**Faculty of Science,
Engineering
and Computing**

**Kingston
University
London**

Design Report

**EV Dealer Website: A better way to
buy or lease a brand-new electric
vehicle**

Digital Media Final Project
CI7800 DMK

MSc User Experience Design

Course Director: Dr Martin Colbert

Module: Digital Media Final Project, CI7800

Supervisor: Raida Shakiry

Student: Yixuan Peng - K2141837

Type of project: Body of Creative Work

Artefact submission folder: https://kingston.box.com/s/
o2bi6xgm1bak02dfza6zd5udal8vy3ep

Prototype Link: https://www.figma.com/proto/
TLH4Wk79YCJSd10X4AduKg/EV-Dealer-Website?page-id=0%3A1&node-
id=3%3A4&viewport=-20852%2C-18785%2C0.65&scaling=scale-down-
width&starting-point-node-id=3%3A4

FACULTY OF SCIENCE, ENGINEERING AND COMPUTING

School of Computer Science and Mathematics

MSc DEGREE IN

User Experience Design

CI7800 Digital Media Final Project

DESIGN REPORT

Name: Yixuan Peng

ID Number: K2141837

Project Title: EV Dealer Website

Date: 2022.09.12

Supervisor: Raida Shakiry

Project Type: BODY of CREATIVE WORK

Kingston University London

Content

Abstract

This project mainly describes and examines the purpose, opportunities, and necessity of developing an online electric vehicle buying website. Electric vehicle (EV) technology has advanced significantly over the past decade, and its adoption is widespread in most developed and developing countries. Since the electric vehicle market is still in the transition process, the majority of Automotive selling platforms only provide limited opportunities for people to purchase EVs. Additionally, the COVID-19 pandemic has directly influenced global EV sales and led to severe production drawdown. By implementing the 5 Stages of Design Thinking approach, the project will primarily focus on defining the user need for EV buying and providing achievable solutions that enable consumers to purchase or lease electric vehicles more conveniently and efficiently online. In addition, the project will also explore and apply relevant design methods to persuade more potential customers to buy EVs.

Acknowledgements

Introduction

Background & Motivation

Over the past decade, electric vehicle (EV) technology has advanced quickly, and its adoption has grown dramatically in recent years. Since vehicle energy consumption has been growing fast and steadily, environmental issues like air pollution and carbon dioxide emissions have become worse and worse across the globe. Although the emergence of electric vehicles has been seen as one of the most effective solutions to address a series of environmental and energy issues, our online research and the observational study revealed that the majority of the current online websites for the sale of vehicles are giving consumers few opportunities to comprehend and buy electric vehicles.

As a passionate electric vehicle supporter, creating a convenient and comprehensive online EV selling website is extremely necessary, directly encouraging more consumers to purchase EVs and pay more attention to the current EV market.

- **Electric vehicle market research**

The COVID-19 epidemic and the subsequent economic slowdown had a significant impact on the global market for all sorts of automobiles in 2020. According to "EV volumes," sales of electric cars increased from 2021 to 6.75 million in 2021. Total BEV+PHEV sales in Europe have climbed by 66%, while China has had exponential growth in BEV+PHEV sales, increasing by 155% from 1331 in 2022 to 3396 in 2021.
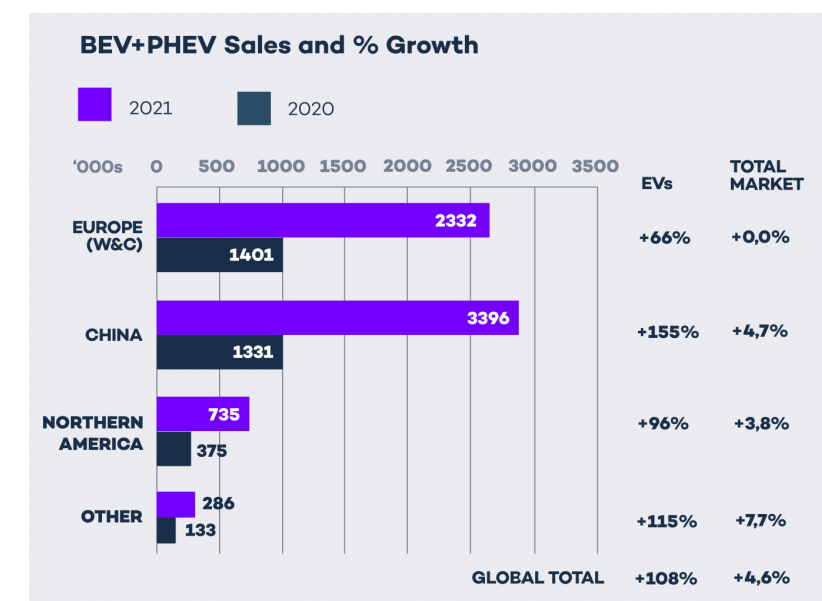
BEV+PHEV Sales and % Growth from 2021 to 2020

In the first half of 2021, "there were more than 1.06 million new registrations in Europe and 1.149 million new registrations in China, followed by the United States." (Irle, 2021).

2022 is a great turning point of the EV market. The market is increasing and it's spreading everywhere. Global EV sales continue to accelerate in 2022, propelled by a decarbonization issue that most leading governments are now taking seriously. "Over the first five months of the year, more than 3.2 million new plug-in automobiles were registered globally" (EV volumes).
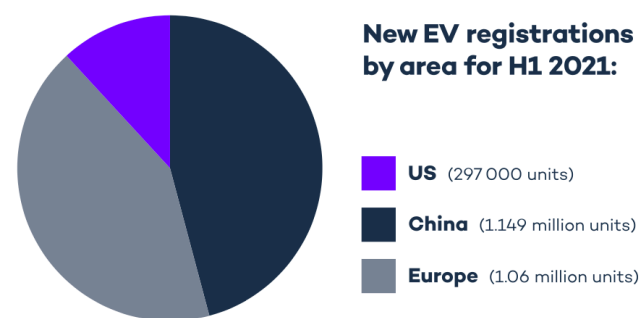
New EV registrations by area for H1 2021
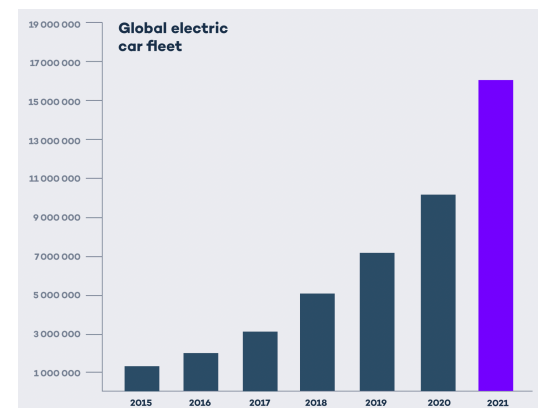
Global electric car fleet from 2015 to 2021

• **Factors that influence consumers EV purchase intention**

Electric vehicles (EVs), according to Zhan's article, "are developing as an eco-friendly are predicted to be a long-term solution to the world's energy scarcity and pollution concerns" (He, 2017, p.2). Governments worldwide have proposed a range of legislative requirements and committed massive amounts to assist the development of electric cars. However, due to a lack of advertising and low EV purchasing intent, the electric car sector now accounts for just a small portion of overall vehicle sales globally.

The authors discovered in the article that customer personality traits such as personal innovativeness and environmental concern are the two key elements that impact people's EV purchasing intentions. Personal innovativeness is defined as "the degree to which new and creative ideas are adopted" (He, 2017, p.4). Consumers that are very inventive are more willing to try new things and accept new ideas. Individuals interested in emerging technologies and new products, for example, may be quickly drawn to the notion of EVs and have a higher possibility of adopting EVs. On the other hand, people with poor innovation and varied concerns about EVs' limited cruising range and unsuitable charging mechanism are less likely to adopt EV innovation.

Furthermore, personal environmental concern has a significant impact on EV adoption. "Environmental concern comprises three components: biospheric, egoistic, and altruistic" (He, 2017, p.4). Environmentally conscious consumers may pay greater attention to their surroundings. For example, they are more aware of the environmental consequences of their actions and are more likely to engage in environmental activities such as recycling and reducing carbon footprint; thus, adopting EVs has become an environmentally friendly alternative that helps them meet their demand for environmental conservation.

• **Transformation toward eCommerce in Automotive Retailing**

1. More consumers are purchasing new vehicles online

The online purchasing experience has progressed from simply purchasing books to purchasing homes, yachts, and even vehicles. The convenience and fast delivery of online shopping are the major factors leading to eCommerce's rapid growth. Additionally, the majority of consumers nowadays are increasingly rely on online shopping since they are building more and more trust with the platforms and their buying process.

According to the research of Frost & Sullivan, the authors pointed out that

> **"In 2020, around 5% of all new car sales were made online. By 2025, online car sales are expected to reach around 6 million" (2019).**

Consumers are more likely to purchase vehicles online since they can access all the important information and purchase options more conveniently; also, they realize that they can complete everything online without visiting showrooms and dealerships. As more and more consumers start purchasing their vehicles online, many popular auto companies begin to apply new technologies and features to enable consumers to purchase their vehicles more efficiently; moreover, professional vehicle platforms have been developed to help consumers browse a variety of brands and models at the same time. According to Kelley, "80% of buyers said they want to complete the majority of their car purchase online, and in 2021, 25% of consumers said they would purchase their vehicles fully online, without visiting any unneeded dealerships." It is undeniable that Automotive retailing is transforming from offline dealerships to entirely online eCommerce, and it is no doubt that online buying will become the primary choice for all vehicle buyers.

