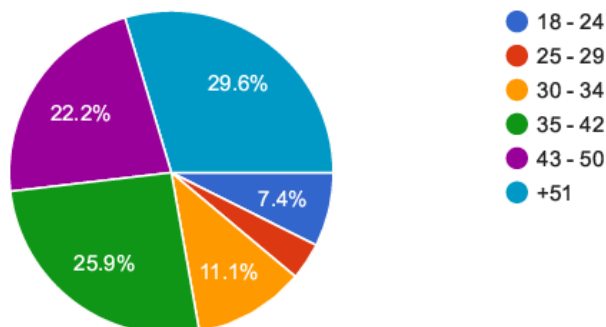
Yearly gross income (USD) – if from other country please convert.

27 responses

- $40,000 - $50,000
- $50,001 - $65,000
- $65,001 - $80,000
- $80,001 - $100,000
- $100,001 - $150,000
- $150,001+

18.5%
14.8%
25.9%
11.1%
14.8%
14.8%
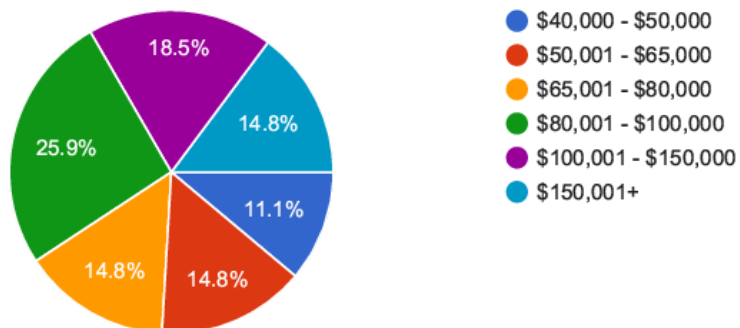
Gender identity

27 responses
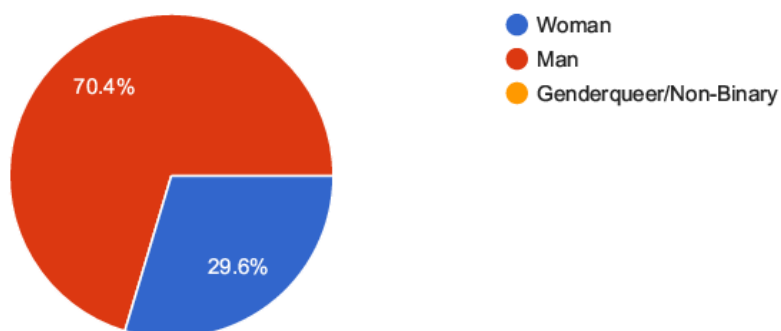
- Woman
- Man
- Genderqueer/Non-Binary

70.4%
29.6%

Google Forms

Appendix B–User Interviews: ICEV-PHEV-EV owners from Canada & Denmark

Interview with Carolina Pedersen / SEM04.Thesis

Questions for FV owners

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to an experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up for telling us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electrical vehicles, we will also ask for your opinion, concerns and expectations when it comes to electricity powered cars as well.

<informing that one wilk ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would you be okay if we would record our conversation in audio format?

Needs

<introduction to the topic>

- What is your background?
- Strategic designer, woking SAP;

Could you tell us the areas where you live and the one you commute most often?
- Lives in Malov. From Malov interviewee goes to Nordhavn (32 KM). During dorona, once a week, pre corona it was normally 3 times per week

- Also, do you live in a house or apartment building?
- Interviewee lives in an apartment building;

- What kind of car do you own? Is it a diesel/petrol one or a hybrid or electric one?
- Interviewee owns a vehicle with a petrol engine (Citroen);

- Are you only using your car or do you also rely on public transportation / bike?
- Interviewee mainly uses the car;

- How often do you use the car?
- Interviewee uses the car daily;

- What are your thoughts on pollution that is caused by cars?

- Interviewee wishes her next car will be a EV or at a PHEV/HV.
- Interviewee cannot afford the previously mentioned types of cars due to finances;

Acquisition
<introduction to the topic>

- Are you a member of a car-related organization like FDM - the Danish vehicle association?
- Interviewee does not belong to a car-related association/organization,

- What factors lead you to a decision to purchase a car?
- Interviewee purchases a car due to family needs. Interviewee is a single mother with 2 kids, need transportation to kindergarten and school;
- Interviewee states that having a car is part of the culture that she is representing;

- What were the main considerations while selecting the car you have right now?

- While considering the car, it had to be new; host at least 3 people and be in certain price range;

- Do you remember the steps that you went through to purchasing a car?
- Interviewee was researching cars, went through a financial check up by the dealership and made the first payment;

- What is the tipping point (ultimate argument) for you to consider / not consider purchasing an EV/PHEV?
- Interviewee would not purchase it due to a price;
- Interviewee would purchase it for a more sustainable lifestyle (green mobility, electricity)

- Why have you not done it yet?
- Interviewee cannot purchase EV/PHEV due to a low income;

Services

<introduction to the topic>
<Remember to inform the interviewee about the time passed>

- What, in your opinion, a modern car dealership/sales point should have so that you would be satisfied as a customer?
- Interviewee was very happy with her previous car purchase experience at the dealership. The dealership had a great service, repairing and always offered an upgraded car as replacement during the car repair period.

- How do you imagine an ideal car purchasing process for yourself?
- For Interviewee, the ideal car purchasing process would involve human interaction. She would like to buy the car while having a human-led instruction session;

- How would you feel if the car purchasing experience could be done only online?
- Interviewee would not be happy with the car purchase experience being fully digitalised and online. However, the interviewee believes that she would adapt to it.

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?

Could you refer us to someone that you know that owns an electric or hybrid car?

- She can refer us to her boyfriend, but for the moment he also owns just a FV and he is kinda in the same mindset as her.

<ask if we could follow-up>

In the future we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
- Yes;

- Do you see as being an advantage to own an electric car versus a combustion one?
- Currently, interviewee does not see a specific advantage in regards to EV/PHEV vs. ICE;
  - Interviewee does not have a charging port;
  - Interviewee believes that owning EV/PHEV in city centre could bring advantages;

- Do you think it is important to own a private charging station at your home?
- Interviewee thinks that it is important to own a private charging station because having a car always charged at full capacity is necessary;

- Would you be willing to share your charging station to earn some extra income and boost up the social sharing mindset?
- Yes;

Impressions after the call

- Interviewee cares about the environment and the pollution that combustion cars are doing;
- Dedicated single mother of 2 kids with love for the environment and wants to give her children a good education in this direction;

Insights

Service
- Interviewee would not be happy with the car purchase experience being fully digitalised and online. However, the interviewee believes that she would adapt to it;
- Interviewee was very happy with her previous car purchase experience at the dealership. The dealership had a great service, repairing and always offered an upgraded car as replacement during the car repair period;

- For Interviewee, the ideal car purchasing process would involve human interaction. She would like to buy the car while having a human-led instruction session;

Charging
- Interviewee thinks that it is important to own a private charging station because having a car always charged at full capacity is necessary;
- Interviewee had no knowledge about technical stuff when it comes to charging points and how or where can the be installed;
- Interviewee is worried a bit too much about the charging problem. The current charging situation is better than interviewee imagines;

User
- Interviewee believes that owning EV/PHEV in city centre could bring advantages;
- Interviewee states that having a car is part of the culture that she is representing;
- Interviewee purchased a car due to family needs;
- Interviewee cannot afford the EV/PHEV due to finances;
- 100% future owner of an EV - Tesla X or Mercedes EQC - for family safety;
- Interviewee does not have much knowledge about EV/ PHEV;

Interview with Connie Hansen / SEM04.Thesis

Questions for PHEV owner

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

Needs

<introduction to the topic>

- What is your background (briefly and broadly)?

- Self-employed. Before was a partner in accounting and auditing firms.

● Could you tell us the areas where you live and the ones you commute to most often?
- Lives in Bagsværd, North Copenhagen. Commutes mostly to Copenhagen

● Also, do you live in a house or apartment building?
- Lives in a house.

● What kind of car do you own? Is it a diesel/petrol one or a hybrid or electric one?
- Owns a PHEV BMW. Family car. Husband sometimes uses it as well even though he has his own car.

● Are you only using your car or do you also rely on public transportation/bike?
- Also relies on public transportation (going to the city centre).

● How often do you use the car?
- In Corona times not much, before that 3-4 times a week.

● What are your thoughts on pollution that is caused by cars?
- She went after PHEV because of her environmental concerns;
- Believes that electric-powered cars pollute less;
- Aware of the discussion in regards to the EV/PHEVHV vs. ICE pollution;

Extra input
- Would suggest someone choose an EV car due to pollution.

Acquisition

<introduction to the topic>

● Are you a member of a car-related organization like FDM - the Danish vehicle association?
- No. When she bought the car, she got the road help plan with the car.

● What factors lead you to a decision to purchase a car?
- Thought that plug-in hybrid might be too annoying
- Dealership salesman's recommendation/explanation on PHEV vs. HV;
- Test-driving several cars that fit interviewee's criteria.

● What were the main considerations while selecting the car you have right now?
- Range
- Efficiency
- Overall "feeling" about the car.

● Do you remember the steps that you went through to purchasing a car?

- She did now know what car she was going after;
- Started looking at non-plug-in hybrids;
- Drive-tested several cars;
- Went to the car dealership and got explained the difference between PHEV and HV;

- What was the tipping point (ultimate argument) for you to purchase an EV/PHEV/Hybrid?
- Range and how far she could go without charging. The final decision was based more on overall liking not rather than the best range option.

- Why have you not done it yet?
- A few years ago, for the interviewee to buy an EV was not practical due to range.

Extra input
- Can charge at work and home.

Services
\<introduction to the topic\>
\<Remember to inform the interviewee about the time passed\>

- What, in your opinion, when buying, a modern car dealership/sales point should have so that you would be satisfied as a customer?
- Have well provided/presented information on the car(s);

- How do you imagine an ideal car purchasing process for yourself?
- Could not elaborate.

- How would you feel if the car purchasing experience could be done only online?
- Referenced our introduced concept to Tesla's approach;
- Does not think that it would be great;
- Would like to see the car before buying it;
- Would try the car ahead of buying one;
- Would be ok to try the car by having it delivered to home;
- Would like to visit a showroom first and then buy a car online.

Extra input
- Her workplace had an agreement with the dealership for discounts.

Optional
\<mention that we still some time left\>

- Do you see as being an advantage to own an electric car versus a combustion one?
- Yes: reducing pollution, better driving experience (e.g. especially in the city centre).

- Do you think it is important to own a private charging station at your home?
  - Has one at home, thinks it is important.

- Would you be willing to share your charging station to earn some extra income and boost up the social sharing mindset?
  - Maybe.

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

- Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?
  - Interviewee's next car will be fully EV.

- Could you refer us to someone that you know that owns an electric or hybrid car?
  - Will ask others and get back to us;
  - Suggested we send questions before having an interview;

<ask if we could follow-up>

In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
  - Yes, use her given email;
  - Would like to have a copy of our master thesis.

Impressions after the call

- Seems to be well-educated, wealthy but not really interested in the car industry;
- Straight dead-end answers;
- Bought a car a few years ago;
- The interviewee suggested we send questions upfront.

Insights

- To commute to city centre uses the car and public transportation;
- Has the "before corona" and "after corona" mindset when it comes to car using;
- Companies have deals with car dealerships in regards to car prices. In interviewee's case, most discounts were for diesel cars, but she got one for a PHEV car;
- Believes electric-powered cars pollute less than ICE cars;
- Willing to share her PHEV owning experience and taking some action to advise others;
- Before researching/purchasing, had negative biases towards PHEVs/EVs
- Was concerned about range, charging practicality;
- Had little knowledge about PHEVs/EVs, got informed about it at the dealership
- Not a member of any car-related organization. But has road support that was bundled with the car;
- The interviewee has skipped the online research phase while looking/purchasing a PHEV;
- Resilient to online purchasing at the time being due to fact that she thought that she could not test the car, see how the car looks like;
- Sees having EV/PHEV as an advantage comparing to ICE cars;
- Decided to own an EV in the next purchase;

Interview with EV driver from Canada / SEM04.Thesis

Questions for EV owners

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

\<introducing ourselves\>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

\<setting the scene\>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

\<explaining context\>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

\<informing that one will ask the questions while another one take notes\>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

\<ask if we can record the conversation\>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

Needs

<introduction to the topic>

- What is your background?
- A software engineer from France, living in Canada, Toronto. Comes from a family with a green orientation mindset;

- Could you tell us the area where you live and the one you commute to most often (how distant is that from home?)?
- Lives in Toronto, outside of downtown. Commutes back and forth to the office daily;
- Crossing Canada once with the Tesla - while working remotely for 1 month - working during the days and driving at night. Using autopilot for 90% of the trip;

- Also, do you live in a house or apartment building?
- Apartment. Uses a parking sport from a building that has a changing point;

- What kind of car do you own? Is it a diesel/petrol one or a hybrid or electric one?
- Owns a Tesla 3 (P) for 2 years;

- Are you only using your car or do you also rely on public transportation/bike?
- Mainly, uses the car daily. Uses other ways of transport to avoid paid parking or during the night outs;

- How often do you use the car?
- Every day before the pandemic. Also almost every day during the pandemic, mostly for pleasure driving;

- What are your thoughts on pollution that is caused by cars?
- The interviewee has consciously avoided acquiring an ICE car so he could not be a part of the air pollution problem. He has been thinking to have his first car to be an EV one back in 2006 in France. For a while, the participant used a French car-sharing company called Mobilezen;

Acquisition
<introduction to the topic>

- Are you a member of a car-related organization like FDM - the Danish vehicle association?
- No. But mentioned that every city has its own Tesla member club where the community speaks about Tesla and other electric vehicles;

- What are the factors that lead you to a decision to purchase a car?
- Mostly political reasons, trying to fight against some big oil organizations that were doing bad things to the environment;

Services
<introduction to the topic>
<Remember to inform the interviewee about the time passed>

- What, in your opinion, a modern car dealership/sales point should have so that you would be satisfied as a customer?
- According to an interviewee, a physical dealership should not exist anymore. He argues that having a dealership is not about just selling a car, but about money out of the repairs (i.e. for his Tesla car, he went once to the dealership in 3 years - to change the brake pads);

- How do you imagine an ideal car purchasing process for yourself?
- An EV car showroom is a must to have. The experience of exploring and talking with someone about the car that you might order seems to be important;

Closing
<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?

<ask if we could follow-up>
In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
- Yes

- Do you see it as being an advantage to own an electric car versus a combustion one?
- Acceleration. Has no acceleration delays, other unpleasant experiences.

- Do you think it is important to own a private charging station at your home?.
- In future, having a private charging station at home will be important because more and more people will have EV vehicles that need to be charged;
- However, if you don't commute a lot you don't need to have a charging point at home. Then, it is important that your work has a charging station.

- Would you be willing to share your charging station to earn some extra income and boost up the social sharing mindset?
- Yes. Especially, if the interviewee would have a house and the charger would not be used.