2. Online showroom and ease of use websites

The COVID-19 pandemic has posted significant impacts on the Automotive industry. Due to the major lockdown and social-distancing policy, consumers cannot access offline car showrooms and dealerships. Therefore, providing an alternative - online showroom for consumers to understand vehicles has become the essential business strategy for all Auto companies to maintain their business modes and avoid loss.

Back in 2015, Audi released their first VR showroom where "customers can test drive their preferred model virtually using VR glasses" (Startupguys, 2021). With the rapid development of the automotive industry, more and more emerging technologies such as AR and VR have been implemented to improve the whole online vehicle buying experience. For instance, Mercedes-Benz has developed a 3D Virtual reality app - Mercedes cAR, that "enables clients and prospects to independently design their car of choice on a smartphone or tablet and examine it in every detail in a unique, three-dimensional resolution" (Lisa, 2018). Nowadays, online showrooms have become the essential tool that facilities consumers to customize their vehicles by selecting model, color, interior, etc.

Mercedes-Benz 3D VR App

Furthermore, providing a professional and valuable website is highly crucial for all automotive companies. Consumers now have so many choices while purchasing vehicles online. They are more likely to compare and judge between various eCommerce sites. "If they find out the website is not the one they want, they may switch to a different website to find the one that is more comprehensive and professional" (Startupguys, 2021). Therefore, in order to attract more consumers and make them stay longer on the site, automotive companies have to make their websites more competitive.

Competitor Analysis

In order to understand the competition among current online vehicle selling platforms, three popular vehicle selling platforms were analyzed which are AutoTrader, Cazoo, and Edmunds. Both the weaknesses and strengths of these three platforms were summarized, and it helps to understand the challenges and problems behind each platform (see Figure 1). Also, a comparison list was created to illustrate the function and feature differences between the three platforms (see Figure 2).
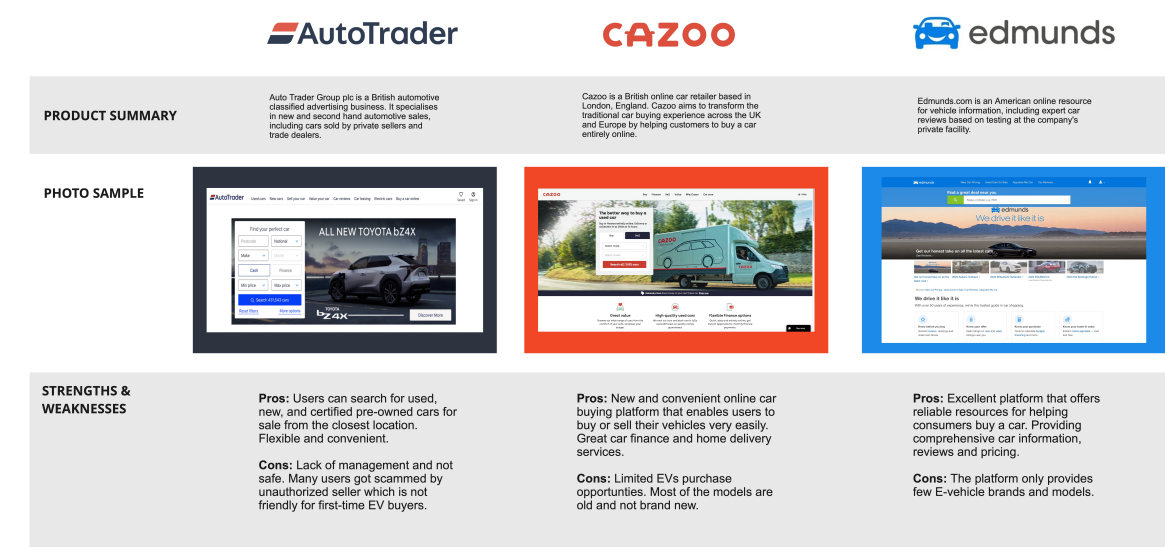

Figure 1. EV's website summary

Figure 2. EV's websites comparison list

Aims and Objectives

Aims

The primary goal of this project is to develop an online EV selling platform that helps users to buy or lease a brand new electric car more conveniently and entirely online. The platform aims to provide comprehensive E-vehicle buying customer service and practical functions to allow users to explore all popular EVs brands and models and access detailed EV information. The website also aims to assist users in finding available charging points and installing private home chargers.

Objectives

The following objectives have been identified to achieve the aims:

- Complete literature review on EV adoption and consumer purchase intention.

- Conduct user interviews to gain insights on users' frustrations, needs, and opportunities associated with the EV buying experience and process.

- Implement a survey to understand people's EV purchase intention, opinions toward EVs, and the ways they access EV information.

- Create user personas, customer journey maps, and empathy diagrams to better illustrate and visualize users' pain points, needs, and expectations from the brand or product.

- Create low fidelity and wireframes to illustrate initial design ideas and concepts.

- Provide a comprehensive style guide, and UX branding to enhance the overall product look and feel.

- Create high fidelity prototypes and major deliverables with professional UX or UI tools.

- Evaluate High-fi prototypes via usability testing and provide final prototype iterations.

Project Plan

The Gantt Chart has been created and provided a detailed project outline and schedule that helps manage the project more efficiently. The chart demonstrates all the important tasks with a relevant timeline, which keeps the project running in proper flow and ensures the completeness of all essential artefacts.
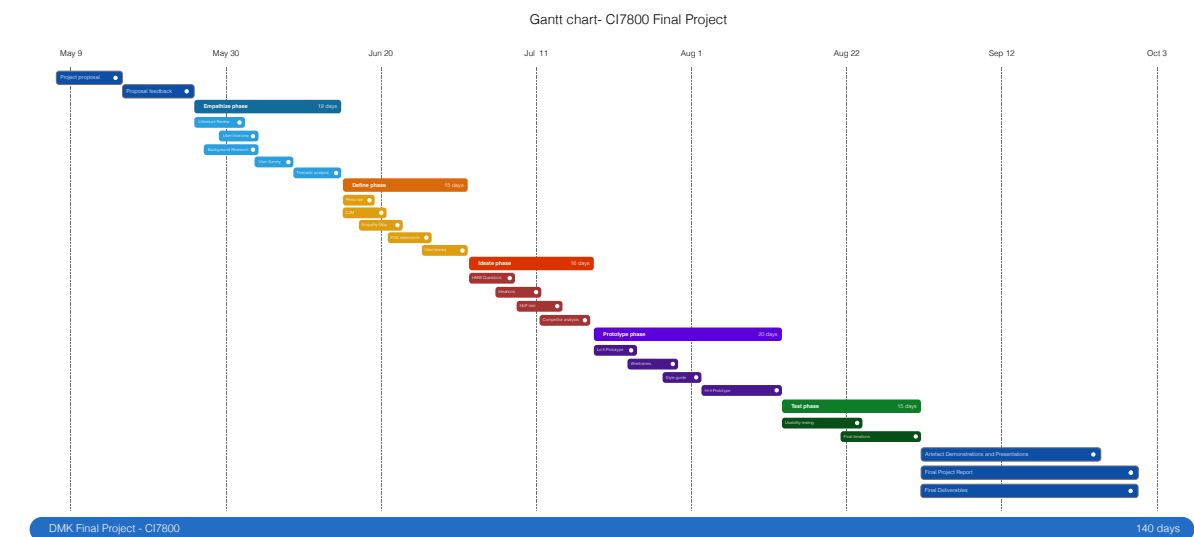
Figure 3. DMK Project - Gantt chart

Design Process

Design methodology

The Stanford "Design Thinking Process" approach will be implemented in this project to create an innovative and accessible product. All five steps will be followed to ensure the whole design process of this project satisfies the principles of design thinking and will eventually achieve all the aims and objectives (see Figure 4).
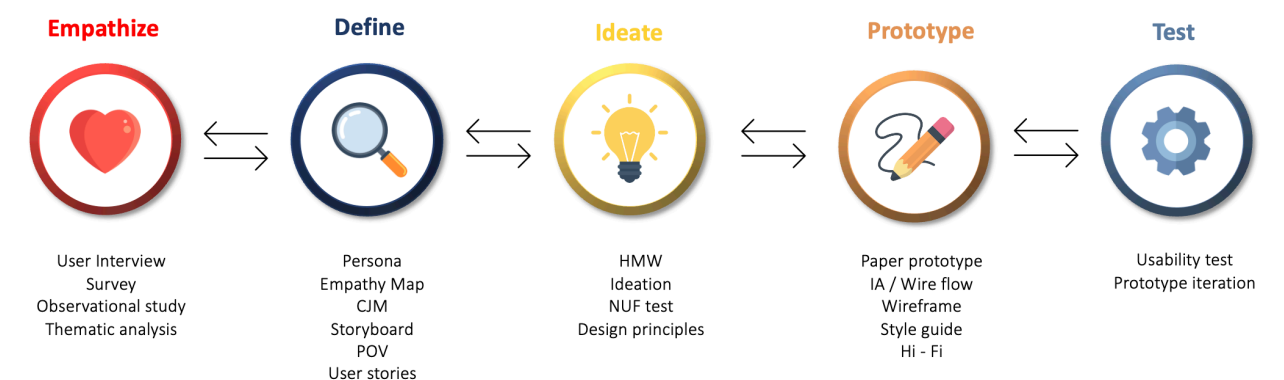
Figure 4. Design Thinking Process

1. Empathize Phase

1.1 Survey

A hundred and six responses were received throughout the survey research session. The survey was created and posted on Qualtrics from July 2nd to 20th. All participants from the session were recruited online via direct invitation and share link. This survey research aims to understand people's intention toward electric vehicles and their willingness to purchase a brand-new EV.