Impressions after the call

- Tesla fan;
- Strongly against ICE cars;
- Techwoker, a fan of technology;
- Investing in the brand that he uses (Tesla);
- Creates an impression that tech-advanced car companies (i.e. Tesla) are always starting/testing in the USA, CA.
- States that he has a feeling of "belonging" to the community of Tesla owners.

Insights

- Test drives are what convince people the most to buy cars;
- Tesla might have a Uber-like service in the future (autonomous taxi);
- It is more important to have a charger in the office rather than at home;
- Tesla is still considered a luxury car but things in the car industry will change;

- More people are going into the stock market and are curious about companies like Tesla that sells EV so they way better known and advertised;
- There are a lot of youtube channels explaining the myths on EV/PHEVs that are in the media. There is pushback, trying to scare people away fro EV/PHEVs;
- EV users might experience/have a "range anxiety";
- During a pandemic, a vehicle could be used as a tool to be entertained;
- In the future, autonomous cars might be charging themselves before the user is using them;
- Some people are pollution conscious, trying to reduce their carbon print by using ride-sharing services of buying a car;
- An EV car showroom is a must to have. The experience of exploring and talking with someone about the car that you might order seems can be vital;
- Demand for charging stations and networks will only increase.

Appendix C–Expert interviews: EV–related business representatives

Expert Interview with Danish charging service's representative

Context

SaaS / Green Energy.

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of working in the EV charging station infrastructure area. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

Understanding the service

<introducing ourselves>

- What are the most important stakeholders for your service?
- The company has two essential stakeholders that are crucial for the service to function
  - Car dealerships (often company's solution get sold with the car purchase)
  - Charge box installation partner (the company does not do installations, for that they have a partner)
    - B2C they rely on (Elcon)
    - For B2B, organizations, public sector company is more flexible with partners (e.g. Elcon, other or Elcome + other);

- Could you tell us the basic customer journey of your service for both B2B and B2C?
- B2C onboarding journey:
  - Starts at a car dealership (Tesla owners comes through the company website because they don't buy a tesla on a dealership)
  - The customer receives a survey to complete for details about the home and place where to install the chagrin box;
  - The customer sends an email back to the company with information about the installation
  - The company informs the installation partner to know how and where to install the charging station at home
  - The customer gets the charming chip to use at his house or to another charging station and subscription starts from that moment (depending on agreement)
  - The client has a call with installing partner about the installation date;
  - Installation partner installs the charging point to the customer

- B2B onboarding journey:
  - Business contacts company directly;
  - The sales team sets the brief with the client:
    - Talking on the phone (smaller, less paying clients);
    - Visiting the organization, location (bigger, more paying clients).

- What are the main pain points that you identify in the previously mentioned B2B and B2C customer journeys?
- Car dealerships are not good or interested in selling company solutions. The money dealerships make after selling an EV is less than combustion cars;

- Dealerships' representatives have to be trained to meet company's selling standards;
- Clients have a hard time understanding the service due to its complexity, unorthodox approach compared to ICEVs experience.
- Service has to ensure that communication is precise and clearly communicated to potential users;
- Challenge for the installation process - a survey with easy questions for ppl but sometimes people get confused because they don't see a resemblance with what company provide with the house-charing station templates plans;
- Not always working Company's charging points.
- Charging takes longer than refuelling;
- Charging point/parking becoming occupated before the customer arrives (C saw that charging point is free before the journey, but at the location, C sees that the charging sport is taken);
- Sometimes people park their cars without charging at a charging point, taking up charging spot parking;
- Customers pay upfront;

- How does a collaboration between the company and the municipality work?
- Collaboration between company and municipalities is great.
    - Municipalities are interested to install charging points and they reach Company because it also has the investing power to quickly act and install them really fast;
    - Sometimes they might want to install charging points in some places with low accessibility like underground parking;
- Municipalities define the need for the charge points. Municipalities put tenders for charging spot installations, then contractors bid and the one with the best offers wins the contract.

Extra input:
- Company' partner's participation in the installation is not mandatory. However, the installation needs to be certified by the company`s partners like Elcon;
- The company offers visual inspiration where the charging point could be placed so that customers know from what to choose in regards to charging box instalment.

Adoption
<introducing ourselves>.

- What do you think the charging network infrastructure is lacking most right now?
- The non-ending debate: who comes first people that require infrastructure or industry that requires people to own cars;
- There is an investment framework that allows installing more than 10k charging points over the next years but they need approval from the landowner;

- Will power grids be able to handle increased electricity demand from EVs in the future?
- Yes, it should. The infrastructure in DK is very good;
- Many user EV/PHEV charging scenarios have been made, and results show that in general, the charging capacity is only lacking at a maximum of 10%. This is considered to be very good;
- In the future, the charging of EVs might be regulated on specific time frames to ensure that grids handle increasing electricity demand.

Future of the industry

<introducing ourselves>

- Can private enterprises profitably build out the necessary charging infrastructure or will governments need to step in to force and/or subsidize charger installation — especially in lower-income communities?
- Currently, the market needs the government's help with subsidies and taxes. Once the market is mature enough and EV/PHEV prices go down, the programs will be not needed;
- The demand for EV/PHEV will tip over ICEV. Than the
    - Price for EV cars will drop when the ice will be more expensive;
    - EV/PHEVs will become the "norm" and governments will stop subsidies for them.

- Do you think that the legacy auto dealership model will evolve or disappear with electric vehicles requiring less service and maintenance combined with a likely gradual move towards direct sales?
- Probably a lot of the "same players" (dealerships) will be still here but adjusting to the new conditions;
- VW seems to be betting a lot on EV/PHEVs, as well as Chinese automakers;

Extra input:
- Demand for charging spots is increasing;

- The company wants to nudge people to charge their car at night;
- All big car companies are adjusting and investing in production facilities to build.

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!
<ask if we could follow-up>

In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
- Yes. Keep Anders informed.

Optional questions

- How do you get user insights?
- Most of the user insights are coming from the customer service centre. Customer service gets notified about problems, issues and answers customer's questions in regards to EV/PHEVs, charging.
- By doing research on customers - identifying right target groups, doing qualitative studies;

- Do you own an EV/PHEV?
- Owns a Tesla, with a private charging station.

- What is your experience while owning EV/PHEV? Are there any downsides?
- Don't see much downside besides calculating the time for a trip but is not a big personal issue;
- Sometimes it is tricky to go to places where there are no charging points (e.g. summer house);

- Do you see it as being an advantage to own an electric car versus a combustion one?
- They are more upsides than downsides, in total, he is playing less because he has a home charging station
- Quite a car, avoids gas stations, peace of mind for the environment;

Impressions after the call

- Industry expert that is also a service designer, giving concrete, right answers;
- Knows the customer journeys really well;
- Confirms a lot of insights coming from other first-wave interviewees;
- A proud EV owner (biased in regards to EVs).

Insights

General

- Currently, the market needs the government's help with subsidies and taxes. Once the market is mature enough and EV/PHEV prices go down, the programs will be not needed;
- The EV/PHEVs will have a tipping point, becoming new "norm", becoming cheaper than ICEVs;
- VW seems to be betting a lot on EV/PHEVs, as well as Chinese automakers;
- Cheaper to build EV than combustion - 11k parts of an EV car compared to 110K parts combustion parts;

Charging/infrastructure

-
- Denmark has very good energy infrastructure with a lot of backup energy to provide if needed;
- The company's charging points are not always working;
- Charging takes longer than refuelling;
- Sometimes people park their cars without charging at a charging point, taking up charging spot parking;
- Demand for charging spots is increasing;
- The company wants to nudge people to charge their car at night:
- Usually, the business is the one that requires more amperes to amplify the energy input

Service

- Besides its' B2B, B2C clients, the company has two essential stakeholders that are crucial for the service to function: car dealerships, charging box installation partner;
- Most of the company's B2C journeys start at car dealerships;

- Most of the company's B2B journeys start via the client's contact to the company;
- Car dealerships are not good or interested in selling company solutions. The money dealerships make after selling an EV is less than combustion cars;
- Municipalities are interested to install charging points and they reach the company
- Municipalities also define the need for the charge points
- At the moment, the electricity bill for charging EV is reimbursed by the government and customers get money back after 3 months.
- The companyFAQ answers a lot of questions - HERE;

User
- Charging point/parking becoming occupied before the customer arrives (C saw that charging point is free before the journey, but at the location, C sees that the charging sport is taken);
- Sometimes it is tricky to go to places where there are no charging points (e.g. summer house);

Expert Interview with Lithuanian charging network service representative

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to an experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up for telling us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electrical vehicles, we will also ask for your opinion, concerns and expectations when it comes to electricity powered cars as well.

<informing that one wilk ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would you be okay if we would record our conversation in audio format?

Understanding the service

<introducing ourselves>

- What are the most important stakeholders for your service?

- Customers (B2C) - EV/PHEV owners that use app for charging, dealerships (B2B) - having agreement to advertise/push company's service for dealership's clients;

- Could you describe to whom are you trying to target your service.
- To new EV/PHEV owners, car dealerships that are creating package deals;

- Describe a typical customer of your service?
- A person that has bought an EV/PHEVs, without much prior knowledge on EV/PHEVs;

- Could you tell us the basic customer journey of your service?
- No. Platform or customer app yet they are in early stage;

- We noticed that you have a Danish campaign for your service. What challenges do you see when it comes to penetrating to Danish market?
- No. No B2C clients at the moment;

- What challenges have you noticed for your customers to purchase and install charging equipment for their EV/PHEV?
- New/upcoming EV/PHEV owners do not know much about charging stations;
- New/upcoming EV/PHEV owners lack knowledge in regards to charging, power grids and other technicalities of EV/PHEVs;

Adoption

<introducing ourselves>.

- Do you anticipate the price for EV / PHEV to go down in the near future?
- Yes. Tony Seba, a futurist (predicted the dollar panel installation boom 15 years ago) states that 2024 is the year when the kw/h cost will be 100 dollars and car prices will go down.

- Will power grids be able to handle increased electricity demand from EVs in the future?
- Yes and no due to fluctuating demand for electricity:
    - Between 10 am - 6 pm peak hour for electricity consumption;
    - Company will pay back some money to people if they for example would electricity outside the peak hours;
- There is dillmera at hand: how to split electricity between users when for example there are 3 charging stations for 20 users.
    - In some location is a huge problem because that is not enough out for electricity to install more than 1 charging station;

Future of the industry

<introducing ourselves>

- Can private enterprises profitably build out the necessary charging infrastructure or will governments need to step in to force and/or subsidize charger installation — especially in lower-income communities?
- When subsidies from government stop - the sales in EV are also dropping (i.e. Germany subsidies case);

- Do you think that the legacy auto dealership model will evolve or disappear with electric vehicles requiring less service and maintenance combined with a likely gradual move towards direct sales?
- The role of legacy auto dealerships is diminishing (e.g. Tesla's online-only sales, WV's approach to sell vehicles online);
- The biggest part of dealership's income - car maintenance. Electric cars require less maintenance (e.g. interviewee is owning Tesla for 5 years and went to service once);

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!
<ask if we could follow-up>

In the future we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
- Yes. Write Rokas an email. Also, keep Rokas informed on the milestone progress.

Optional questions

- Do you own an EV/PHEV?
- Owns Tesla for 5 years. Has no changing station at home because lives in an apartment that has no parking space where he could charge the car;

- What is your experience while owning EV/PHEV? Are there any downsides?
- Charging is the only problem because charges have to be planted in advance;

- The EV owner cannot be spontaneous when going for trips due to preparation needed in charging (i.e. planning charging route, charging car before leaving);

- Do you see as being an advantage to own an electric car versus a combustion one?
- Cheaper, quiter, has better acceleration, fun to drive, runs on clean energy.

Impressions after the call

- Not keen on speaking about his own service and its' status (not launched);
- Felt as a trustworthy industry's expert, in the area of charging infrastructure and EV;
- Experienced EV user, has admits that EVs do have some UX-related issued;
- Visit carwow.co.uk - service that sells EVs online;

Insights

- UK's car dealership frameworks: dealerships have agreements between each other;
- Research on Deals On Wheels service, business model;
- It might be a good service solution to collaborate with the current dealership and save them some costs for stock;
- Denmark's vs. Norway's electric car sales: even though the cultures seem to be similar, in Norway car sales a way higher than in Denmark;
- People would like to charge their car home or at their workplace most often;
- People are passionate about green electricity but lack knowledge on technicalities (electrical phase charging types, energy balancing);
- Charging is the main pain point because often charges have to be planted in advance;
- Often, the EV owner cannot be spontaneous when going for trips due to preparation needed in charging (i.e. planning charging route, charging car before leaving);
- The role of legacy auto dealerships is diminishing (e.g. Tesla's online-only sales, WV's approach to sell vehicles online);
- The biggest part of dealership's income - car maintenance. Electric cars require less maintenance (e.g. interviewee is owning Tesla for 5 years and went to service once);

EXTRA:
He would like to be kept informed about what direction we are going to take with the service solution!

Appendix D—Expert interview: municipality's representative

Expert Interview with Danish municipality's representative

Context

Interviewee works in the Sustainability and Green Mobility department in one of the Danish ommunes.

About interview

Explanatory interview.
Aiming for: expectations, experiences, concerns, attitude, needs.

Interview structure

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of working in the EV charging station infrastructure area. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

Understanding the municipality's position

<introducing ourselves>

- What is the commune's/public sectors opinion or a stance on the adoption of EV/PHEVs?
- This summer the government will hold an event to address the climate goals. During this event, a new viewpoint and the government's stance might be introduced for EV/PHEVs.

- Does the government have a clear and strict distinction between EV and PHEVs?
- For the time being, municipality does not distinguish between EV and PHEV. These car types are seen as equal;

- Are there any differences when it comes to the law, subsidiaries and so on?
- At the moment, for PHEV/EVs, there are no law, subsidiary or other differences;

- Does the commune have any nudging incentive for people to buy EV/ PHEV?
- Not yet:
  - They want to address these incentives to state's politicians this summer, e.g.:
    - Suggest cheap parking for green cars, restrict some streets to only have busses;
    - Have more regulations for pure petrol and diesel cars, like paying more for parking;
    - Nudging incentives towards all available green choices: bus, train, scooter, EV;
- The municipality does not see nudging as a solution for fast change. They will rather use regulations to bring-up everyone up to speed;

Extra input:
- Electric scooter companies started contacting kommune 2 years ago;
- Citizens were nervous about Electric scooters that at the beginning;
- They looked into E scooters to become a green mobility option instead of a car;
- More E-scooter companies are asking to be allowed to operate in municipality;
- Municipality wants to control where the scooters stand. They will float during the day and be collected by the company during night time in one place;
- Copenhagen does not use permits for E scooters, making them behind the latest implementation practice.

Charging-related

<introducing ourselves>.

- How does collaboration between EV charging networks and municipality work?
- The municipality needs to have legislation that would help the municipality to have better guidelines on how to work and collaborate with charging companies.