Survey key findings

Based on the results of survey research:

- 59.1% of the participants have heard of EVs but do not know much about them (see Figure 5).

- 54.55% of the participants have never owned a car before, 37.50% and 7.95% owned a petrol car and EV, respectively.

- The majority of the participants usually collect EV information from friends (27.9%), online articles (23.8%), and social media (30.2%) (see Figure 7).

- "The lack of available charging stations" and "limited EV range" are the two primary reasons that prevent participants from purchasing electric vehicles (see Figure 6).

- Almost 86% of the participants agreed that "electric vehicles are more environmentally friendly" and "the cost to charge an EV is much less than the fuel costs for a petrol car" (see Figure 8).

- Near 87.9% of the participants are very likely to purchase an EV in the next two to four years.

- 67.82% of the participants prefer to purchase EVs through online websites and platforms in the future (see Figure 9).

- VR features, Vehicle comparison features, and EV charging station finder are the essential features that participants wanted from online EV buying websites (see Figure 10).
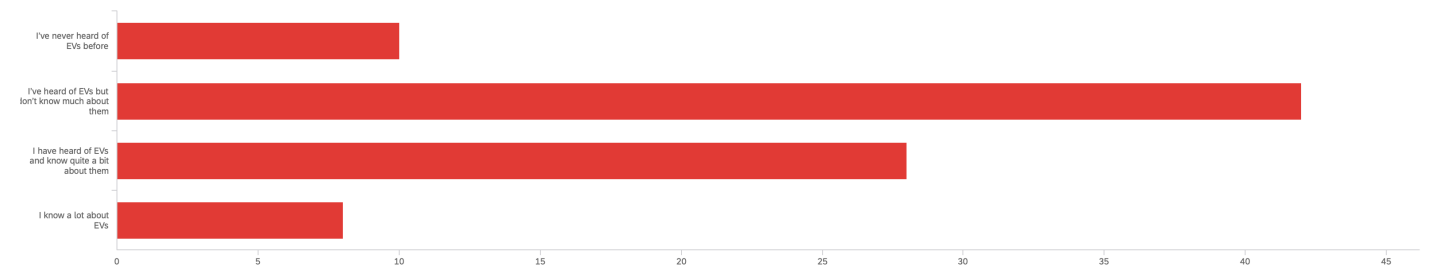
Figure 5. Which of the following best describes your knowledge of plug-in or battery electric vehicles?
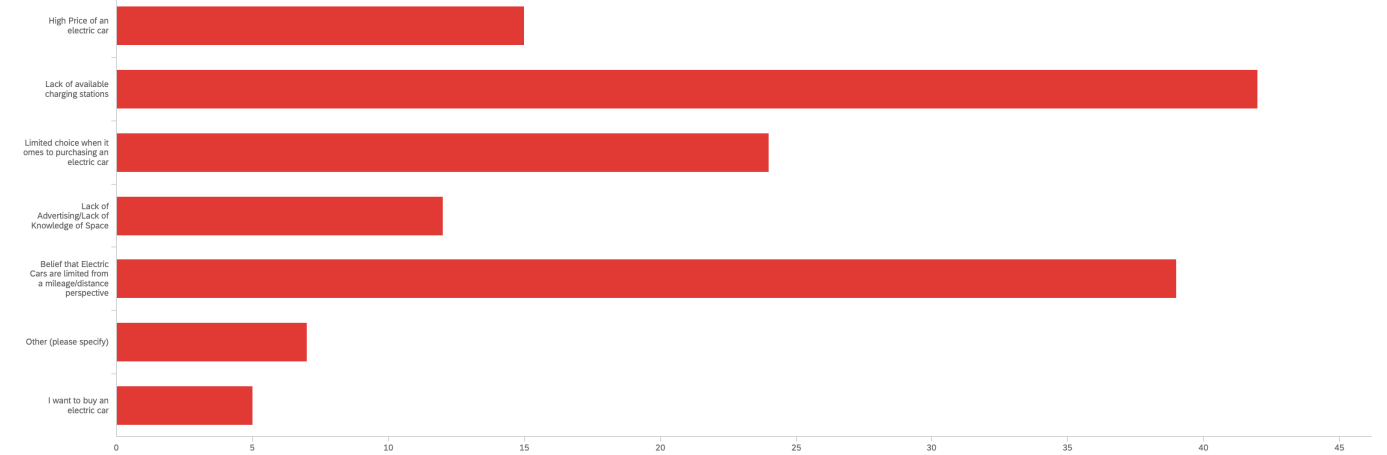
Figure 6. If you are not consider buying an EV, what are the major reasons?
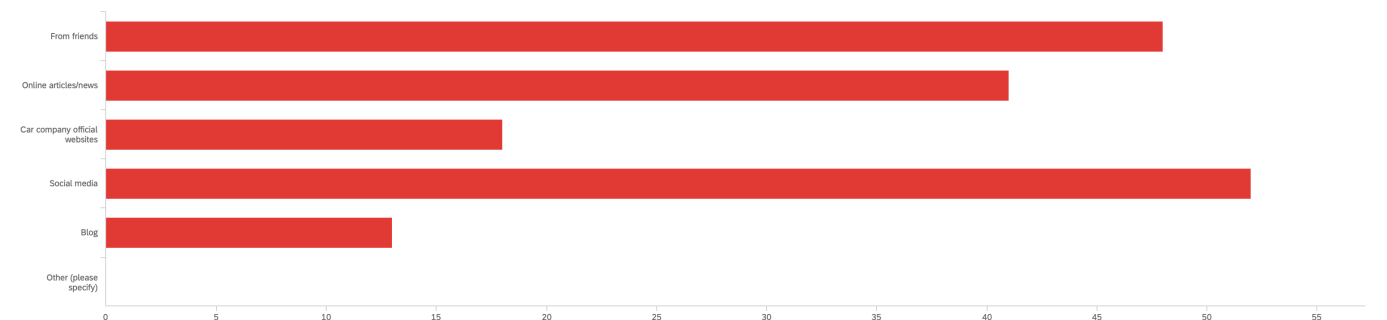
Figure 7. Where do you usually collect information about electric vehicles?
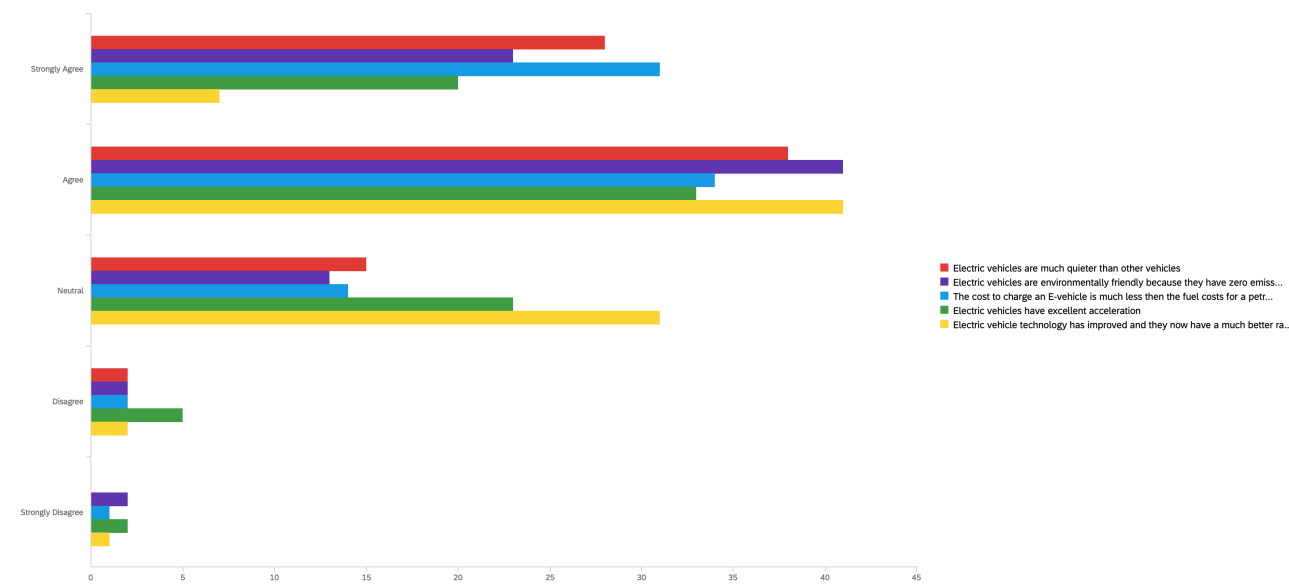
Figure 8. what are some statements people have made about the benefits of electric vehicles?

Figure 9. You prefer to purchase an EV through?
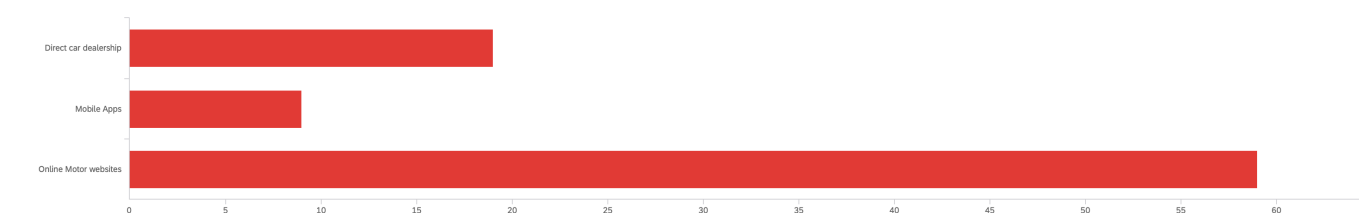
Figure 10. What are the important features that you want from an online EV buying website?

1.2 Interview

The interview session included seven people ranging in age from 20 to 29 and working in a variety of fields such as freelance designers, workers, and managers. Each interview lasted around 25 to 40 minutes and was conducted using Microsoft Teams and Zooms Meeting. Participants were chosen for the interview session because they had previous car purchasing experience and a strong desire to acquire an EV.

Participant#	Gender	Age	Occupation	Vehicle purchase experience	Owned a car
1	Male	25	Programmer	Yes	1
2	Female	24	Ux designer	Yes	1
3	Male	23	Student	No	0
4	Male	27	Data analyst	Yes	2
5	Male	29	Manager	Yes	2
6	Male	26	Photographer	Yes	1
7	Male	22	Student	No	0

Table 1 - Interview participants' table

Interview key findings

Participants' pain points:

• Limited EV brands and information.

• Difficult to compare EV models.

• The whole online vehicle buying process is complex and time-consuming.

• Feeling insecure about online payment.

• Busy and cannot visit physical stores.

Participants' Quotes:

- "There were only few EV brands shown on the platform."

- "Some charging piles were damaged, which is difficult to find."

- "The whole buying process was complicated."

- "I have to switch between different webs to compare."

- "I hope they can offer more opportunities for us to purchase EVs."

1.3 Observational Study

Six observational studies were conducted in this study to investigate and observe how participants would purchase an EV online and access relevant EV charging facilities. Participants were asked to complete two tasks: "use any online websites or platform to purchase an EV" and "find the closest charging pile by using any websites or applications."

Observational study key findings

Task 1: Use online vehicle selling platforms or official motor company's websites to purchase your ideal EV.

- None of the participants used online selling platforms.

- 6 out of 6 participants chose to use official motor websites.

- 5 out of 6 of the participants opened more than two websites simultaneously.

- 2 out of 6 participants failed the task because the website does not offer online payment options.

Task 2: Use any online websites to find a nearest or available charging station.

- 4 out of 6 participants completed the task successfully by using Google Maps.

- 2 out of 6 participants cannot find available charging stations due to region restrictions.

- Participants were frustrated because some charging points do not provide images and detailed information.

1.4 Thematic Analysis

Thematic Analysis was implemented in this project to organize and generate ideas based on all the key findings from the survey, interview, and observational study. By analyzing the interview transcripts, all the initial codes were created, illustrating all the key terms collected from the interview sessions. Similar key terms were combined and organized into relevant themes and patterns. There are a total of ten final themes have been generated throughout the thematic analysis.
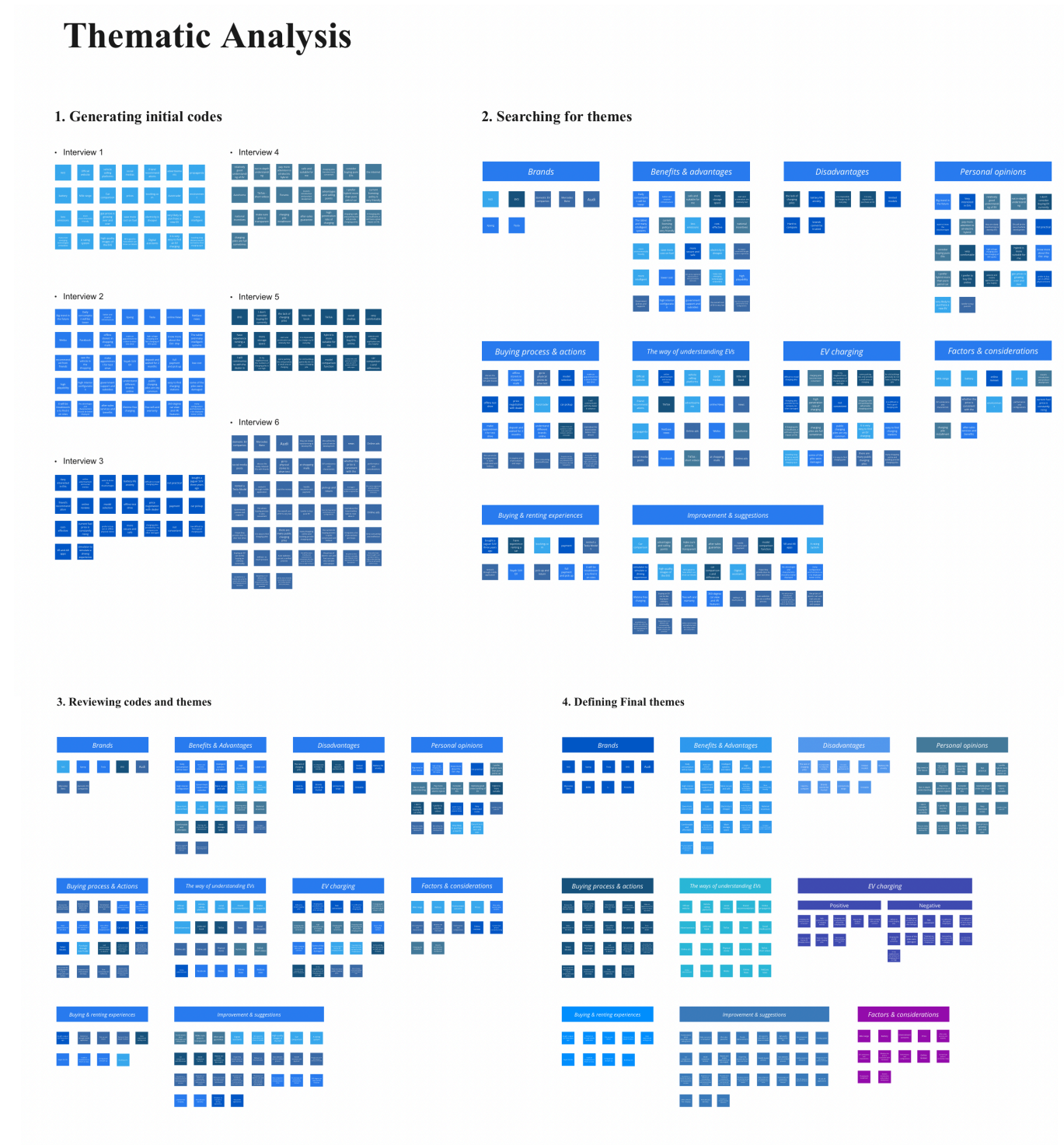
Figure 11. Thematic Analysis

2. Define Phase

2.1 User Personas

Developing user personas is the best way to understand the needs and challenges of the users. Two user personas were created in this project to identify two different user profiles with distinct patterns and needs. The first user persona was created to target potential users who have never purchased an electric vehicle before, and want to purchase their first electric vehicle online. The second user persona targets users who have previous vehicle buying experience and they want to purchase a new electric vehicle through a reliable and useful platform.

THOMAS JEFFERY

28, London

Programmer

- Status — Dating
- Education — Bachelor
- Tier — Mid-Level
- Archetype — Technocrats

Biography

Thomas Jeffery is a **Computer Programmer** who works in a social media company for 5 years. Thomas is currently living with his girlfriend and it was a little bit far away from his office. Thomas is very interested in electric vehicles and he decides to purchase a pure EV since it would be more convenient for him to go to work and also he can travel to different places with his girlfriend.

Personality

Creative   Passionate   Responsible   Organized

👍 Goals

- Purchase a brand-new electric vehicle online.
- Access more information about EV's technology and sales.
- Compare different EVs and models.
- Contact dealer and book test drives.
- Access EV charging facilities.

👎 Frustrations

- It is difficult to find information about all EV's brands and models.
- Limited choices when it comes to purchasing an EV online.
- Lack of EV knowledge and buying experience.
- Cannot find reliable platform and dealer.
- Worried about EV charging and safety issues.

> "I think it is a right time to own an electric vehicle which I wanted to buy for a long time"

Technologies

Internet
Social Networks
Messaging
Online shopping
Documenting

Tools & Brands

Eclipse   AutoTrader

Tesla

Figure 12. User Persona 1

JENNIFER LAW

35, Singapore

Visual Designer

- Status — Married
- Education — Master
- Tier — High-Level
- Archetype — Perfectionist

Biography

Jennifer Law is a **Visual Designer** who lives in Singapore and works in a fashion magazine company for the past six years. Jennifer is also a mother of two children, she needs to take care of her children after work everyday. Jennifer decides to buy a new electric vehicle since her children is getting older and her petrol car is not performing well.