- We have been told that municipalities are invested to have as many charging points installed as possible. Is that true? If yes - would you be able to elaborate on why?
- Not anymore. The attitude from: "let us install the most of charging stations" has changed to "lets us give time and let private owners, businesses to take care of charging points";
- Municipality wants to take it slow to see how people will react to ongoing implementations and private organizations' take on installing charging points;

- What do you think the charging network infrastructure is lacking most right now?
- Charging stations require space. That is a problem in public and especially private domains since not all of the residential building areas give it's residents private parking spaces, making the private charging space difficult to implement;

- It was tough to install charging near residential building areas. With cars and their travelling range becoming better, the respondent thinks that charging in residential areas is not that essential anymore. Primarily because of private businesses installing charging stations in their perimeters (e.g. charging at IKEA's or Lidl's parking spots);

- Will power grids be able to handle increased electricity demand from EVs in the future?
- In municipality, it seems that powers grids will have to do some major changes to establish a reliable charging infrastructure. The process of municipality's first 50 public charging stations' installation is going slow. To receive a permit for instalment takes half a year and then electric companies also take the time to do the installation works.

Extra input:
- Old and new companies are contacting municipality, asking for contracts. This month the municipality has received 6 applications, last month - 3 or 4'
- There are only a few companies that offer charging services. People think that to use these services - the user needs a subscription, otherwise, it costs double the price.
- Municipality doubts if subscription-based charging services are the best approach for individual EV/PHEV owners.
- Cities with dense population will have more owners that can afford EV/PHEV cars.

- Manufacturers are heading towards EV/PHEVs, therefore, municipality's needs to adapt to the changing auto industry market;

Future of EV/PHEV landscape

<introducing ourselves>

- Can private enterprises profitably build out the necessary charging infrastructure or will governments need to step in to force and/or subsidize charger installation — especially in lower-income communities?
- Cannot answer. The interviewee thinks that it is a big task to map out the full grid for charging. Therefore, the government might address EV/PHEV charging only on state-level infrastructure;

- What tax and incentive schemes will the government use to spur EV adoption and build-out of charging infrastructure in disadvantaged communities?
- Does not know. Thinks that the government could lower taxes for electricity;

- Will the government continue to subsidize or incentivize electric and alternative fuel vehicles as well as charging infrastructure?
- The government will continue to subsidize and implement new incentives for electric and alternative fuel vehicle adoption. The change will take more than 3-4 years, therefore continues support has to be done.
- Thinks that it will take a long time for the government to implement subsidies and incentives regarding EV/PHEVs.

- And how will that affect regional competitiveness?
- Smaller communes are worried about how much success they will have in establishing infrastructure for EV/PHEVs. The reason behind this that small communes have a low population and companies might not invest in them due to the low profitability rate.
- In municipality's case, the participant thinks that the municipality should collaborate with the neighbouring communes to maintain their competitiveness when it comes to EV/PHEV infrastructure;

Extra input:
- The government will establish EV/PHEV infrastucture for the state-level roads, but municipalities will have to handle their own infrastructure;

- The government should give money to small communes instead of giving it to the large ones

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!
<ask if we could follow-up>

In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights.

- Would you be up for participating in another interview or survey?
- Yes.

Optional questions

- How does the kommune communicate/gather insights from existing or upcoming EV/PHEV owners to maintain a dialogue in regards to meeting the community's needs?
- The commune has a citizen panel. The panel has 1000 people that represent the majority and that is where the input from people come from.

- Do you own an EV/PHEV?
- No, owns a 1-2-year-old petrol car.
- Would like to make the transition first to a PHEV because of the range, he has a large family and does large trips 700 + km;

- Do you see it as being an advantage to own an electric car versus a combustion one?
- Yes, especially in the future, because conventional cars will not be welcomed in large cities. Cities will continue to increase the number of regulations and tolls on ICE cars.

Impressions after the call

- Not an expert in EV/PHEVs, but an expert in public domain-relations;
- Felt like the municipality is a bit behind with the knowledge related to PHEV/EVs;
- Public servant, not a politician;

Insights

General

- Public domain is lagging behind the private sector;
- The municipality is more interested in the public sector's EV/PHEV fleet development rather than private's;
- Municipalities have a certain degree of autonomy, enabling them to influence the business scene for their needs/problems;
- The government will continue to subsidize and implement new incentives for electric and alternative fuel vehicle adoption. The change will take more than 3-4 years, therefore continues support has to be done.

Municipality-level

- For the time being, the municipality does not distinguish between EV and PHEV. These car types are seen as equal;
- Municipality states that there is a need for having more regulations for pure petrol and diesel cars, like paying more for parking;
- The municipality does not see nudging as a solution for fast change. They will rather use regulations to bring-up everyone up to speed.
- A while ago, Municipality looked at e-scooters as a window to green mobility to combat ICE vehicles;
- Municipalities want to be able to have a control/voice on how service's artefacts are being placed out and used in public spaces;
- The municipality needs to have legislation that would help the municipality to have better guidelines on how to work and collaborate with charging companies;
- The attitude from: "let us install the most of charging stations" has changed to "lets us give time and let private owners, businesses to take care of charging points";
- Municipality wants to take it slow to see how people will react to ongoing implementations and private organizations' take on installing charging points;
- Manufacturers are heading towards EV/PHEVs, therefore, kommune needs to adapt to the changing auto industry market;
- The government will establish EV/PHEV infrastructure for the state-level roads, but municipalities will have to handle their own infrastructure;

- Municipality has a citizen panel. The panel has 1000 people that represent the majority and that is where the input from people come from.
- Yes, especially in the future, because conventional cars will not be welcomed in large cities. Cities will continue to increase the number of regulations and tolls on ICE cars.

Carging/infrastucture
- Charging stations require and have space constraints. That is a problem in public and especially private domains since not all of the residential building areas give it's residents private parking spaces, making the private charging space difficult to implement;
- It was tough to install charging near residential building areas. With cars and their travelling range becoming better, the respondent thinks that charging in residential areas is not that essential anymore. Primarily because of private businesses installing charging stations in their perimeters (e.g. charging at IKEA's or Lidl's parking spots);
- The process of municipality's first 50 public charging stations' installation is going slow. To receive a permit for instalment takes half a year and then electric companies also take the time to do the installation works.

Service
- Municipality doubts if subscription-based charging services are the best approach for individual EV/PHEV owners.

Users
- There are only a few companies that offer charging services. People think that to use these services - the user needs a subscription, otherwise, it costs double the price.
- For some ICE car owners that have bought the vehicle 1 or 2 years ago it is not acceptable to sell their purchased car due to loss of money while selling;
- Would like to make the transition first to a PHEV because of the range, he has a large family and does large trips 700 + km;

Appendix E—User interviews: Danish EV owners

Interview with a Danish EV owner

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

- What kind of car do you own?
- The interviewed couple has a BMW i3 (EV) and Tesla Model 3 (EV);

Pre-EV/PHEV purchasing

- How did you come up with an idea to purchase an EV/PHEV?
- The interviewee has used a car-sharing service with a BMW i3 EV that acted as an EV test drive;

- What was your approach to purchasing your car? (steps wise)
- The participant had two different, online purchasing experiences:
  - While purchasing a BMW i3, the interviewee was motivated by the aspect of sustainability and purchased a second-hand EV from a dealership that helped the abroad dealership with selling;

- ○ While purchasing Tesla, the interviewee got a new EV from a manufacturer. The interviewee's husband wanted a car "more for him" that was more "cool" and had a better driving distance range for longer trips;

- While you were getting an EV/PHEV, were you more inclined to lease or to own one?
- The participating couple would avoid the option of leasing an EV.
- The husband has pointed out that owning a car is a personal motivation, not necessarily relying on the need of having it;

Extra input:
- The interviewee thinks that Tesla (EV) enables her to travel more sustainable compared to a gasoline car;
- While owning two EVs, the participant feels more confident with a Tesla EV because of the EV's longer driving range capabilities;
- The interviewee has range anxiety;
- The interviewee states that having a car is not necessary as she is not dependent on it;

EV/PHEV purchasing

- While you were purchasing your vehicle, what aspects of the purchase were you happy or unhappy with?
- Both EV purchasing experiences (second-hand EV and new EV) were done over the internet:
  - ○ During the second-hand purchasing experience, the interviewee has spent a lot of time talking with the car salesman since he was a middleman between the abroad dealership (positive);
  - ○ The interviewee was irritated by the fact that the middleman had no technical knowledge in regards to the car that the participant was purchasing (negative);
  - ○ The interviewee has liked the Tesla purchasing experience. The ability to track the ordered EV's journey was satisfying;
  - ○ The interviewee was upset with the fact that the initially scheduled delivery time was not respected and it took longer to get the car delivered;

- Through your car purchasing research - was it easy for you to find the necessary information in regards to available brands, charging solutions, taxes and other car-related things?

- The interviewee's husband was a car enthusiast and knew where to look online to find the needed information;
- The participant has relied on their previous BMW EV purchasing experience and applied a lot of previously acquired knowledge while considering, planning and purchasing Tesla;
- The interviewee was aware that the family needs a fast DC charging station, however, they had problems with finding suppliers that could install one;

- Do you consider a car salesman to be an essential part of a car purchasing experience?
- The participant thinks that a car salesman is not necessary for the car purchasing journey;
  - The salesman that was selling a second-hand BMW EV did not know any car-related specifications;
  - While purchasing a new Tesla, the purchasing journey was completed by using the website, communicating via email and meeting in person to hand over a car;

- Was it important for you to have a test drive to be convinced of your car purchase?
- While purchasing a BMW i3, the participant has tested the car by using the car-sharing service, therefore, a test drive provided by the seller was not necessary;
- While purchasing Tesla, the interviewee did not saw a huge need for a test drive since he was trusted with the EV's reputation;

- What did you like or not like while having a test drive?
- While having a test drive, the interviewee had a certain expectation of the car's build and performance quality;

- Did you add any customization to your car? Did you do that online or in the showroom?
- While purchasing a new Tesla, the interviewees have customized their vehicle online by selecting wheel caps, hook and paint protection foil addons for the EV;
- For the interviewees, the customization of the Tesla was not important, however, the process was simple and easy to follow with only a handful of possible add-ons;

- Reflecting on your discussed purchasing experience, is there anything that you would like to change, add or remove?
- During Tesla purchasing experience, the interviewee was not able to test drive the EV and its delivery was delayed;

- The participant points out that more transparent and clearer legislation for EVs coming from the Danish government would be much appreciated;
- The interviewee liked that Tesla had a 14 days return policy for its purchased vehicles;

- Did the financial agreements/paperwork require you to physically be at the showroom or everything happened online?
- The interviewee was not required to be physically at the showroom to sign the paperwork, agreements;

Post-EV/PHEV purchasing

- What does it mean for you to own an EV/PHEV?
- For the participant, owning an EV means having a vehicle that is fun and silent to drive while saving money;
- The interviewee was motivated to own an EV for sustainability and practicality reasons;

- What is your parking experience with an EV?
- The participant owns a house, therefore, parking a car at home not an issue;
- The interviewee is happy about the fact that parking an EV car is free in Copenhagen;
- The participant is aware of the EV parking and charging situation and state that the interviewee would not park their charged EV to a free EV-charging spot if it is not needed for charging;

- What is your experience with charging your EV?
- The interviewee states that BMW EV needs more charging;
- The interviewee states that Tesla EV is mostly charged at home;
- The interviewee had an experience when the hotel was able to provide the participant with a parking space that was suitable for charging EV;
- The participant acknowledges the fact that sometimes the charging stations do not have the required charging plug, making the interviewee go and find another charging station with the compatible charger adapter;
- The interviewee states that while travelling further, the trip must be planned with charging stations in mind;

- Where is it more important to own a charging station: at home or at the office?
- For the interviewee, it is more important to have a charging station at home to ensure the availability for charging;

- What are your thoughts on car-related clubs, memberships, organizations?
  - The interviewee is a vehicle enthusiast and likes to surf forums, however, he has no affiliation with car-related clubs or organizations;

Extra input:
- The interviewee has installed a Solar panel on their household's roof to also use solar energy to charge the car;

Optional

- Does an EV/PHEV have any obvious advantages over a combustion vehicle?
- To the interviewee, the most obvious advantage to having EV vs. ICEV is sustainability-related;

- How do you feel about companies/governments trying to influence/nudge your decisions in the name of sustainability, practicality?
- The interviewee thinks that the Danish government should "do more" to encourage its citizens to purchase EV/PHEV instead of ICEV;
- The participant thinks that the Danish government is not promoting/highlighting the existing infrastructure for EV/PHEV as much as needed as they are promoting EV/PHEVs in general;
- The interviewee states that there are a lot of calculations done for EV exploiting and its pollution when it comes to EV's batteries, but even by taking that into consideration, the EVs are still better than ICEV pollution-wise.

Closing

<asking for interviewee's final thoughts>
- And this was the last question. You did great. Thank you!

- Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?
- The interviewee states that the way of driving has changed with EV, mainly of the fact that the driver needs to manage (be aware of) the range;
- The participant states that changed driving style helps to be more economic (saving);
- The participant sees opportunities and positive outcomes from the driving range restrictions due to charging (i.e. avoiding highways and exploring new places, cities);

<ask if we could follow-up>

- In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights. Would you be up for participating in another interview or survey?
- The interviewee would like to participate in further thesis processes;
- The interviewee would like to receive a copy of the solution (thesis?);

Impressions after the call

- The interviewee was a researcher that worked with sustainability;
- The interviewees were a young couple that was aware of the climate situation;
- The interviewee reached about sustainability at school and wanted to be an example by practising sustainable behaviour

Insights

General

- The interviewee has used a car-sharing service with a BMW i3 EV that acted as an EV test drive;
- The participant thinks that a car salesman is not necessary for the car purchasing journey;
  - The salesman that was selling a second-hand BMW EV did not know any car-related specifications;
  - While purchasing a new Tesla, the purchasing journey was completed by using the website, communicating via email and meeting in person to hand over a car;
- The interviewee states that there are a lot of calculations done for EV exploiting and its pollution when it comes to EV's batteries, but even by taking that into consideration, the EVs are still better than ICEV pollution-wise.
- The interviewee states that the way of driving has changed with EV, mainly of the fact that the driver needs to manage (be aware of) the range;
- The participant states that changed driving style helps to be more economic (saving);
- The participant sees opportunities and positive outcomes from the driving range restrictions due to charging (i.e. avoiding highways and exploring new places, cities);

EV VS. PHEV

- They went for two EVs, hybrids was never a choice to start with maybe before
- If someone has knowledge about cars they will always skip the hybrid and go for full EV especially now that their range has increased considerably for all manufacturers.