Personality

Patient   Creative   Thoughtful   Feminist

👍 Goals

- Purchase a new electric SUV through online platform.
- Access comprehensive vehicle's introduction and selling points.
- Door-to-door test drive service.
- Convenient online payment process and home-delivery service.
- Install private charging pile and access excellent after-sales services.

👎 Frustrations

- Complicated and time-consuming offline vehicle buying process.
- Hard to find vehicle's information and detailed configurations.
- Cannot compare different new models.
- Busy and does not have enough time to visit physical store.
- Cannot find charging stations.

> "I hope buying an EV can be like buying an ordinary commodity. Convenient and fast."

Technologies

Internet
Social Networks
Texting
Online shopping
Documenting

Tools & Brands

amazon   VOGUE
Amazon   Vogue Magazine

Mercedes Benz

Figure 13. User Persona 2

2.2 Empathy Maps

"Empathy map is a critical part of the human-centered design" (Jennifer, 2018). It helps UX researchers to understand and capture knowledge about their user's actions and attitudes. By creating empathy maps, researchers are able to synthesize their observations into a simple and concise format and also reveal all the key insights about the user's pains and goals with a visual map.

Figure 14. Empathy Map 1

Figure 15. Empathy Map 2

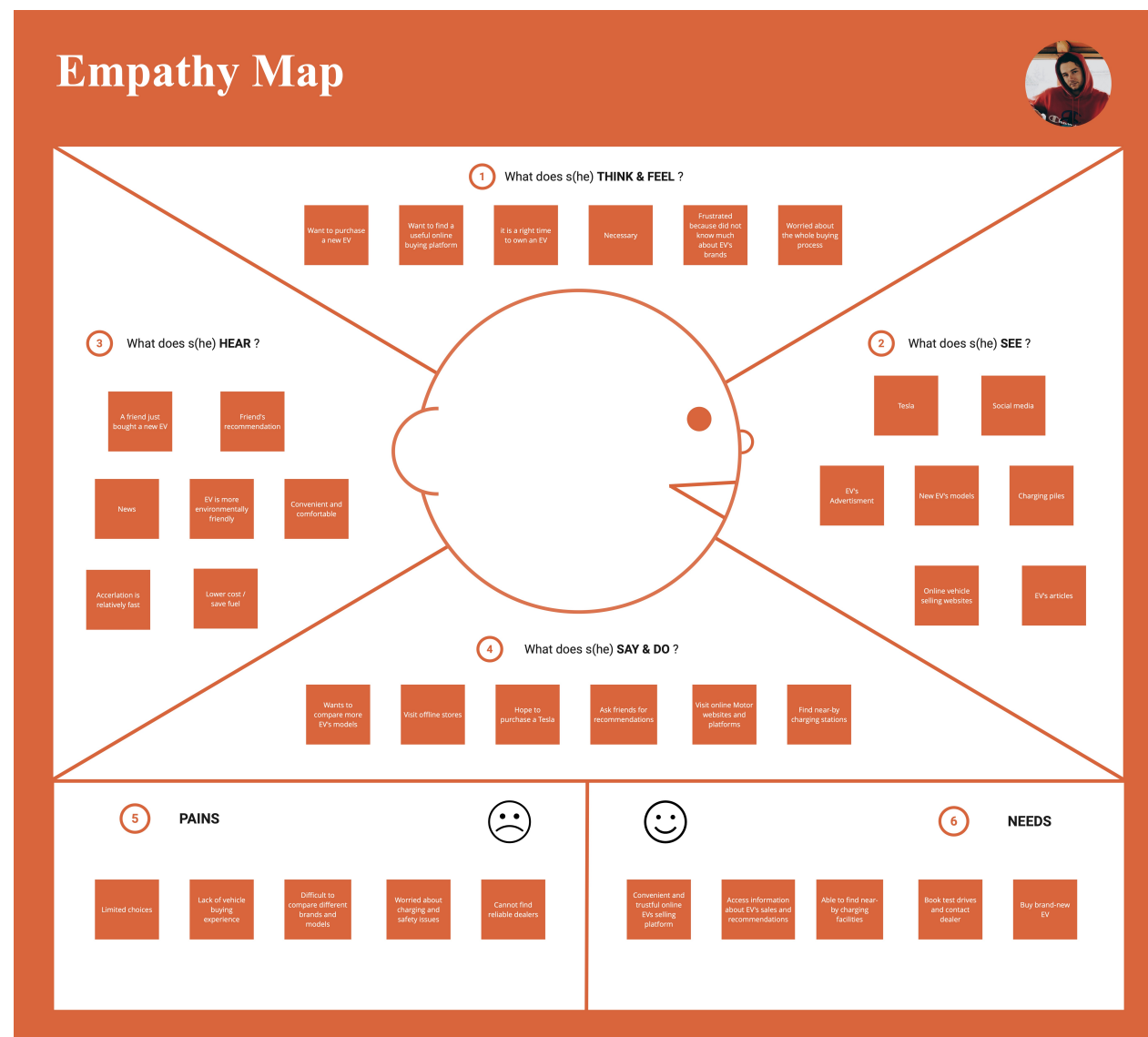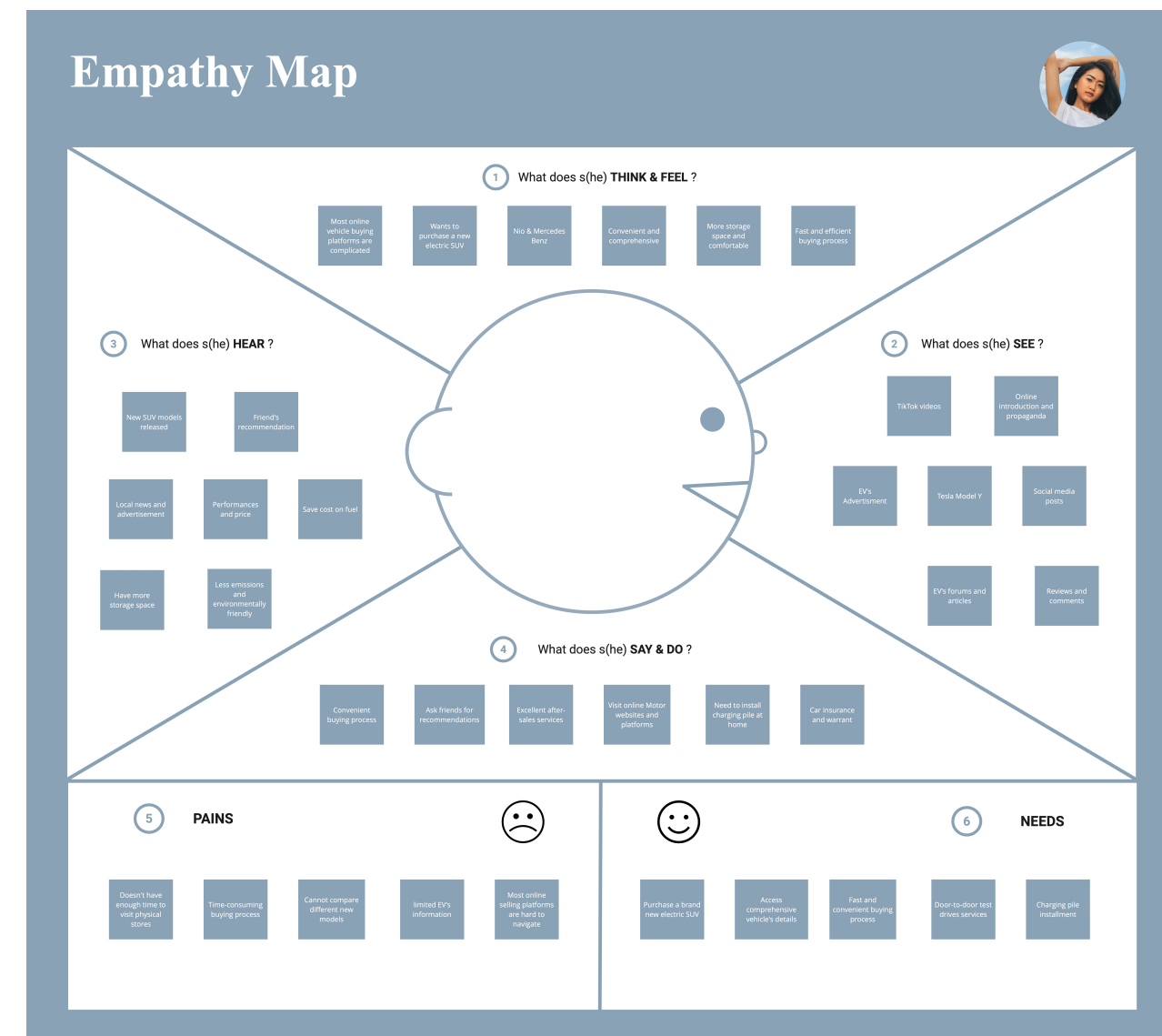# 2.3 Customer Journey Map

A customer journey map is a visual representation of the customer journey. It helps researchers to understand the whole customers' experience with the brands or products across all touchpoints. Customer journey map is extremely significant when people are trying to understand customer expectations and optimize the whole customer experience. Two customer journey maps were created in this project to understand how customers purchase their electric vehicles online for the first time.
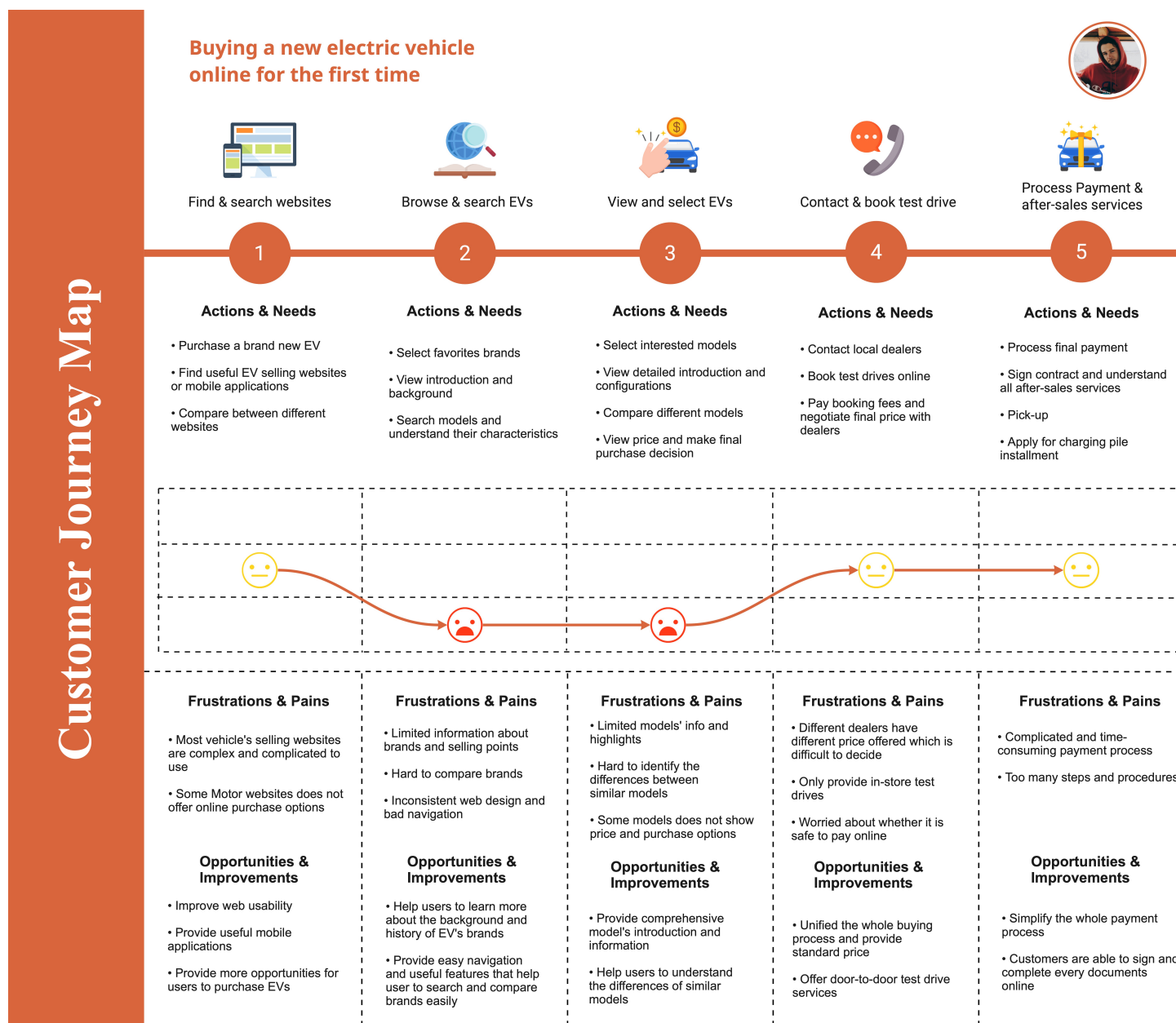

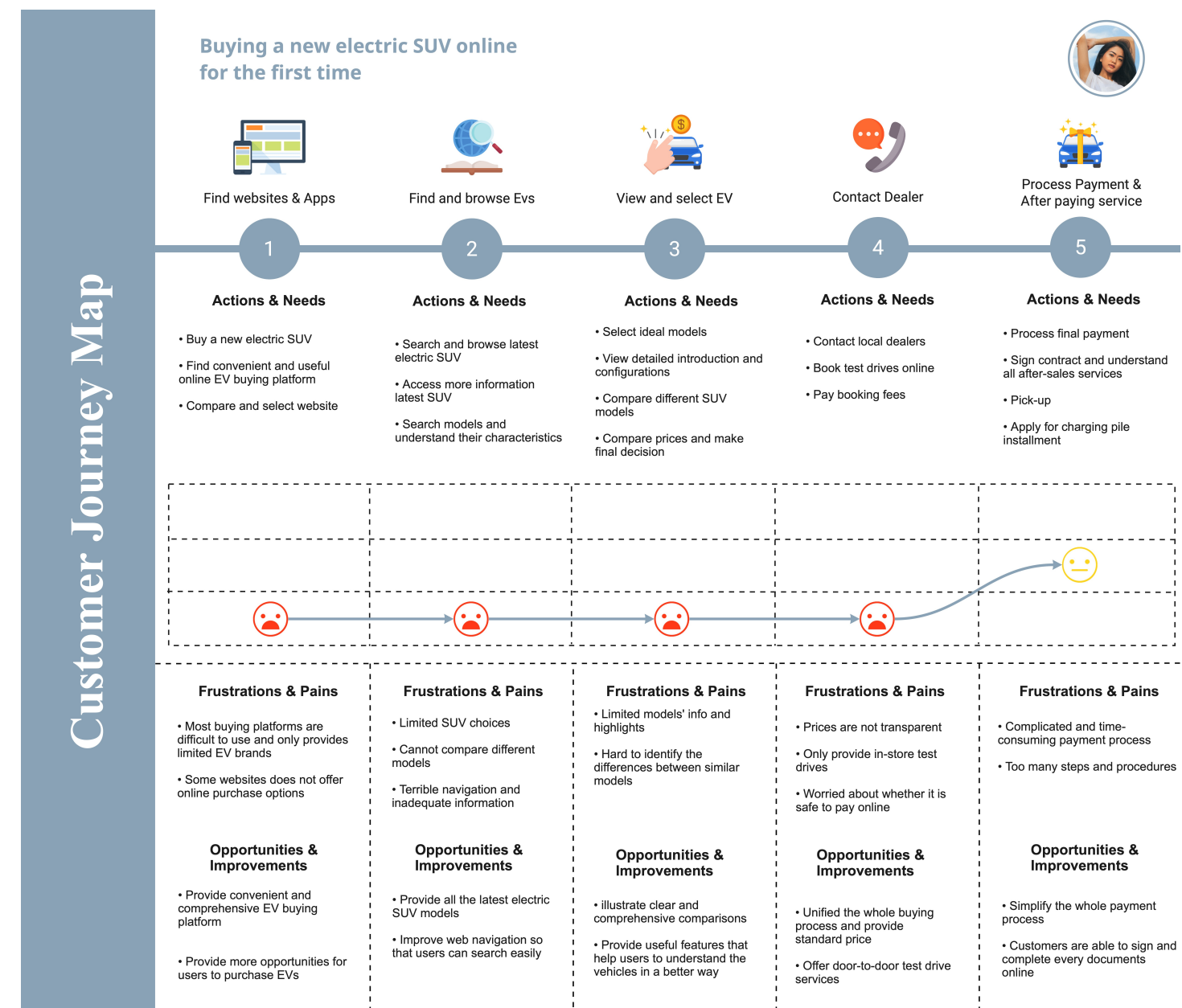**Buying a new electric vehicle online for the first time**

1	2	3	4	5
Find & search websites	Browse & search EVs	View and select EVs	Contact & book test drive	Process Payment & after-sales services

Actions & Needs
- Purchase a brand new EV
- Find useful EV selling websites or mobile applications
- Compare between different websites

Actions & Needs
- Select favorites brands
- View introduction and background
- Search models and understand their characteristics

Actions & Needs
- Select interested models
- View detailed introduction and configurations
- Compare different models
- View price and make final purchase decision

Actions & Needs
- Contact local dealers
- Book test drives online
- Pay booking fees and negotiate final price with dealers

Actions & Needs
- Process final payment
- Sign contract and understand all after-sales services
- Pick-up
- Apply for charging pile installment

Frustrations & Pains
- Most vehicle's selling websites are complex and complicated to use
- Some Motor websites does not offer online purchase options

Frustrations & Pains
- Limited information about brands and selling points
- Hard to compare brands
- Inconsistent web design and bad navigation

Frustrations & Pains
- Limited models' info and highlights
- Hard to identify the differences between similar models
- Some models does not show price and purchase options

Frustrations & Pains
- Different dealers have different price offered which is difficult to decide
- Only provide in-store test drives
- Worried about whether it is safe to pay online

Frustrations & Pains
- Complicated and time-consuming payment process
- Too many steps and procedures

Opportunities & Improvements
- Improve web usability
- Provide useful mobile applications
- Provide more opportunities for users to purchase EVs

Opportunities & Improvements
- Help users to learn more about the background and history of EV's brands
- Provide easy navigation and useful features that help user to search and compare brands easily

Opportunities & Improvements
- Provide comprehensive model's introduction and information
- Help users to understand the differences of similar models