Purchasing

- The participant had two different, online purchasing experiences:
    - While purchasing a BMW i3, the interviewee was motivated by the aspect of sustainability and purchased a second-hand EV from a dealership that helped the abroad dealership with selling;
    - While purchasing Tesla, the interviewee got a new EV from a manufacturer. The interviewee's husband wanted a car "more for him" that was more "cool" and had a better driving distance range for longer trips;
- The participating couple would avoid the option of leasing an EV.
- The husband has pointed out that owning a car is a personal motivation, not necessarily relying on the need of having it;
- Both EV purchasing experiences (second-hand EV and new EV) were done over the internet:
    - During the second-hand purchasing experience, the interviewee has spent a lot of time talking with the car salesman since he was a middleman between the abroad dealership (positive);
    - The interviewee was irritated by the fact that the middleman had no technical knowledge in regards to the car that the participant was purchasing (negative);
    - The interviewee has liked the Tesla purchasing experience. The ability to track the ordered EV's journey was satisfying;
    - The interviewee was upset with the fact that the initially scheduled delivery time was not respected and it took longer to get the car delivered;
- The interviewee's husband was a car enthusiast and knew where to look online to find the needed information;
- For the interviewees, the customization of the Tesla was not important, however, the process was simple and easy to follow with only a handful of possible add-ons (had few add-ons);
- During Tesla purchasing experience, the interviewee was not able to test drive the EV and its delivery was delayed;
- The interviewee liked that Tesla had a 14 days return policy for its purchased vehicles;

Test driving

- While having a test drive, the interviewee had a certain expectation of the car's build and performance quality;

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Sustainability:
- The interviewee thinks that Tesla (EV) enables her to travel more sustainable compared to a gasoline car;

Government-related
- The participant points out that more transparent and clearer legislation for EVs coming from the Danish government would be much appreciated;
- The interviewee thinks that the Danish government should "do more" to encourage its citizens to purchase EV/PHEV instead of ICEV;
- The participant thinks that the Danish government is not promoting/highlighting the existing infrastructure for EV/PHEV as much as needed as they are promoting EV/PHEVs in general;

Charging
- The participant's husband is an electrical engineer that was able to modify a charging cable to be used in another type of charging station;
- The interviewee has range anxiety;
- The interviewee was aware that the family needs a fast DC charging station, however, they had problems with finding suppliers that could install one;
- The interviewee is happy about the fact that parking an EV car is free in Copenhagen;
- The participant is aware of the EV parking and charging situation and state that the interviewee would not park their charged EV to a free EV-charging spot if it is not needed for charging;
- The participant acknowledges the fact that sometimes the charging stations do not have the required charging plug, making the interviewee go and find another charging station with the compatible charger adapter;
- The interviewee states that while travelling further, the trip must be planned with charging stations in mind;
- For the interviewee, it is more important to have a charging station at home to ensure the availability for charging;
- The interviewee is a vehicle enthusiast and likes to surf forums, however, he has no affiliation with car-related clubs or organizations;
- To the interviewee, the most obvious advantage to having EV vs. ICEV is sustainability-related;

Owning

- For the participant, owning an EV means having a vehicle that is fun and silent to drive while saving money;
- The interviewee was motivated to own an EV for sustainability and practicality reasons;

Interview with a Danish EV owner

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

- What kind of car do you own?
- Kia Eniro;

Pre-EV/PHEV purchasing

- How did you come up with an idea to purchase an EV/PHEV?
- The interviewee came up with an idea to purchase an EV since her family needed another car to replace the old one;
- The participant considered herself to be practical and thought that an electric car is more practical than ICEV;

- What was your approach to purchasing your car? (steps wise)
- The interviewee spoke with a family's friend that owned an EV (Tesla) and asked about electric cars;
- The participant's husband gathered a lot of EV-related information from the magazine "Motors;

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- The interviewee was searching for an EV simultaneously with one of her family's relatives and shared their knowledge on the topic;
- The participant has visited several dealerships and tried to 2 -3 different EVs;
- The interviewees had a need to try the car before buying it and had test drives in the city, highway and other locations;

- While you were getting an EV/PHEV, were you more inclined to lease or to own one?
- The interview has focused on owning an EV, seeing it as a step forward after having an ICEV;

Extra input:
- The interviewee wanted a car with a big battery since they wanted to travel often to Aarhus;
- For the participant, purchasing Tesla was a bit out of budget;
- The interviewee loved driving an EV thought that it was an extra good experience compared to driving an ICEV;

EV/PHEV purchasing

- While you were purchasing your vehicle, what aspects of the purchase were you happy or unhappy with?
- The interviewee was pleased with the KIA car dealership's car salesman as he seemed enthusiastic about the EV that the participant was interested in;
- The participant was informed that to receive the ordered car it will take around a year. The news was not the most pleasant. However, the interviewee has remained positive since they were feeling confident about their made choice, plus, car salesman was also re-confirming them that they made a great choice;

- Through your car purchasing research - was it easy for you to find the necessary information in regards to available brands, charging solutions, taxes and other car-related things?
- The interview did not have a lot of problems with finding information on EVs since they gathered information from family and friends, plus, had a magazine subscription about cars;
- The participant has mentioned that finding a vehicle with large car batteries was a challenge;

- Do you consider a car salesman to be an essential part of a car purchasing experience?

- The interviewee does not think that a car salesman is essential while purchasing a car. However, the car salesman was considered as a positive actor that answered questions that the interviewee ha and gave a realistic viewpoint on EV owning and issues with it;
- The interviewee has stated that she was rather sceptical than optimistic when thinking about car salesman. However, they were happy with the KIA's salesman as she seemed to be honest and not persuasive;

- Was it important for you to have a test drive to be convinced of your car purchase? How much did the test drive have an impact on your decision: low/high?
- For the interviewee, it was important to try several EVs before purchasing one. A test drive has made a high impact on her purchasing decision;

- What did you like or not like while having a test drive?
- The interviewee has enjoyed the test drive, but as she was driving EV for the first time, she felt a bit weird and needed to adapt to the absence of motor sound.

- Did you add any customization to your car? Did you do that online or in the showroom?
- The interviewee did not get any customization as they took the basic packaging, stating that they are practical and not in favour of having additional equipment that makes the vehicle more "fancy";

- Reflecting on your discussed purchasing experience, is there anything that you would like to change, add or remove?
- The interviewee had a great vehicle purchasing experience;
- The participant was happy about the car salesmen initiative to have a reflection/Q&A meeting after 1 month of owning a vehicle;

- Did the financial agreements/paperwork require you to physically be at the showroom or everything happened online?
- The interviewee does not remember the process clearly, but states that she had to sign documents digitally while the bank was taking care of other steps;

Extra input;
- The interviewee has received the vehicle after 9 months of waiting;

- No more trips to the gas station for them in the evening as they were used to, they just plug in at home,

Post-EV/PHEV purchasing

- What does it mean for you to own an EV/PHEV?
- For the interviewee it is important to be aware of how they transport themselves and how they use the electricity;

- The participant liked the idea that they are running their vehicle on green electricity since most of Denmark's grid infrastructure is providing green energy;
- For the interviewee, using EV is making her feel good;
- The participant states that it is important for them that they chose to move towards the [green mobility] direction while owning and using an EV;

- What is your parking experience with an EV?
- The interviewee considers it nice to have the ability to park EV for free in the city and without a time meter;

- What is your experience with charging your EV?
- The interviewee has travelled around the country with EV and had a great experience while charging their EV since their booked hotels had charging stations. Plus, it was not had to know if hotels are EV charging-friendly or not;
- The participant states that some parts in Northern Jutland have a small amount or no public charging stations;

- Where is it more important to own a charging station: at home or at the office?
- For the interviewee, it is important to have as large a charging infrastructure as possible, so that people will not have to plan their travelling and avoid worrying about charging;
- The interviewee has a charging station at home that they use most of the charging occasions;
- The participant rarely charges its EV in public charging stations;

- What are your thoughts on car-related clubs, memberships, organizations?
- The interviewee reads "Motor" magazine due to information that is about EVs and their myths, positive and negative sides;

Extra input:
- The interviewee is rarely using EV to commute to Copenhagen because she bikes there, still she considers that it is nice to being able to park for free when she drives EV to Copenhagen;

Optional
- Does an EV/PHEV have any obvious advantages over a combustion vehicle?
- The participant thinks that her family is saving time by charging their EV at home during the night while others have to spend time filling up the ICEV with fuel at gas stations;

- How do you feel about companies/governments trying to influence/nudge your decisions in the name of sustainability, practicality?
- The participant thinks that it is very important for the government to nudge people towards people buying more EV instead of using ICEVs that are polluting;
- The interviewee thinks that governments incentives like tax-free EV purchasing, free parking and et cetera are important to help in changing people's mind about EVs;
- The participant notes that having a vehicle can be very important and changing its usage routine might be challenging;
- The participant thinks that some people might see nudging champaigns as government trespassing to people's lives;

- What does the word "sustainability" mean to you?
- The interviewee considers sustainability to be very important. To her, sustainability is about people avoiding leaving a high carbon footprint during their life on the planet. Commodities are important but it is important to have these commodities with as less carbon footprint as possible. Even though governments need to take responsibility for increasing sustainability, the sustainability question is everyone's responsibility to do their best;

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

- Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?
- The interviewee states that it Is not cheap to purchase an EV for a majority of people. Not everyone has high salaries and this might be a barrier for them. EVs should become more accessible to everyone;

<ask if we could follow-up>
- In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights. Would you be up for participating in another interview or survey?
- The interviewee agrees to be contacted again;
- The participant would like to receive our thesis;

Impressions on the interviewee after the all

- The interviewee is used to doing research;
- A participant is a family-oriented person, coming from an educational background;

- The interviewee wanted to be a first-mover;
- The participant is a "team player" kind of person, that likes to be a model for others in changing towards sustainable lifestyles;
- The interviewee values practicality and tries to avoid fancy or unnecessary items;

Insights

General

- The participant considered herself to be practical and thought that an electric car is more practical than ICEV;

Researching

- The interviewee spoke with a family's friend that owned an EV (Tesla) and asked about electric cars;
- The participant's husband gathered a lot of EV-related information from the magazine "Motors;
- The interviewee was searching for an EV simultaneously with one of her family's relatives and shared their knowledge on the topic;
- The participant has visited several dealerships and tried to 2 -3 different EVs;
- The interviewees had a need to try the car before buying it and had test drives in the city, highway and other locations;
- The participant has mentioned that finding a vehicle with large car batteries was a challenge;

Purchasing

- The interview has focused on owning an EV, seeing it as a step forward after having an ICEV;
- The participant was informed that to receive the ordered car it will take around a year. The news was not the most pleasant. However, the interviewee has remained positive since they were feeling confident about their made choice, plus, car salesman was also re-confirming them that they made a great choice;
- For the interviewee, it was important to try several EVs before purchasing one. A test drive has made a high impact on her purchasing decision;
- The interviewee has enjoyed the test drive, but as she was driving EV for the first time, she felt a bit weird and needed to adapt to the absence of motor sound;
- The interviewee has received the vehicle after 9 months of waiting;

- The interviewee states that it Is not cheap to purchase an EV for a majority of people. Not everyone has high salaries and this might be a barrier for them. EVs should become more accessible to everyone;

Car salesman

- The interviewee was pleased with the KIA car dealership's car salesman as he seemed enthusiastic about the EV that the participant was interested in;
- The interviewee does not think that a car salesman is essential while purchasing a car. However, the car salesman was considered as a positive actor that answered questions that the interviewee ha and gave a realistic viewpoint on EV owning and issues with it;
- The interviewee has stated that she was rather sceptical than optimistic when thinking about car salesmen. However, they were happy with the KIA's salesman as she seemed to be honest and not persuasive;
- The participant was happy about the car salesmen initiative to have a reflection/Q&A meeting after 1 month of owning a vehicle;

Owning

- For the interviewee it is important to be aware of how they transport themselves and how they use the electricity;
- The participant liked the idea that they are running their vehicle on green electricity since most of Denmark's grid infrastructure is providing green energy;
- The participant states that it is important for them that they chose to move towards the [green mobility] direction while owning and using an EV;

Charging

- The interviewee has travelled around the country with EV and had a great experience while charging their EV since their booked hotels had charging stations. Plus, it was not had to know if hotels are EV charging-friendly or not;
- For the interviewee, it is important to have as large a charging infrastructure as possible, so that people will not have to plan their travelling and avoid worrying about charging;
- The participant thinks that her family is saving time by charging their EV at home during the night while others have to spend time filling up the ICEV with fuel at gas stations;

Nudging

- The participant thinks that it is very important for the government to nudge people towards people buying more EV instead of using ICEVs that are polluting;

- The interviewee thinks that governments incentives like tax-free EV purchasing, free parking and et cetera are important to help in changing people's mind about EVs;
- The participant notes that having a vehicle can be very important and changing its usage and routine might be challenging;
- The participant thinks that some people might see nudging champaigns as government trespassing to people's lives;

Sustainability
- The interviewee considers sustainability to be very important. To her, sustainability is about people avoiding leaving a high carbon footprint during their life on the planet. Commodities are important but it is important to have these commodities with as less carbon footprint as possible. Even though governments need to take responsibility for increasing sustainability, the sustainability question is everyone's responsibility to do their best;

Interview with a Danish EV owner

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

- What kind of car do you own?
- Tesla S, 100D;

Pre-EV/PHEV purchasing

- How did you come up with an idea to purchase an EV/PHEV?
- The participant has decided to purchase an EV since his son owned one (WOM);

- What was your approach to purchasing your car? (steps wise)
- The interviewee has purchased a second-hand car in Bilbasen;

- While you were getting an EV/PHEV, were you more inclined to lease or to own one?
- The participant was inclined to purchase, rather than lease the vehicle due to expensive insurance;

EV/PHEV purchasing

- While you were purchasing your vehicle, what aspects of the purchase were you happy or unhappy with?
- The interviewee was only happy while purchasing the car;

- Through your car purchasing research - was it easy for you to find the necessary information in regards to available brands, charging solutions, taxes and other car-related things?
- The interviewee had no issue with research, especially acknowledging the fact that he used the database where it shows the car's information.

- Do you consider a car salesman to be an essential part of a car purchasing experience?
- N/A

- Was it important for you to have a test drive to be convinced of your car purchase?
- For the interviewee, the test drive was not necessary due to his previous experience with the car. However, throughout the purchase, the participant has driven the car for 10 minutes to check if everything was working;
- The participant was calm about buying the second-hand car due to an existing warranty for the vehicle;

- How much did the test drive have an impact on your decision: low or high?
- For the interviewee, the test drive had a low impact on his purchasing decision;

- What did you like or not like while having a test drive?
- N/A

- Did you add any customization to your car? Did you do that online or in the showroom?
- N/A

- Reflecting on your discussed purchasing experience, is there anything that you would like to change, add or remove?
- N/A

- Did the financial agreements/paperwork require you to physically be at the showroom or everything happened online?
- The interviewee has done the financial agreement via phone, by talking to the car's owner and bank;

Post-EV/PHEV purchasing

- What does it mean for you to own an EV/PHEV?
- The interview states that "it is nice" to own an EV/PHEV;

- What is your parking experience with an EV?
- The parking experience for the interviewee does not bring any issues despite the fact that the vehicle is wide;

- What is your experience with charging your EV?

- The interviewee is mostly using Tesla's supercharger stations even though he has his own charger at home and in the summer house.

- Where is it more important to own a charging station: at home or at the office?
- The owner states that it depends on which place the owner can charge the car for free;

- What are your thoughts on car-related clubs, memberships, organizations?
- The participant does not belong to any car-related club and has no knowledge of them;

Optional

- Does an EV/PHEV have any obvious advantages over a combustion vehicle?

- The interviewee highlights that EV is safer and faster in acceleration while comparing it to the ICEV;

- How do you feel about companies/governments trying to influence/nudge your decisions in the name of sustainability, practicality?
- The participant thinks that it is a problem that the government is able to nudge the public since there are a lot of changes in tax and so on;

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?