Opportunities & Improvements
- Unified the whole buying process and provide standard price
- Offer door-to-door test drive services

Opportunities & Improvements
- Simplify the whole payment process
- Customers are able to sign and complete every documents online

Figure 16. CJM 1

Buying a new electric SUV online for the first time

1	2	3	4	5
Find websites & Apps	Find and browse Evs	View and select EV	Contact Dealer	Process Payment & After paying service

Actions & Needs
- Buy a new electric SUV
- Find convenient and useful online EV buying platform
- Compare and select website

Actions & Needs
- Search and browse latest electric SUV
- Access more information latest SUV
- Search models and understand their characteristics

Actions & Needs
- Select ideal models
- View detailed introduction and configurations
- Compare different SUV models
- Compare prices and make final decision

Actions & Needs
- Contact local dealers
- Book test drives online
- Pay booking fees

Actions & Needs
- Process final payment
- Sign contract and understand all after-sales services
- Pick-up
- Apply for charging pile installment

Frustrations & Pains
- Most buying platforms are difficult to use and only provides limited EV brands
- Some websites does not offer online purchase options

Frustrations & Pains
- Limited SUV choices
- Cannot compare different models
- Terrible navigation and inadequate information

Frustrations & Pains
- Limited models' info and highlights
- Hard to identify the differences between similar models

Frustrations & Pains
- Prices are not transparent
- Only provide in-store test drives
- Worried about whether it is safe to pay online

Frustrations & Pains
- Complicated and time-consuming payment process
- Too many steps and procedures

Opportunities & Improvements
- Provide convenient and comprehensive EV buying platform
- Provide more opportunities for users to purchase EVs

Opportunities & Improvements
- Provide all the latest electric SUV models
- Improve web navigation so that users can search easily

Opportunities & Improvements
- illustrate clear and comprehensive comparisons
- Provide useful features that help users to understand the vehicles in a better way

Opportunities & Improvements
- Unified the whole buying process and provide standard price
- Offer door-to-door test drive services

Opportunities & Improvements
- Simplify the whole payment process
- Customers are able to sign and complete every documents online

Figure 17. CJM 2

Customer Journey Map

2.4 Point Of View Statements

"A Point Of View (POV) statement is a meaningful and valuable problem statement, which helps you to ideate and solve design challenge in a goal-oriented manner" (Dam, 2020). Creating actionable POV statement is important which keep us focusing on our users, their needs, and our insights about them.

A POV statement contains three elements - **Users, needs and insight.**

POV 1: Thomas Jeffery, a professional programmer, needs to find out more about electric vehicles in order to purchase a new EV safely, because he has no experience of vehicle buying and wants to find a reliable platform that provides comprehensive and safe buying customer services.

POV 2: Jennifer Law, a very busy mother and visual designer, needs to purchase an electric SUV for her family, because her children is getting older and she wants to find an online website that helps her to purchase an EV conveniently.

POV Statement

POV statement:		
USERS	NEEDS	INSIGHTS
Thomas Jeffery Programmer	to find out more about electric vehicles in order to buy new EV safely	he has no experience of vehicle buying. He wants to find a reliable platform that provides safe and comprehensive buying customer services.
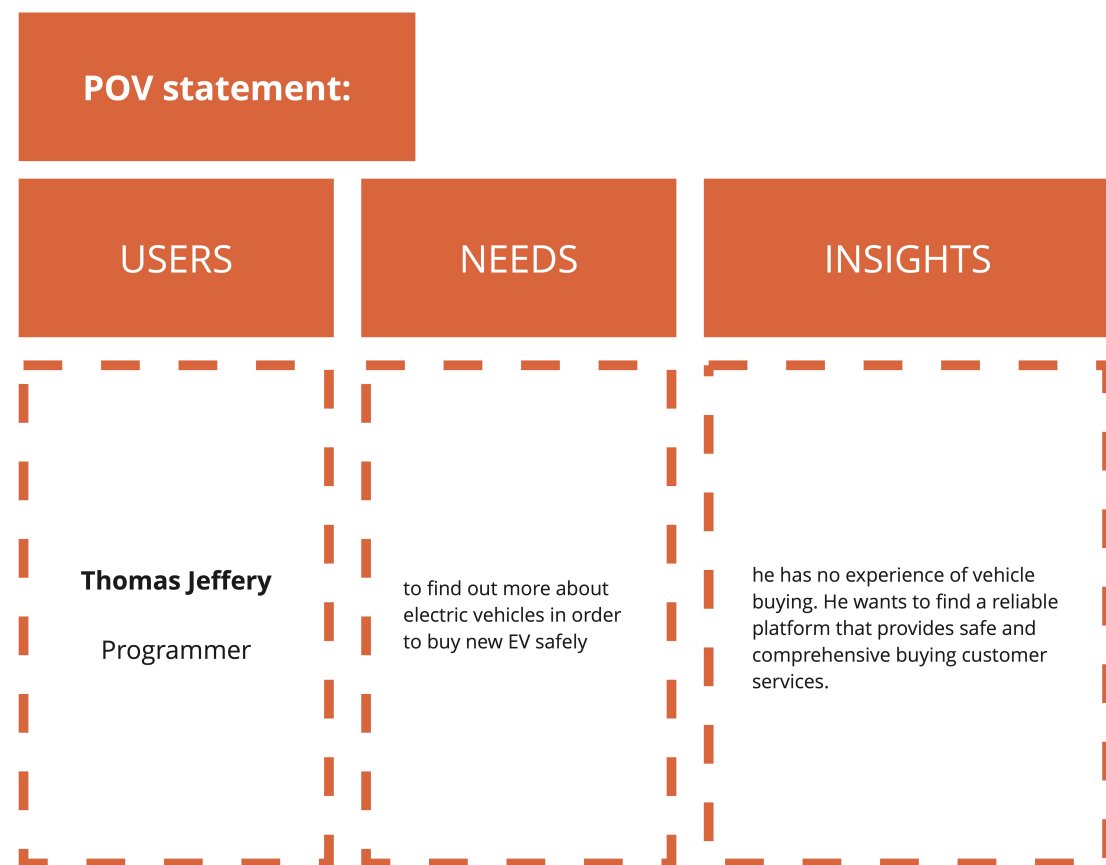
Figure 18. POV Statement 1

POV Statement

POV statement:		
USERS	NEEDS	INSIGHTS
Jennifer Law Visual Designer	to purchase a brand new electric SUV through online EV selling platform	she is very busy with her work and family. Jennifer wants to purchase a bigger vehicle since her children is getting older; purchasing online is the best solution for her. She wants to find a website that helps her to purchase electric SUV conveniently.

Figure 19. POV Statement 2

2.5 User Stories

A user story is a brief, straightforward description of a feature presented from the perspective of the person who is often a system user or customer; demands the new capability. Also, creating user stories allows UX researchers to convey the value of a product feature and gain a deeper understanding of why people want a particular functionality. Eight important user stories were generated in this project to illustrate the primary user's needs and expectations of the product.

User Story
" As a user I want to be able to search and browse different brands so that I can make a better choice."

User Story
" As a potential user I want to be able to compare different models so that I can understand the differences."

User Story
" As a user I want to access more information about EV's market trend and sales."

User Story
" As a user I want to view the details of select model including both the interior and exterior."

User Story
"As a user I want to be able to contact local dealers so that I can book test drives and ask questions."

User Story
" As a user I want to process all the payment online instead of visiting physical store."

User Story
" As a user I wish the whole buying process could be as convenient as possible."

User Story
" As a user I want to access useful EV charging facilities and being able to have my own charging pile."

Figure 20. User Stories

3. Ideate Phase

3.1 How Might We Questions

The initial ideation method implemented in this project is the HMW Questions. Developing HMW questions aids UX designers in generating potential solutions and reframing observations into possibilities. Figure 21. depicts the entire process of converting challenging questions into potential opportunities. It is crucial to refine critical HMW issues with suitable structure in order to provide feasible insights and answers.

1. Generate Challenge Questions & Possible Solutions

"How might we help users to search and find various EV's brands ?"
_____
Create useful features that help users to find all EV's brands easily

"How might we help users to compare different EV's models ?"
_____
Comparison feature that helps users identify the differences and characters between different models

"How might we help users to learn about EVs and its technologies ?"
_____
Provide professional articles and posts that introduces a variety of EVs

"How might we create useful features to help users better understand EV's performance ?"
_____
Offer detailed EV's pages that indicate all essential information

"How might we enable to contact reliable local dealers ?"
_____
Features that help users to contact local dealers

"How might we help customers who purchase EV for the first time to process whole buying process safely and efficiently ?"
_____
Offer comprehensive customer services and convenient online purchase procedures

"How might we assist users in finding near-by charging stations ?"
_____
EV charging stations or piles finder

"How might we provide convenient car pickup and after-sales services ?"
_____
Offer Home delivery service and comprehensive after-sales service

"How might we help users to complete all the payment online ?"
_____
Online E-commerce & payment function

2. Stretched Metaphor & Refined HMW Questions

Create an online platform that help users to purchase electric vehicles more conveniently and confidently

Create a mobile application provides comprehensive EV customer services and buying experience

"How might we help customers who purchase EV for the first time to manage the whole buying process safely and conveniently **?"**

"How might we provide users the most comprehensive EV's information and purchase experience **?"**

"How might we help users to select and compare all different EV's brands and models **?"**

Figure 21. HMW Questions

3.2 Rapid Idea Generation

The second ideation technique employed in this project is rapid idea generation. Rapid idea generation is a simple method for generating as many ideas as possible from a single challenge question. Participants in this study were asked to provide ideas by answering questions such as **"what would Google do?"** and **"what would Instagram do?"** , as well as **"What would Elon Musk do?"** .