<ask if we could follow-up>

In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights. Would you be up for participating in another interview or survey?

Impressions after the call

- An elderly participant that had a hard time using technology;
- The interviewee has purchased a second-hand car from the private owner;

Insights

General

- The participant has decided to purchase an EV since his son owned one (WOM);
- The interviewee was motivated to purchase a car by its' technological advancements and monetary savings rather than by the sustainability question;
- The participant thinks that it is a problem that the government is able to nudge the public since there are a lot of changes in tax and so on;

Purchasing

- The participant was calm about buying the second-hand car due to an existing warranty for the vehicle;
- For the interviewee, the test drive had a low impact on his purchasing decision;

Charging

- The interviewee is mostly using Tesla's supercharger stations even though he has his own charger at home and in the summer house.
- The owner states that the home vs. office charger debate depends on which place the owner can charge the car for free;

Interview with a Danish EV owner

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

- What kind of car do you own?
- The interviewee and his family own two EV/PHEVs: Proche Taycan Electric (EV) & Ford Kuga (PHEV);

Pre-EV/PHEV purchasing

- How did you come up with an idea to purchase an EV/PHEV?
- The interviewee needed a new car for this wife. It was noticed that due to the Danish state's regulations, it was cheaper to purchase and PHEV rather than to get an ICEV;
- While purchasing an EV, the participant did calculations and saw that EV owning taxes were lower and provided a better value for the paid money in general;

- What was your approach to purchasing your car? (steps wise)
- Choose PHEV because the interviewee's wife drives a lower mileage in the city, plus, Ford offered a relatively cheap price for the Ford Kuga PHEV;

- While you were getting an EV/PHEV, were you more inclined to lease or to own one?
- The participant was not inclined to lease the vehicles due to his conservative opinion on material ownership, chosen models and previous experience;
- The interviewee would lease a car if it would be more expensive since expensive cars get more taxed by the state;
- The participant thinks that if you lease a car you might have some problems in the long term while if you own the vehicle permanently - the ownership makes vehicle owning more self-secure in the long term;

Extra input:
- The interviewee thinks that there is a "no brainer" to make a purchase a PHEV instead of ICEV in the current Danish market;
- The participant owns a company and has a lot of connections with dealerships that are offering him deals related to cars;
- Mercedes and BMW use the leasing option to manage and register vehicles, making them cheaper to process and have a good market price;

EV/PHEV purchasing

- While you were purchasing your vehicle, what aspects of the purchase were you happy or unhappy with?
- Interviewee thinks that physical purchasing process is not hard and takes less than an hour to buy a car;
- The participant thinks that, in Denmark, car ownership-related paperwork is not hard or frustrating to complete;
- The interviewee was purchasing a vehicle that was not yet in the Danish market, making the process less pleasant: the participant had to buy the car through a subcontractor and wait more time than told due to delays;

- Through your car purchasing research - was it easy for you to find the necessary information in regards to available brands, charging solutions, taxes and other car-related things?
- For the interviewee, it was challenging to understand the aspect of charging: what charging station can he use, what output charing his vehicle needs,
- There is a steep learning curve for upcoming/new EV owners to go through when learning about charging;
- The participant has an impression that the presented car performance-related statistics are not accurate, often trying to form a better impression of the car than it actually is in the reality;

- Do you consider a car salesman to be an essential part of a car purchasing experience?
- The interviewee thinks that online vs. physical purchasing experience depends on the context, brand and attitude of the car;
- Interviewee thinks that if the car is pre-configured the purchasing process is much faster and easier, making the car dealer an unnecessary actor;
- The participant thinks that for manufacturers true profit comes from the extra configurations that manufacturers and dealers are offering;

- Was it important for you to have a test drive to be convinced of your car purchase? How much did the test drive have an impact on your decision: low/high?
- While purchasing Ford Kuga (PHEV), the test drive was fun, but with low impact as the interviewee has previously owned Ford brand cars in a similar price category;
- While purchasing Porche Taycan Electric (EV), the interviewee has driven the car once, but not in the test drive. While purchasing the test drive was not available due to the car not being in the market yet. However, the participant was relying on the brand's reputation while making a purchase;

- What did you like or not like while having a test drive?
- While purchasing Porche Taycan Electric (EV), the interviewee had to rely on his expectations and impression of the brand's dedication to quality;

- Did you add any customization to your car? Did you do that online or in the showroom?
- The interviewee has customized one of the purchased cars at the dealership;

- Reflecting on your discussed purchasing experience, is there anything that you would like to change, add or remove?
- Participant highlights the fact that dealerships should have more realistic car performance figures. For example, the charging statistics should be represented in different temperature rates such as 0-9C, 10-19C and 20C;

- Did the financial agreements/paperwork require you to physically be at the showroom or everything happened online?
- While purchasing Ford Kuga (PHEV), the interviewee has filled the paperwork at the dealership
- While purchasing Porsche Taycan Electric (EV) the purchasing journey was done online, almost like a Tesla's;

  - If answered physically - could have been done also online?
  - Yes.

- The interviewee is aware of the fact that Manufacturers such as Proche, BMW and VW are creating a shared charge station network;
- The participant states that he calculates the travelling distances and calculates to be aware of his charging needs;
- The interviewee saw Tesla as a more experienced EV manufacturer;
- The interviewee states that driving patterns are super important for how far the car can go;
- The participant has an E-on/Clever.DK charging station at home;
- The interviewee did not see an issue with online vehicle purchasing;
- According to the interviewee, Porsche's online purchasing journey is different from Tesla's. For Porche, it is all about the vehicle add-ons.
- For the interviewee, purchasing Porche Taycan Electric (EV) was a bit hard to understand what each configuration does, therefore, the ability to speak with a sales agent online was seen as a necessity to get help and guidance online.

Post-EV/PHEV purchasing

- What does it mean for you to own an EV/PHEV?
- The interviewee is less irritated with EV/PHEV related problems than he thought he would be;
- The participant enjoys driving the vehicle that is silent and pollutes less environment while driving;
- The interviewee appreciates the fact that EV/PHEVs have more electric/IT integrations, enabling the driver to use the car via applications without being in it (e.g. heating the car before starting it);

- What is your parking experience with an EV?
  If you enter the city and you are in a charing network like E-on or cleaver you can park and charge there - a good advantage- he can see on a phone where parking spots are available

- What is your experience with charging your EV?
- The interviewee is conscious of the fact that this one-charge/fill range is lower. However, he says that he has adjusted to the situation;
- The interviewee is upset because of the fact that he does not if he can charge his Porsche in the Tesla charging station or not;
- The participant says it is frustrating to be locked in one charging network. For example, in this car's navigation, the charging points shown on his GPS are only

shown from Porsche networks, not including other charging stations that belong to other charging networks;

- Where is it more important to own a charging station: at home or at the office?
- For the interviewee, having a charging at home is the option best because he can have his car charged every day, during the night (cheaper electricity)
- Having a charging station at work also does make sense, especially to those who live in flats or other buildings that limit the owner's ability to have the personal charing spot;

- What are your thoughts on car-related clubs, memberships, organizations?
- The interviewee is not taking a part in any car-related club as he does not like such socialising concept;
- The interviewee mentions that he knows people who belong to such car-related clubs and highlights the fact that the members of the club are paying membership fees;

Extra input
- The participant has bought a Porsche Taycan Electric (EV) because the car was the cheapest option to own obtain in Denmark while comparing similar models from the mother brand.

Optional

- Does an EV/PHEV have any obvious advantages over a combustion vehicle?
- The interviewee likes silence and smoothness while driving on electricity;
- For the participant, in general, driving an EV/PHEV is a more pleasant experience than driving an ICEV;
- For the interviewee, it Is annoying when the petrol motor starts on his hybrid vehicle;

- How do you feel about companies/governments trying to influence/nudge your decisions in the name of sustainability, practicality?
- The participant thinks that the calculations done for EV's sustainability might be a bit misleading knowing that the batteries used for EV/PHEVS are not the "greenest" to produce;
- Interviewee things that EV/PHEVS are a good transition for sustainable mobility and that the government should help more with tax incentives, encouraging to purchase/drive EVs, at least, until EVs become the most common car;

Extra input:
- The interviewee has a belief that EV/PHEV cars have done much more progress than combustion ones did in 100 years;

- The participant this that EV/PHEVS are that much "greener solution" for the moment, but highlights that EV/PHEVS will become more and more environmentally friendly in future since the development's rate is much higher;
- The interviewee thinks that many manufacturers are trying to catch up on Tesla, making the automotive industry better;

Closing

<asking for interviewee's final thoughts>
And this was the last question. You did great. Thank you!

Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?

<ask if we could follow-up>
- In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights. Would you be up for participating in another interview or survey?
- The interviewee has agreed to participate in further research, testing processes and would like to receive the completed thesis paper.

Impressions on the interviewee after the all

- The interviewee has a fair share of knowledge on PHEV/EVs;
- The participant owns both types of cars: EV and PHEV;
- The participant has a lot of knowledge about dealerships, manufacturers and other business-related questions since he is a business owner himself;
- The interview states that he tends to be more conservative and wants to own things;
- The participant does thorough research before purchasing his products;
- The interviewee had a lot of car purchasing experiences.

Insights

General
- It was noticed that due to the Danish state's regulations, it was cheaper to purchase and PHEV rather than to get an ICEV;
- The participant thinks that the calculations done for EV's sustainability might be a bit misleading knowing that the batteries used for EV/PHEVS are not the "greenest" to produce;

- Interviewee things that EV/PHEVS are a good transition for sustainable mobility and that the government should help more with tax incentives, encouraging to purchase/drive EVs, at least, until EVs become the most common car;
- The participant this that EV/PHEVS are that much "greener solution" for the moment, but highlights that EV/PHEVS will become more and more environmentally friendly in future since the development's rate is much higher;

Permanent owning vs, leasing
- The interviewee would lease a car if it would be more expensive since expensive cars get more taxed by the state;
- Mercedes and BMW use the leasing option to manage and register vehicles, making them cheaper to process and have a good market price;

Purchasing process
- Interviewee thinks that physical purchasing process is not hard and takes less than an hour to buy a car;
- The participant thinks that, in Denmark, car ownership-related paperwork is not hard or frustrating to complete;
- While purchasing Porsche Taycan Electric (EV) the purchasing journey was done online, almost like a Tesla's;
- The interviewee did not see an issue with online vehicle purchasing;
- According to the interviewee, Porsche's online purchasing journey is different from Tesla's. For Porsche, it is all about the vehicle add-ons.
- For the interviewee, purchasing Porsche Taycan Electric (EV) was a bit hard to understand what each configuration does, therefore, the ability to speak with a sales agent online was seen as a necessity to get help and guidance online.

Dealerships, car salesman
- The interviewee thinks that online vs. physical purchasing experience depends on the context, brand and attitude of the car;
- The participant owns a company and has a lot of connections with dealerships that are offering him deals related to cars;
- Interviewee thinks that if the car is pre-configured the purchasing process is much faster and easier, making the car dealer an unnecessary actor;
- The participant thinks that for manufacturers true profit comes from the extra configurations that manufacturers and dealers are offering;
- While purchasing Ford Kuga (PHEV), the test drive was fun, but with low impact as the interviewee has previously owned Ford brand cars in a similar price category;

- Participant highlight the fact that dealerships should have more realistic car performance figures. For example, the charging statistics should be represented in different temperature rates such as 0-9C, 10-19C and 20C;

Charging
- If you enter the city and you are in a charing network like E-on or cleaver you can park and charge there - a good advantage- he can see on a phone where parking spots are available;
- The interviewee is upset because of the fact that he does not if he can charge his Porsche in the Tesla charging station or not;
- The participant says it is frustrating to be locked in one charging network. For example, in this car's navigation, the charging points shown on his GPS are only shown from Porsche networks, not including other charging stations that belong to other charging networks;

EV/PHEV owning
- The participant states that he calculates the travelling distances and calculates to be aware of his charging needs;
- The interviewee states that driving patterns are super important for how far the car can go;
- The participant enjoys driving the vehicle that is silent and pollutes less environment while driving;
- The interviewee appreciates the fact that EV/PHEVs have more electric/IT integrations, enabling the driver to use the car via applications without being in it (e.g. heating the car before starting it);
- The interviewee is conscious of the fact that this one-charge/fill range is lower. However, he says that he has adjusted to the situation;

Interview with Danish EV owner

Intro

<introducing ourselves>
We are master students that are studying Service Systems Design at Aalborg University and writing a thesis on car purchasing experience.

<setting the scene>
In today's interview, we will be asking for your opinion in regards to the experience of owning a car. The interview itself is semi-structured and informal, therefore, please feel free and look at it as a casual conversation. We are aiming to take less than 30 minutes, but if you will be up to tell us more - we are happy to take longer.

<explaining context>
We are in the initial phase of research where we are interested to know the car owner's needs, experiences and attitude towards owning a car. Since we are working on a thesis that is related to electrical and plug-in hybrid electric vehicles, we will also ask for your opinion, concerns and expectations when it comes to electric-powered cars as well.

<informing that one will ask the questions while another one take notes>
As we start the interview, my colleague will be writing down your answers while I will be asking you questions.

<ask if we can record the conversation>
Also, we would like to know, would it be okay if we would record our conversation in audio format?

- What kind of car do you own?
- Tesla S

Pre-EV/PHEV purchasing

- How did you come up with an idea to purchase an EV/PHEV?
- Wanted to contribute to the "green aspect": own a vehicle that is CO_2 emission-free;
- Loved the driving experience with Tesla S;
- The participant has decided to purchase Tesla because he got a good offer from a private person to purchase it;

- What was your approach to purchasing your car? (steps wise)
- The participant has done a lot of pre-purchase research because 4 years ago the technology was new (" everything was new");
- The participant has researched a lot about EV's battery life;

- While you were getting an EV/PHEV, were you more inclined to lease or to own one?
- For the next purchase, the participant would investigate leasing and permanent owning options and decide;
- The participant has noticed that a value of Tesla drops more than an ICEV, therefore, leasing might be the better choice due to that;

Extra input:
- After owning an EV for 4 years, the interviewee thinks that he might be inclined to try other EVs like a Porsche (mentions different experience);
- Tried hybrid and realised that EV suits him better (was ok with the current range on EV);

EV/PHEV purchasing

- While you were purchasing your vehicle, what aspects of the purchase were you happy or unhappy with?
- Before purchasing a car, the participant knew exactly what car and with what specifications he wanted;
- While purchasing a car, the interviewee considered the vehicle's addons to be important, especially sunroof, speakers and automated suspension;
- According to the participant, the purchasing process is simpler if there are not a lot of customization options that are, however, important;

- Through your car purchasing research - was it easy for you to find the necessary information in regards to available brands, charging solutions, taxes and other car-related things?
- Participant found it easy to find information about Tesla S as he used worldwide EV user forums to ease his research;

- Do you consider a car salesman to be an essential part of a car purchasing experience?
- The participant thinks that it is not necessary to include a car salesman into the purchasing journey if the configuration of the car is simplified;
- The interviewee states that the cars salesman might be needed if the car manufacturer/dealership is offering a lot of customization options that might confuse the purchaser;

- Was it important for you to have a test drive to be convinced of your car purchase?
- Since the participant was purchasing the vehicle from a private seller, the test drive was important to see if the car was working as it should;

- What did you like or not like while having a test drive?

- Did you add any customization to your car? Did you do that online or in the showroom?

- Reflecting on your discussed purchasing experience, is there anything that you would like to change, add or remove?
- The participant states that people are becoming more trustworthy about buying things online;
- The interviewee thinks that for the high-value online purchases, the purchasing process should be more comfortable, safe and with chances to withdraw purchase (14days of return rule);

- Did the financial agreements/paperwork require you to physically be at the showroom or everything happened online?

Extra input:
- The interviewee likes his owned car manufacturer's community;
- For the participant, while acquiring an EV, there was a tax deduction for the charging station;
- The interviewee chose E-ON because of the best price and specification on the charging station for a Tesla to charge;
- The participant states that Porsche is going in the same direction as Tesla - to buy it online - but offers too many customization options making him confused;
- The interviewee states that the infrastructure of Hybrid/PHEVs is more complex, making him avoid car of such engine types;

Post-EV/PHEV purchasing

- What does it mean for you to own an EV/PHEV?
- For the interviewee, to own an EV brings a high personal experience value;
- The participant states that the car's care gets depreciated over time value and money-wise;

- What is your parking experience with an EV?
- The participant states that the parking experience was great, however, one year ago everything seemed to change and now it has become hard to find a parking spot dedicated to EVs;

- What is your experience with charging your EV?
- The interviewee thinks that now, it has become difficult to get access to chargers;

- The participant is annoyed that the "hybrids" are also using the dedicated parking spots with the chargings station. even though they need to charge a small amount of electricity and not completely dependent on it in comparison to EV owners;

- Where is it more important to own a charging station: at home or at the office?
- The interviewee states that it is definitely more important to have a charger at home rather than having it at the office;

- What are your thoughts on car-related clubs, memberships, organizations?
- The interviewee is a member of FDM. However, it is not because of his Tesla ownership, rather it is because he joined it 10 years ago and was "lazy" to leave;
- Even though the interviewee is happy that his car's manufacturer has a great community around the brand, the participant does not want to have any affiliation with it and use the forms, groups only for receiving information;

Extra input:
- The participant had to change the EV's CPU (MCU) that was expensive;
- The interviewee thinks that VW has more engineering experience but somehow, in a relatively short time, the Tesla brand has managed to reach a title of trustworthy and well-engineered products;
- The interviewee states that Tesla was the coolest car at the time of his purchase. However, he states that he would like to try other EV brands as well;
- The participant is inclined to use as many innovative technologies in his vehicle as possible;
- None of the Tesla owners has said anything about autonomous driving or that they are looking forward to using it in DK.

Closing

<asking for interviewee's final thoughts>
- And this was the last question. You did great. Thank you!
- Maybe you have any final thoughts that you would like to share with us in regards to the interview topics?

<ask if we could follow-up>
- In the future, we are planning to reach out to some of our interviewees again to discuss and further analyse our gathered insights. Would you be up for participating in another interview or survey?
- The interviewee would like to participate in further research;
- The interviewee would like to receive the finished thesis;

Impressions after the call

- The interviewee has purchased a second-hand EV from a private seller;
- The interviewee has decided to purchase an EV after trying PHEV/HV;
- The participant is tech-savvy (works as a software developer);
- The interviewee is not bothered by the fact his EV's value has dropped a lot in 4 years;
- The interviewee seems to be very interested in each car's value proposition before purchasing

Insights from the interview

General

- The participant is inclined to use as many innovative technologies in his vehicle as possible;
- None of the Tesla owners has said anything about autonomous driving or that they are looking forward to using it in DK;

Purchasing

- Before purchasing a car, the participant knew exactly what car and with what specifications he wanted;
- While purchasing a car, the interviewee considered the vehicle's addons to be important, especially sunroof, speakers and automated suspension;
- According to the participant, the purchasing process is simpler if there are not a lot of customization options that are, however, important;
- The participant states that people are becoming more trustworthy about buying things online;
- The interviewee thinks that for the high-value online purchases, the purchasing process should be more comfortable, safe and with chances to withdraw purchase (14days of return rule);
- The participant states that Porsche is going in the same direction as Tesla - to buy it online - but offers too many customization options making him confused;

Car dealerships and car salesman

- The participant thinks that it is not necessary to include a car salesman into the purchasing journey if the configuration of the car is simplified;

- The interviewee states that the cars salesman might be needed if the car manufacturer/dealership is offering a lot of customization options that might confuse the purchaser;

Leasing vs. permanent ownership
- For the next purchase, the participant would investigate leasing and permanent owning options;
- The participant has noticed that a value of Tesla drops more than an ICEV, therefore, leasing might be the better choice due to that;

EV ownership
- After owning an EV for 4 years, the interviewee thinks that he might be inclined to try other EVs like a Porsche (mentions different experience);
- The participant states that the car's care gets depreciated over time value and money-wise;
- The interviewee states that Tesla was the coolest car at the time of his purchase. However, he states that he would like to try other EV brands as well;
- The participant is inclined to use as many innovative technologies in his vehicle as possible;

Parking and charging
- The participant states that the parking experience was great, however, one year ago everything seemed to change and now it has become hard to find a parking spot dedicated to EVs;
- The interviewee thinks that now, it has become difficult to get access to chargers;
- The participant is annoyed that the "hybrids" are also using the dedicated parking spots with the chargings station. even though they need to charge a small amount of electricity and not completely dependent on it in comparison to EV owners.

Appendix F—Interviews: overview of insights

First-wave interview synthesis

Legend:
- Attitude (x12) - **A**
- Need (x7) - **N**
- Problem (x8) - **P**
- Idea (x4) - **I**
- Environment (x6) - **E**

Use zoom-in function to see smaller elements

Stakeholder-related

First-wave interview synthesis
Municipalities are invested to have as much charging points installed as possible **E**

First-wave interview synthesis
EV/PHEV-related services sometimes use nudging to maintain/establish a healthier organizations and so on, help or advocating for EV/PHEV related services: - gets lower price margining to have the DK industry flourishing **E**
EV/PHEV using environment **E**

First-wave interview synthesis
Government's support for EV/ PHEV adoption is necessary for tipping point **E**

First-wave interview synthesis
Public domain is lagging behind the private sector in regards to EV/PHEV infrastructure related to it. **P**

First-wave interview synthesis
Automative industry's stakeholders categorise timelines as: pre-corona, during corona and post corona. **A**

First-wave interview synthesis
The government/municipalities can be more interested in the public sector's EV/PHEV fleet development rather than private x. **E**

First-wave interview synthesis
Odense commune has a citizen panel. The panel has 1000 people that represent the majority and that is where the input from people come from. **N**

First-wave interview synthesis
Municipalities want to be able to have a control/voice on how service's artefacts are being placed out and used in public spaces. **I**

First-wave interview synthesis
It could be that collaboration between dealerships, interested in selling EV/PHEVs or advocating for EV/PHEV related services: - gets less income from maintenance. **I**

First-wave interview synthesis
Stakeholders (e.g. corporates) have deals with autodealerships **E**

First-wave interview synthesis
Pushback against EV/PHEVs exists. One of the reasons - EVs bring less money for other stakeholders in industry **E**

First-wave interview synthesis
Dealership's role is not crucial in car purchasing experience. **A**

First-wave interview synthesis
It is being challenged by manufacturers and other stakeholders. Thus, the role is slowly diminishing. **E**

Dealership-related

First-wave interview synthesis
Some users have great experiences with car dealerships **A**

First-wave interview synthesis
Often car dealership representatives are the ones who inform users about cars, maintenance and so on. **E**

First-wave interview synthesis
For some, human interaction while purchasing a car is necessary **A**

First-wave interview synthesis
One of the most important car purchasing touchpoints are dealerships **P**

First-wave interview synthesis
Test driving is often an important touchpoint of car purchasing experience **A**

Consideration
Dealerships are seen as the "experts" to whom ppl will go for any related question when thinking about buying a car. Could we add another "expert" to "buying a car customer journey? **E**

Consideration
Maybe an AI "Qbot chat guiding people in the right direction **I**
ICE vs. PHEV/EV: benefits and downsides should be clearly listed down

User/perception-related

First-wave interview synthesis
Some upcoming EV/PHEV owners do not have technical knowledge in regards to EV/ PHEVs, charging **E**

First-wave interview synthesis
Car type purchases are often connected with family needs **A**

First-wave interview synthesis
Some EV/PHEV users are eager to advocate, share their owning experiences with others **E**

First-wave interview synthesis
Car is not only seen as transport to get from A to B. It can also be associated with entertainment, status, hobbies or a statement **I**

First-wave interview synthesis
Some ICE car owners would transition to PHEVs first before purchasing EV. **P**

First-wave interview synthesis
Purchasing PHEV/EV is more expensive than purchasing ICE **A**

First-wave interview synthesis
Not everyone belongs to a car-related organization/ membership. **N**

First-wave interview synthesis
Generally, EV/PHEVs are considered to be more environment-friendly. **A**

First-wave interview synthesis
However, some are aware/ heard of ICE vs PHEV/EV the production costs **A**

Comment

First-wave interview synthesis
Not everyone is keen on purchasing car online **A**

First-wave interview synthesis
Before purchasing, some owners were negatively biased about PHEV/EVs **A**

First-wave interview synthesis
Potential/upcoming EV/PHEV users often have misconceptions, stereotypes and incorrect information in regards to purchasing, owning, maintaining, charging the EV/PHEV **P**

Charging-related

First-wave interview synthesis
Main EV owning pain point is charging: - having/finding charging stations; - planning charging; - charging st. fueling **P**

First-wave interview synthesis
Some users think that it is important to always have car fully charged. That is why they want home charging option. **A**

First-wave interview synthesis
Some people think that using charging services is beneficial only if having a subscription. One-time use - expensive. **A**

First-wave interview synthesis
Demand for charging stations/network/services is increasing **N**

First-wave interview synthesis
Infrastructure for public charging points is not well-developed yet: - not always marked as taken. - sometimes not working. - not always offering fast charging - sometimes inaccessible for some drivers **N**

First-wave interview synthesis
Charging station installation process for public sector takes too long (approx. 0.5 -1 year) **P**

First-wave interview synthesis
Residential areas, charging vs. public, charging areas; private businesses are providing accessible charging spaces **E**

Owning-related

First-wave interview synthesis
"Range anxiety", "Charge anxiety" are the terms that are associated with EV owners **A**

First-wave interview synthesis
It is crucial to have a charging point either at work or at work **P**

First-wave interview synthesis
Charging station installation for private house is an important touchpoint **E**

First-wave interview synthesis
PHEV/EV owning/charging consumer culture is not fully developed yet **E**

First-wave interview synthesis
Charging stations require space, often having installation constraints (more for private owners) **P**

First-wave interview synthesis
Maintaining and using EV is cheaper than ICE cars **A**

First-wave interview synthesis
Some 1-2 year old ICE car owners will not sell their car due to a high money loss **E**

Reflection
Is an important aspects that might need to integrated in our possible solution somehow

First-wave interview synthesis
Owning EV/PHEV in city and rural areas are two different experiences **A**

First-wave interview synthesis
Some users need to own HV/ PHEV before owning an EV **N**

Impression on users segments
Young people 30-45) are more inclined to think first about the environment and after about how cool and fun is to drive an EV - Victor's opinion

Reflection on interviews
If people cannot tell what they would like to have or expect from online purchasing experience we have to prepare with yes/no questions in regards to their likings (e.g. would you love to have a test drive before purchasing (yes/no), would you prefer to be visited by a car salesman or have a virtual car tour, etc.)

Reflection on participants
Owners that bought new TESLA cars had totally different purchasing experience. We should ask People who plans to purchase or owns something else than TESLA will have other purchasing experience. We need to pressure them to hear what they would love/hate experiencing while purchasing EV/PHEV, (others online selling journey is not well defined yet)

Legend

- Attitude (x24) - A
- Need (x7) - N
- Problem (x11) - P
- Idea (x5) - I
- Environment (x7) - E

Stakeholder-related

Second-wave interview synthesis
Denmark's infrastructure and businesses are ready for EV/PHEV, making them not excluded from the rest of vehicles — E

Second-wave interview synthesis
Regulations and rules towards EV/PHEVs are changing fast — E

Second-wave interview synthesis
People who are purchasing EV/PHEVs due to monitary savings are sensitive to rule/regulation changes and others factors (i.e. charging price) that effect cost of owning EV/PHEV — P

Second-wave interview synthesis
General people's perception of goverment's nudging is not seen as only positive or negative. There are people up and against it — A

Second-wave interview synthesis
Existing state's legislations/rules on EV/PHEVs should be communicated in a better — A

Second-wave interview synthesis
There is no "difference" between EV and PHEV when it comes to public's usage viewpoint — A

Dealership-related

Second-wave interview synthesis
Car sharing services with EV/PHEV fleet can act as test driving services — I

Second-wave interview synthesis
Manufacturers and car dealerships are often misrepresenting EV/PHEV specifications/facts that do not live-up in reality — P

Second-wave interview synthesis
Some EV/PHEVs are purchased from abroad with car salesman help since Denmark does not always have the models introduced in the market yet — E

Second-wave interview synthesis
Car salesman often seen as middleman — A

Second-wave interview synthesis
Often, receiving a vehicle takes more than 5-10 months of waiting time — A

Second-wave interview synthesis
Some car salesman do not know anything about EV/PHEVs — P

Second-wave interview synthesis
Good car salesperson is presenting vehicle's usage cases in realife scenarios, being critical and not pushy or sale-oriented — A

User/perception-related

Second-wave interview synthesis
Leasing seems to be more appealing when purchasing expensive vehicles to avoid high taxes — A

Second-wave interview synthesis
Some people are purchasing EV/PHEV from second-hand market — A

Second-wave interview synthesis
If car purchasing experience is necessary — E

Second-wave interview synthesis
Not everyone cares for sustainability or puts it to the first place when it comes to purchasing EV/PHEV — A

Second-wave interview synthesis
Some people are motivated to buy EV/PHEVs because of technical advancements in comparison with ICEVs — A

Second-wave interview synthesis
Car salesperson is not necessary in the car purchasing experience. However, the process has to be charged to fill the gap — I

Second-wave interview synthesis
Some people are motivated to buy EV/PHEVs because of practicality or monetary-saving reasons — P

Second-wave interview synthesis
Reconfirming user that the taken choice was good is important and motivating to endure some inconveniences like waiting time — I

Second-wave interview synthesis
There is increase of trust when it comes to purchasing goods online — A

Second-wave interview synthesis
EV range restrictions can be presented as positively aspects — I

Second-wave interview synthesis
Environment conscious EV/PHEV owners care about their methods of transportation and electricity, it's source's greenprint — A

Second-wave interview synthesis
Warranty is important aspect of the car purchase — A

Second-wave interview synthesis
For some, physical purchasing is not perceived as a long procedure — A

Second-wave interview synthesis
Current EV/PHEV prices are considered to be high and preventing others from buying/switching to EV/PHEVs — A

Second-wave interview synthesis
Online purchasing journey should be as simple as it can, presenting only several choices throughout the purchase — N

Reflection
Is it possible to lower or soften the price barrier? — P

Charging-related

Second-wave interview synthesis
The EV/PHEV public parking and charging experience is starting to worsen as more and more people are getting EV/PHEVs — P

Second-wave interview synthesis
Daily charging is saving time in comparison of fuelling — A

Second-wave interview synthesis
Charging takes more time only when doing it on the road — A

Second-wave interview synthesis
Infrastructure has flaws when it comes to charing stations and their plug/output types that can cause trouble for drivers that are seeking for a charger — P

Second-wave interview synthesis
Car charging networks are decentralised, meaning that drivers often are not aware of able to access some car charging networks — P

Second-wave interview synthesis
Having charging station at home considered to be important when owning EV/PHEV — A

Second-wave interview synthesis
Long-range trips have to be planned and have charging points identified — A

Owning-related

Second-wave interview synthesis
Some participants state that EVs are "fun" to drive — A

Second-wave interview synthesis
After having a successful EV/PHEV owning experience, some could be inclined to explore more progressive EV/PHEV alternatives — A

Second-wave interview synthesis
EV/PHEV owners are forced to change their driving hobbits and routine — P

Second-wave interview synthesis
The interviewee noticed that his EVs price droped faster than in comparison to ICEVs in general — P

Use zoom-in function to see smaller elements

Second-wave interview synthesis
Ability to speak with sales agent online is a great addition to online purchasing experience
N

Second-wave interview synthesis
Several pre-configured car purchasing packages can make the online purchasing journey simpler
I

Second-wave interview synthesis
Online shopping for high-value items/services should be more reassuring safety/trust-wise
N

Second-wave interview synthesis
It is important to have an ability to track purchased EV/PHEVs order/shipment journey
N

Second-wave interview synthesis
Some people are inclined to have several car tests with few EV/PHEVs to get a better "feeling"
A

Second-wave interview synthesis
Some EV/PHEVs car be purchased without the test drive as long as models have a good reputation
A

Second-wave interview synthesis
Test drives should reflect as much real-using experience as possible (i.e. testing on city, highway, warm, cold, etc.)
A

Second-wave interview synthesis
Test drives are not always the important factor when purchasing a car
A

Second-wave interview synthesis
Test drives for first-time EV owners should be more tailored and longer
I

Second-wave interview synthesis
It seems to be a challenge when it comes to searching for EV/PHEVs with specific criteria
P

Second-wave interview synthesis
People purchasing cars often have expectations on some of the aspects
A

Second-wave interview synthesis
People expect EVs to be the future of the vehicles and see a lot of potential in future EV development
A

Second-wave interview synthesis
EV/PHEVs considered to be more practical than ICEVs
A

Second-wave interview synthesis
Word of mouth plays important role for the first time EV/PHEV movers
I

Second-wave interview synthesis
If someone has knowledge about cars they will be more prone to skip the hybrid and go for full EV especially now that their range has increased considerably for all manufacturers.
A

Second-wave interview synthesis
Car enthusiasts have no issues with finding information about cars as they are more aware of informational channels, terms and so on.
E

Comment
Warranty can help people to be more confident and calm while purchasing car. Consider to have a better offering with warranty when others.

Appendix G—Pretotyping: created template and participants' answers

Introduction & instructions

Hello,

Once again, thank you for your participation. During this session, you will be asked to give your opinion on our presented service concept. The idea is in the infancy stage and is not flawless. Please read thoroughly and follow the chronological order of the document.

The session is divided into four sections:
1. Introduction & instructions *(currently you are in this section)*;
2. A brief explanation of the service concept in a short video sketch;
3. A more detailed service Concept explanation in written;
4. Follow-up questions;

The purpose of the test *(i.e. pretotyping)* is to get your opinion and comments on the ideated service concept (what you like, do not like, do not think can work, etc.). Therefore, focus your input on the introduced idea and please be:
1. Proactive to express your opinion/take on presented material;
2. Elaborative on your comments;
3. Critical (kick it to the ground);

Please be aware that you have the commenting/suggesting permissions for this document. Therefore, do not be afraid to delete or move something, it can be reverted back by us or you, yourself.

You can leave your input in two ways: commenting on the selected text or typing:
- For the provided text and video, we suggest that you select the parts of the text that you want to reflect on and click on the button that will appear on the right side of the page;

- For answering questions, we suggest you type in the fields that are indicated for your written input.

Your given input will make an impact on our decision - whether this concept idea should be developed further or not.

Short video presenting a simplified customer's purchasing experience

Please click on the provided link to be directed to the video.
After the video stops - close the tab and return to this document to continue further.

Link to the video: EV Collective purchasing agreement service concept.mp4

Note: if the video does not play, you can download it and play it from your computer.

Service concept: Collective EV[1] purchasing via the online

The core of the service concept

The service concept is based on the idea that by buying EVs in bulk, the purchase-related stakeholders are saving money. By dropping down the initial cost barriers for EVs and having EV retail prices closer to wholesale-purchase prices we expect to speed up EV adoption in Denmark.

Customers would have to join a waiting list. After a certain amount of people would be enrolled, we would place an order through partnering dealerships/manufacturers and purchase cars in bulk for a discounted price.

Reflecting on the Danish market

We see this service concept to be working in both: urban and rural EV owning experiences. Especially in the locations where EV purchasing is withheld due to not well-developed parking and charging infrastructure or lack of EV promotion for lifestyles that do not seem to be compatible with EV ownership. We expect that collective purchasing would help the owners to create a community around EV ownership that would push a charging infrastructure surge in private households and public or business areas.

Knowing that traditional car dealerships are offering deals to companies, we would also take advantage of such practice in Denmark and also offer companies to purchase fleets in bulk or suggest their staff to purchase cars cheaper while purchasing them as a group.

Avoiding traditional dealerships

Our research has shown that the majority of our respondents did not see the vehicle purchasing experience through traditional car dealerships to be always positive or satisfying. For example, it was argued that some salesmen are creating a feeling of pressure to purchase a car regardless if the car fits the purchaser's real needs or not. Furthermore, it was discovered that car dealerships are not always motivated and prepared for selling EVs as they are gaining less profit by selling EVs that require less servicing and technical maintenance.

Online over physical experiences for most of the customer's journey

The service is based on an online platform and seen as a better choice than having physical offices around the country. By having an easy-to-use online platform, we would enable the customers to place an order for an EV, find all information in regards to regulations, car specifics and so on. Running the majority of service's processes online enables us to save

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[1] EV - electric vehicle.

time on some consultation scenarios and have a systemic approach when it comes to addressing user's needs. Providing several information sources and presenting everything in a standardised manner helps to keep and improve the service's quality. Not to mention, most of the service's features can be accessed anytime and anywhere by the customer that is visiting the online platform.

Our research shows that some people prefer human guidance rather than doing everything by themselves online. As we saw with the COVID19 pandemic, video calls and online consultations are possible. Having a friendly, "customer-first" rather than "sales-first" online representative, has a chance to improve purchasing experience for the customer, making him feel more welcomed while receiving a personalised online purchasing experience.

Vehicle test driving is also not being forgotten. The majority of respondents point out that they would not consider purchasing a vehicle online due to the inability to test drive and see the vehicle. Looking at the EV selling practices, we see that some manufacturers do offer an online purchasing experience and touchless test drives. Therefore, test driving would also be offered before choosing to purchase an EV. This would make the service "come to a customer" rather than "a customer to come to a service" which can be presented as the additional benefit of the service.

Saving resources in comparison to traditional business

With EV bulk purchasing, we expect to decrease pollution and need of resources when it comes to the distribution of the vehicles and infrastructure since the process would be more streamlined and planned for several EV owning households rather than one.

The simplified representation purchasing process

To help you imagine how you could be using the service, we re-introduce you to the previously presented simplified EV purchasing journey of the customer.

Find out about service > Do research & browse cars > Test drive the selected car > Pay for the vehicle > Join and sign waitlist agreement > Be informed about finalizing the cars' pool purchase > Receive updates in regards to car's arrival > Go to pick-up location/Get car delivered > Sign documents > Drive

Service's core stakeholders

When it comes to the service's core stakeholders, we have identified 8 of them:
1. Consumers interested in purchasing EV - using the service, purchasing vehicles;

2. Banks - helping consumers with purchasing, communicating with service;

3. Insurance companies - providing insurance for the service and customers;

4. EV owners/car experts - welcoming upcoming EV owners by sharing their knowledge, opinions about EVs;

5. Businesses - encouraging and informing their staff with the news that EVs car be purchased in bulk;

6. Dealerships/manufacturers - providing vehicles, warranty;

7. Charging network providers - offering charging subscriptions as service's partners;

8. Municipalities - addressing the increase of EV owners and installing public charging stations, running EV purchasing incentives.

Follow-up questions

Before the end of the pretotyping session, we would like to ask you several questions to know your thoughts about the service concept.

What are your thoughts on the described service concept?
I don't really see the point as I could use the same service on the manufacturer's website. Occasionally they even have very good offer for purchasing online. Moreover buyers can customize the details of the car from engine to interior designs in a user friendly mode in their website. So if I want to order an electric it would be easier for me to go directly to their website.

In your opinion, could the presented or similar idea be worth trying out in Denmark?
In Denmark usually people research themselves before they purchase something expensive. There are many forums and platforms where they compare prices with different specifications. So When I wanted to buy my electric car I researched online a bit about EV ranges, prices and charging times. Then I checked Tesla, Mercedes, Audi and Jaguar websites. In all four manufacturers I booked a driving test and later I could build and design my future car and order it. So all and all folks wouldn't use or trust different platform than the manufacturers website where they can use the same service.

If yes, do you imagine yourself using the presented service or a similar one day?
No.

Do you have any general, other comments that you would like to provide us with?
My suggestion is to focus on the first part of your service which is research and browsing. Help future EV buyers to understand their needs and direct them to their target product. Normally people are so confused what to buy due to the different products in the market. But as soon as they know what they want, they order them directly online from the manufacturers website or main dealership or find them second hand in BilBasen.dk

Thank you for your given input. You have done something truly amazing today🎉
If you need to get in touch, please contact us via the following emails:
Julius Staskunas - jstask19@student.aau.dk;
Victor Stan - vstan19@student.aau.dk.

Creating a service that helps to increase EV adoption in Denmark
Service Systems Design MSc., thesis project, 2021

5. Businesses - encouraging and informing their staff with the news that EVs car be purchased in bulk;

6. Dealerships/manufacturers - providing vehicles, warranty;

7. Charging network providers - offering charging subscriptions as service's partners;

8. Municipalities - addressing the increase of EV owners and installing public charging stations, running EV purchasing incentives.

Follow-up questions

Before the end of the pretotyping session, we would like to ask you several questions to know your thoughts about the service concept.

What are your thoughts on the described service concept?
Overall, the discount is appealing, but not sure that the process of buying in bulk is. Andreas does not think it is appealing. Charlotte likes it to some extent. Charlotte likes the idea of community building as part of buying cars in bulk, and see some merits in this way of buying a car may pave the way for community charging stations. But not sure if that is really what you mean by the buying-in-bulk. The community aspect may even bring with it that people use your service to buy a car together (sharing), but this is probably not what you anticipate. Andreas thinks that buying a car is a very (extremely) personal thing to do. Charlotte might be more inclined towards the community aspect ;)

In your opinion, could the presented or similar idea be worth trying out in Denmark?
Yes, it is worth a try, for two reasons; 1) the buying-in-bulk discount will be appealing to many, and 2) the community aspect will be appealing to some (Denmark is a country that is very used to co-ops).

If yes, do you imagine yourself using the presented service or a similar one day?
Andreas: not likely for buying, but would maybe use/visit to gather information on possible EVs in Denmark (like a forum). Charlotte: maybe, if I can get help from representatives in terms of identifying what car suits my needs the best.

Do you have any general, other comments that you would like to provide us with?
No, please see our other comments :)

Thank you for your given input. You have done something truly amazing today🎉
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8. Municipalities - addressing the increase of EV owners and installing public charging stations, running EV purchasing incentives.

Reflections and questions to consider for further development

Questions

Question: what is needed to make the service work?

Question: should we buy the cars first or wait for them to be delivered?

Question: what is the consumer looking for when purchasing an EV? Design, mileage, technology?

Question: how big of a bulk purchase do we need for the manufacturer to give us a discount?

Question: how are we going to solve/tackle logistics?

Question: who will deliver cars, participate in test drives? Could we rely on paid freelancers and car enthusiasts?

Question: who and where holds the purchased vehicles?

Suggestions

Suggestion: have several vehicle bulk-purchasing offers (several offers to choose from, to try to cut down the waiting time);

Suggestion: consider if the service could offer different vehicle ownership models: (1) Subscription to have a vehicle; (2) Leasing; (3) Permanent owning;

Suggestion: offer vehicle models that only have a good build quality;

Suggestion: do not take Tesla's model and put it on the Volkswagen;

Suggestion: if you are providing test driving with several cars - make the test drive with all of them at once.

Challenges

Challenge: test drive process: accommodating a lot of people in a short span of time,

Challenge: making the manufacturers/dealerships partner with us and give the cars for test driving;

Challenge: charging infrastructure (are collaborators ready for the EV surge?

Challenge: make the customer avoid having fewer touchpoints with other collaborators, manufacturers so that they do not leave;

Challenge: as oil prices go down, fewer people are motivated to go for EVs;

Challenge: due to a corona, people's monetary status could worsen;

Challenge: creating a digitalised service that has taken care of logistics flawlessly and can see it and control it all the time;

Problems

Problem: for a customer, bouncing around service's collaborators could be confusing;

Problem: some manufacturers will not be interested in partnering with our proposed service concepts.

Thank you for your given input. You have done something truly amazing today 🎉

If you need to get in touch, please contact us via the following emails:

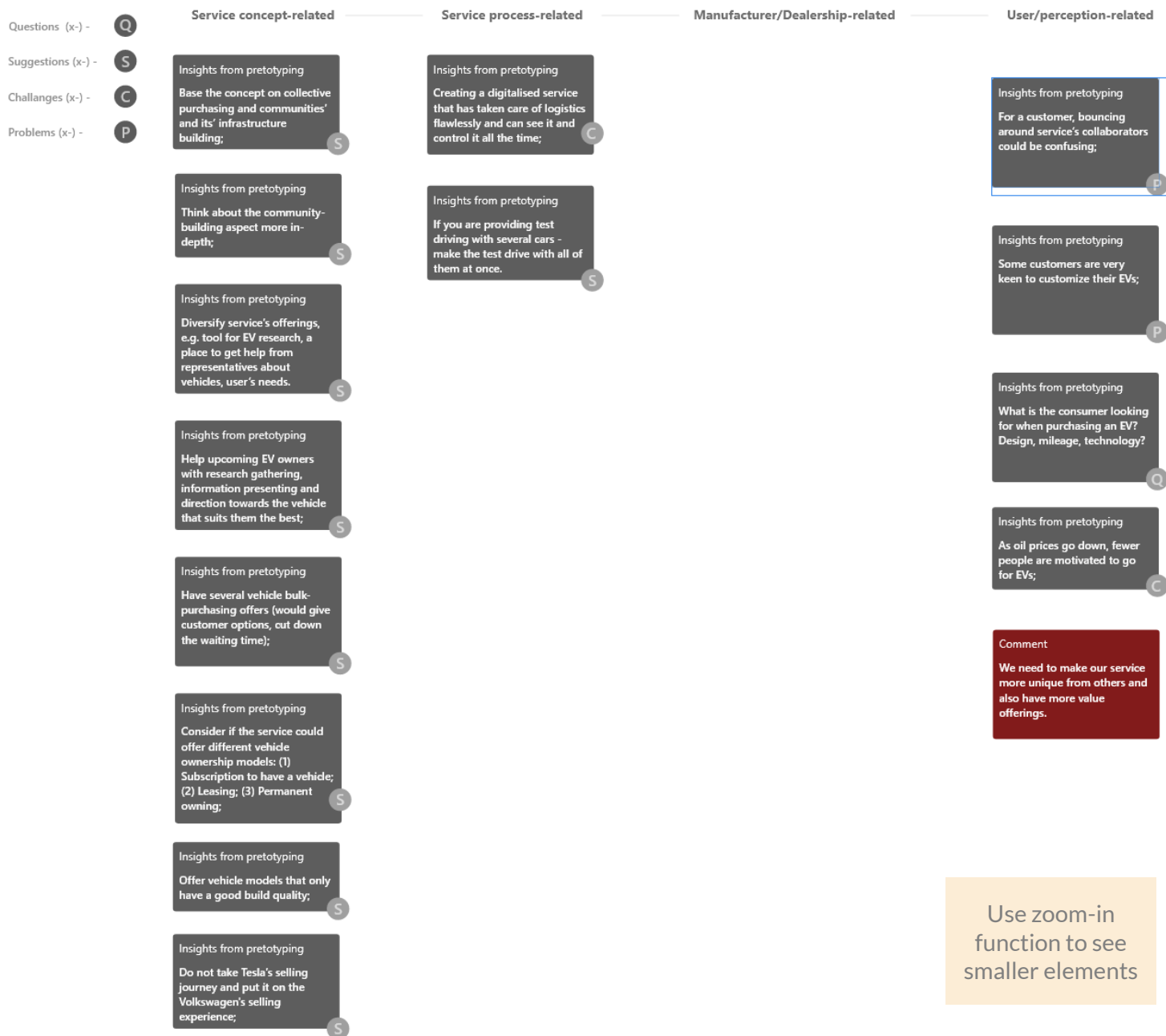Julius Staskunas - jstask19@student.aau.dk;

Victor Stan - vstan19@student.aau.dk.

Insights from pretotyping session

Questions (x-) - **Q**
Suggestions (x-) - **S**
Challenges (x-) - **C**
Problems (x-) - **P**

Service concept-related

Insights from pretotyping
Our service should aim at people who are not able/keen on spending a lot of money on EVs; (S)

Insights from pretotyping
Who provides vehicle service and maintenance after the EV is purchased? Us or manufacturer? How? (Q)

Insights from pretotyping
Have a clearer definition and explanation of the "waiting list" concept. (S)

Insights from pretotyping
Is it possible to use our service completely without the service's representative? (Q)

Insights from pretotyping
If we try to present our service as sustainable friendly - we need to have good arguments and examples. Otherwise, people might call it a bluff (i.e. greenwashing); (P)

Insights from pretotyping
Keep the trust and lower price in line with each other; (C)

Insights from pretotyping
Introduce stakeholders in more detail and explain their relations; (S)

Service process-related

Insights from pretotyping
Ensure that the car representative is available during the working hours to assist people that need help; (S)

Insights from pretotyping
What resources, processes and etc. are needed to make the service work? (Q)

Insights from pretotyping
How are we going to solve/tackle logistics? (Q)

Insights from pretotyping
Who will deliver cars, participate in test drives? Could we rely on paid freelancers and car enthusiasts? (Q)

Insights from pretotyping
Car storage: who and where holds the purchased vehicles? (Q)

Insights from pretotyping
Test drive process: accommodating a lot of people in a short span of time, (C)

Insights from pretotyping
Charging infrastructure (are collaborators ready for the EV surge? (C)

Manufacturer/Dealership-related

Insights from pretotyping
Manufacturers might also be introducing/having discounts. Making our service obsolete. (C)

Insights from pretotyping
Making the manufacturers/dealerships partner with us and give the cars for test driving; (C)

Insights from pretotyping
Some manufacturers will not be interested in partnering with our proposed service concepts (P)

Comment
We need to present ourselves as manufacturer's/dealership's partners not competition

Insights from pretotyping
How big of a bulk purchase do we need for the manufacturer to give us a discount? (Q)

Insights from pretotyping
There are already a lot of platforms that compare vehicle stats and so on; (P)

Insights from pretotyping
Second-hand markets is another channel to purchase EV cheaper (P)

User/perception-related

Insights from pretotyping
People might see our service as a scam; (P)

Insights from pretotyping
What do we do to ensure the users that we are trustworthy? Do we get any kind of certification or similar? (Q)

Insights from pretotyping
How do we ensure that we are not alienating buyers who are not comfortable with online shopping; (Q)

Insights from pretotyping
To create the community EV adoption affect a good number of people from that community is needed; (P)

Insights from pretotyping
Some people perceive vehicle purchasing as an extremely personal process; (C)

Insights from pretotyping
Make the customer having fewer touchpoints with other collaborators, manufacturers so that they do not leave; (C)

Insights from pretotyping
Due to a corona, people's monetary status could worsen; (C)

Use zoom-in function to see smaller elements

Questions (x-) - **Q**

Suggestions (x-) - **S**

Challanges (x-) - **C**

Problems (x-) - **P**

Service concept-related

Insights from pretotyping

Base the concept on collective purchasing and communities' and its' infrastructure building; **S**

Insights from pretotyping

Think about the community-building aspect more in-depth; **S**

Insights from pretotyping

Diversify service's offerings, e.g. tool for EV research, a place to get help from representatives about vehicles, user's needs. **S**

Insights from pretotyping

Help upcoming EV owners with research gathering, information presenting and direction towards the vehicle that suits them the best; **S**

Insights from pretotyping

Have several vehicle bulk-purchasing offers (would give customer options, cut down the waiting time); **S**

Insights from pretotyping

Consider if the service could offer different vehicle ownership models: (1) Subscription to have a vehicle; (2) Leasing; (3) Permanent owning; **S**

Insights from pretotyping

Offer vehicle models that only have a good build quality; **S**

Insights from pretotyping

Do not take Tesla's selling journey and put it on the Volkswagen's selling experience; **S**

Service process-related

Insights from pretotyping

Creating a digitalised service that has taken care of logistics flawlessly and can see it and control it all the time; **C**

Insights from pretotyping

If you are providing test driving with several cars - make the test drive with all of them at once. **S**

Manufacturer/Dealership-related

User/perception-related

Insights from pretotyping

For a customer, bouncing around service's collaborators could be confusing; **P**

Insights from pretotyping

Some customers are very keen to customize their EVs; **P**

Insights from pretotyping

What is the consumer looking for when purchasing an EV? Design, mileage, technology? **Q**

Insights from pretotyping

As oil prices go down, fewer people are motivated to go for EVs; **C**

Comment

We need to make our service more unique from others and also have more value offerings.

Use zoom-in function to see smaller elements

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Appendix I—Prototyping: insights from reflection sessions

Prototype walkthrough with potential service's user

About

The prototype walkthrough was done in the live meeting format where the participant was interacting with the presented device (laptop) that had the prototype's mockup ready to be interacted with. The session was recorded in audio format. During the call, we have presented an interactive mockup of our service's digital touchpoint - website. The prototype was designed to help the participant to understand the service concept and reflect on the idea, introduced processes and other service-related aspects.

The interactive prototype of a mockup can be accessed via:
https://www.figma.com/file/asVlHvKJOhdma1KiAzhQrl/Prototype%3A-website?node-id=0%3A1

Participant's reflections and our insights from the walkthrough session

General
- Some people might think that "bulk-purchasing" means that the service is only B2B;
- Connect the service's purpose to the existing initiatives like SDG, Copenhagen without diesel and petrol cars before 2030;
- People might have a perception that we are cutting corners to provide cheaper vehicles. Consider how to avoid this negative perception;
- Try to have "backup" organizations - Copenhagen's commune, Danish EV association, etc.
- If you decide to have an app - consider having a car app;
- Have a plan B for service if the government introduces legislation that goes against the service's concept;

Website touchpoint
- Have an About us section that has a promise, shows the team's faces, the idea of the service, how you trying to protect the initiative;
- Have a section where you explain the EV basics i.e. first 72 hours of an EV owner guide when you present all the possible scenarios and considerations for a freshly new owner of the EV. Answer for to have a nice life as an EV owner;
- When presenting a vehicle - ensure that everywhere we present the approximate range of the vehicle;
- With bulk purchasing webpage we create FOMO. Consider if we want to use it more or less;

Customer service

- How do you ensure that service hours for the customer are given, but in a very effective manner to ensure that you do not spend a whole day per customer;
- How does the customer know that he will not have to wait for 3 years to get our car or lose his money?

Customer's purchasing journey

- How do we ensure that people avoid dropping off from the waiting list;
- What happens if you want to leave in mid-way of the purchase?
- Can customers purchase vehicles from other locations/communities? I.e. participating in bulk buy for Copenhagen but coming from Aarhus;
- Let people join whatever waiting list is active from regardless of their location;
- After submitting the request for the waiting list - what can you do? Can you withdraw yourself from it? How?
- What else can you do while being on a waiting list? Can you see if there is a change in price?
- Have an option for people to signup for a future/upcoming bulk-purchase

Price

- Think what we need to present the service to a person that has the main goal: to have an EV as cheaply as possible;
- Consider how people will interpret the vehicle's price. Set the scene better when it comes to vehicle purchasing and selecting;
- What is important for the customer is the price - be very precise and descriptive about it. Everything in regards to money should be detailed;
- Shown price is it with or without the taxes? We should also introduce the buyer to the Danish state's initiatives to get the money back;
- Does the price of the car goes down/up if people leave or join?

Service abuse/stress

- How do we prevent people from reselling vehicles to others to earn money?
- Consider how to prevent service manipulation from the customer's side (exploiting the service to get the cheapest car possible);
- How are we going to handle a large number of people interested and trying to purchase it cheaper;

Competition

- What about the competition? People will try to copy the concept. As a frontrunner, the service will encounter a lot of problems that competitors might avoid by looking at our mistakes;

Catering service towards government

- Contact kommunes/government with service proposition while pointing out how the service can help the governmental body to succeed with the initiative
- Two scenarios: cater the service concept more towards government's needs, have the service as an independent business;
- If working with the government, might help with funding/losses to ensure that the service does not go bankrupt in the first years.

Prototype walkthrough with a fellow service designer

About

The prototype walkthrough was done in a format of a video call. During the call, we have presented an interactive mockup of our service's digital touchpoint - website. The prototype was designed to help the participant to understand the service concept and reflect on the idea, introduced processes and other service-related aspects.

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Fellow service designer's reflections and our insights from the walkthrough session

Service's tone of voice/message

- We need to make it clearer for others to understand that the service is primarily meant for private individuals/owners;
- Clearly state service's advantages;
- Focus on presenting the service as positive as possible;
- Do not emphasise a lot on the whole bulk-purchasing, the customer might not really care about it, what he cares about is getting the car, getting a good car and that nothing will go bad with the purchase;
- Think about presenting the service for a private person vs. presenting a car for a company/organization

Website

- "News" webpage is confusing on our website, having our own blog might be better,
- Have success stories presented on the website: reflect on what changed after getting an EV;

Trust

- We need to focus a lot on reassurance;
- Create a feeling of "safe purchasing"
- Before purchasing, people want to check the reviews, reputation, service score for reassuring;
- People might not trust our reviews, but trust third party ones;
- Use Trustpilot to help showcase service's trustworthiness;

Competition/comparison

- How our service could compete with other online services/platforms?
- Have a comparison between our service's sold car and other cars price-wise;
- Have a comparison of why it is better to use our service than other/similar;
- Used cars - you can get it faster than a new one, how do we counter that?
    - Why to still choose us?

Individualism vs. community;

- Purchase is your own individual decision, item, experience;
- Communities might not be that tight relationship-wise;
- What the user cares about is about himself in the end, he wants to be treated specially and the whole community service is kind of a "second thing";

Prototype walkthrough with Startup Lighthouse's representative

About

The prototype walkthrough was done in a format of a video call. During the call, we have presented an interactive mockup of our service's digital touchpoint - website. The prototype was designed to help the participant to understand the service concept and reflect on the idea, introduced processes and other service-related aspects.

The interactive prototype of a mockup can be accessed via:
https://www.figma.com/file/asVlHvKJOhdma1KiAzhQrl/Prototype%3A-website?node-id=0%3A1

Representative's reflections and our insights from the walkthrough session

Workshop-related
- Rural workshops - distance is a problem;
- Have workshop digitally, because physical ones (after corona are not that convenient);
- Make it on demand, do not get a teacher and so on physically - write about this workshop execution approach as well;
- What why a workshop is better than the dealership approach? What added value would our workshop add in comparison to dealership/manufacturer;
- Workshops being free - people are not always willing to drop by afterwards;
- Workshops - space, someone to teach and some beverages;
- What are the criteria for a successful workshop

General
- Speak about the dealership license in the service concept;
- The more costs/expensive we have - the more expensive the car will get - becoming a purchase price problem;
- Do the dummy prototype testing and walk through with them;
- Present Tim as a collaboration party that is an expert in entrepreneurship and business relations;
- Talk about our service's ownership;

Bulk-purchasing & waiting list
- Speak about pre-research before buying;

- Waiting list and patience - take that into a consideration how to ensure that they stay in it;
- Consumers want things on demand;
- Do not combine workshops with "the hey get on the list";
- Mention the bulk-purchasing approach working in other countries;
- The thing about consumer behaviour: patience is short;

Discussion-future-related:
- Future testing walking with the phone and checking how people react;
- Future talking: mention what else we would research further.

Appendix J— Business Model Canvas template with support questions used in Deliver phase

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
• Who are our key partners? • Who are our key suppliers? • Which key resources are we acquiring from partners? • Which key activities do partners perform?	• What key activities do our value proposition require? • Our distribution channels? • Customer relationships? • Revenue streams? **Key Resources** • What key resources do our value proposition require? • Our distribution channels? • Customer relationships? • Revenue streams?	• What value do we deliver to the customers? • Which one of our customer's problems are we helping to solve? • What bundles of products and services are we offering to each customer segment? • Which customer needs are we satisfying?	• What type of relationship does each of our customer segment expect us to establish and maintain with them? • Which ones have we established? **Channels** • Through which channels do our customer segments want to be reached? • How are we reaching them now? • How are our channels integrated?	• For whom are we creating values? • Who are our most important customers?

Cost Structure	Revenue Streams
• What are the most important costs inherent in our business model? • Which key resources are most expensive? • Which key activities are most expensive?	• For what value are our customers really willing to pay? • For what do they currently pay? • How are they currently pay? • How would they prefer to pay? • How much does each revenue stream contribute to overall revenues?

Business Model Canvas, Osterwalder (2010)

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