1. Generating Ideas

What would G do?

Show all useful EV buying platforms	Provide Google reviews and ratings	Provide advanced search filters
Shows useful images and video links	Indicate all near-by charging pile locations	Offer relative articles and news
Show all popular EV's webs	Google online assistant	Easy navigation

What would (Instagram) do?

Show EV posts and stories	Recommend popular motor accounts to follow	show comments toward different new EV models
Share relative EV short videos	provide links to purchase EVs	Offer Brand's advertisements
Provide high quality product images and description	Indicate user's comments and feedback	

What would ∞ Meta do?

Develop a new website	show all EV's posts	Create online EV forums
Develop mobile applications	Create online EV community	Offer opportunities for users to purchase EVs
Develop software to make EVs' buying process more convenient	Develop EV media platforms	

What would [Elon Musk] do?

Apply AR & AI to help users purchase EVs	Build a new platform	Create his own charging pile
Use AI to compare all EV's models	Develop new algorithms	Provide Tesla door-to-door test drive
Offer fast and convenient online payment	Improve Tesla's web pages	Make a speech about EV technologies

2. Refining ideas & Reflections

Advanced search filters	Comprehensive brands introduction	Comparison features	EV's reviews and ratings	Detailed images & videos	EVs advertisment	Forums & community
Convenient and clear navigation	Door-to-door test drives appointment	AR & VR features	Charging pile finder	Profile page	EV's articles & news	Fast and secure payment

Figure 22. Rapid Idea Generation

3.3 NUF Test

The NUF test is a practical approach for determining if ideas that have been chosen are likely to be effective and operate in practice. All presented ideas were assessed from 1 to 10 on three criteria: **New, Useful, and Feasible.**

Ideas	New	Useful	Feasible	Total
EV's comparison	7	10	10	27
AR & VR carview	8	10	10	28
Rating & reviews	6	10	10	26
Contact local dealer	5	8	10	23
Door-to-door test drives	10	10	10	30
Ecommerce & Leasing	7	9	8	24

Figure 23. NUF Test 1

Ideas	New	Useful	Feasible	Total
Home Delivery	9	10	10	29
Digital assistant	7	9	9	25
Forum & EV community	8	10	10	28
Profile page	5	8	10	23
Public charging point finder	9	10	10	29
After-sales services	5	8	8	21

Figure 24. NUF Test 2

3.4 Design Principles

Designing a great and useful website is often challenging, and it requires a lot of effort in constructing the layout and organizing content. Six design principles will be followed and implemented into the design of the EV Dealer website.

1. Easy and logical page navigation

According to the survey from an online article, the author found that "94% of the participants mentioned easy and logical navigation is the most important website feature" (Tanu, 2020). It is undeniable that providing easy page navigation can help users to find their information more easily and move through the website smoothly.

Important tips that are suggested for creating great page navigation:
- Maintain as few options as possible in the navigation bar.
- Reduce the number of drop-down menu selections.
- For naming the choices, utilize real-world norms or the user's language.
- Avoid making too many internal website clicks.

2. Use readable and web-friendly fonts

Selecting the right and readable typography is extremely important because it helps to grab your audience's attention and reflect your brand personality. Typefaces used in web design should also be useful and readable. If a user needs to spend a long time reading your text, they are unlikely to connect with your message, and they might get tired quickly.

"Web-friendly fonts include **Arial, Helvetica, Times New Roman, and Courier New**"(Tan, 2020). This means they are legible at any size and operate well on mobile and desktop.

3. Use negative space

Providing enough white space or negative space is essential that it helps to keep the audience's attention on the most important content and increase text readability. Readers are more likely to get visual fatigue if there is so much content placed in one place without proper spacing.

4. Same color scheme (consistency)

Choosing the right color for the website is always the hardest task. It is important to understand that sometimes the color which we choose for the website might not be liked by others. Therefore, selecting a simple and clear color makes the audience feel more pleasant and relaxed. Also, we should always keep the coloring scheme consistent.

Important tips for web color choice:
- Avoid using too bright or dark colors.
- Highlight the important content reasonably.
- Use right color combination.

5. Feedback about progress

Providing constant feedback is significant because it helps readers to understand what is going on with the current web page and what steps or actions have been taken to reach the current page. Using appropriate items or features to illustrate the progress of the web page is an effective way to provide feedback to the users.

6. Choose your image wisely

Make sure that the images that we used in our website are carefully selected and they should be suit the overall aesthetic of the website.

4. Prototype Phase

4.1 Information Architecture

Information architecture (IA) is concerned with organizing, structuring, and categorizing material in an efficient and long-term manner. The purpose of creating IA is to assist users in finding information and completing tasks. The Figure 25. illustrates the complete IA of the EV Dealer website. Furthermore, the IA also helps UX designers to organize their major content and understand the primary hierarchy between each pages.
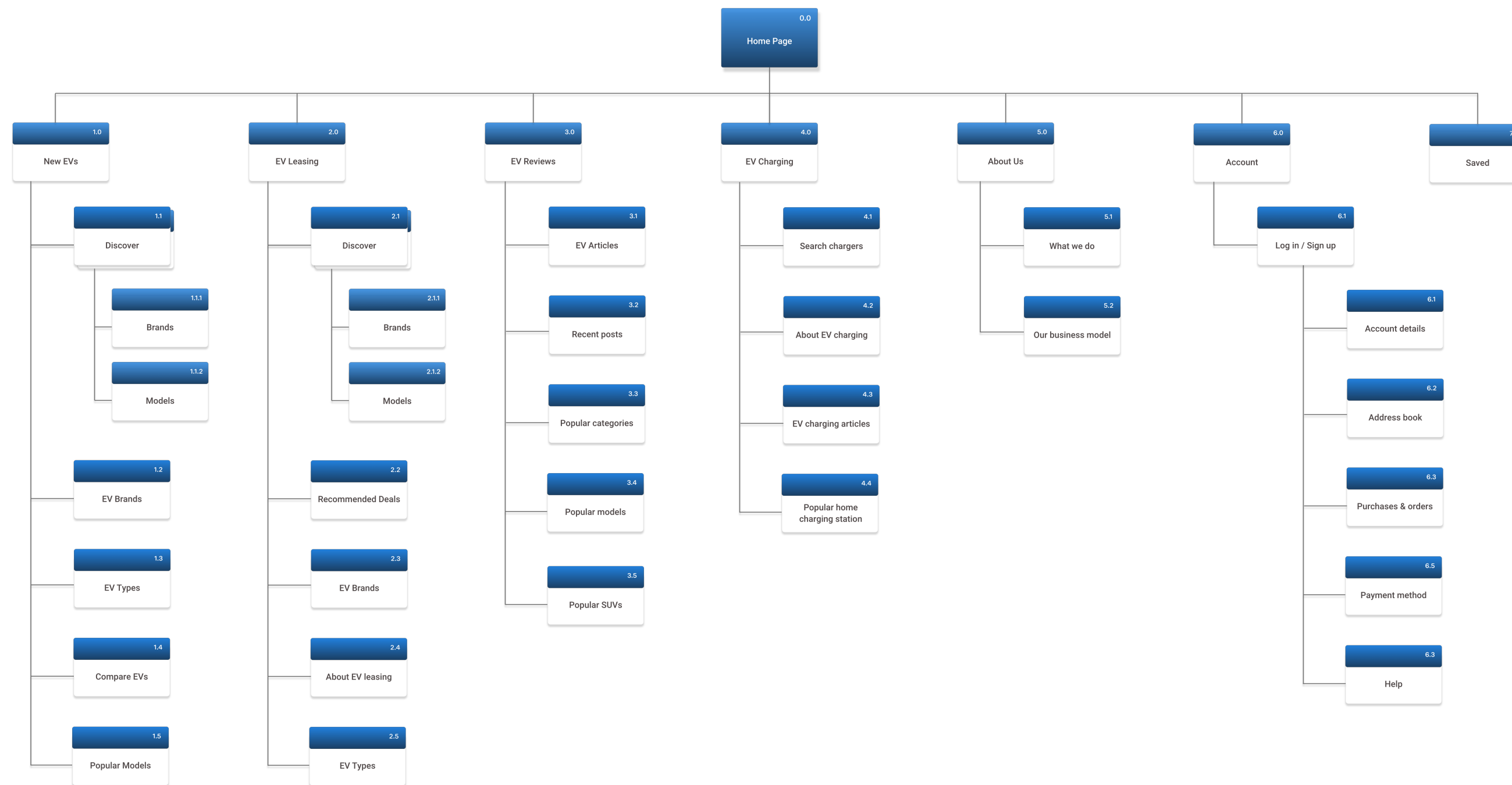
Figure 25. Information Architecture

4.2 Low-Fi & Wireframes

Wireframing is a useful approach for designing a website's structure. A wireframe is commonly used to arrange the information and functionality of a website while keeping user demands and user journeys in mind. Before visual design and content are added, wireframes are used to create the basic structure of a page early in the development process. The wireframes for three key EV Dealer web pages are shown below.
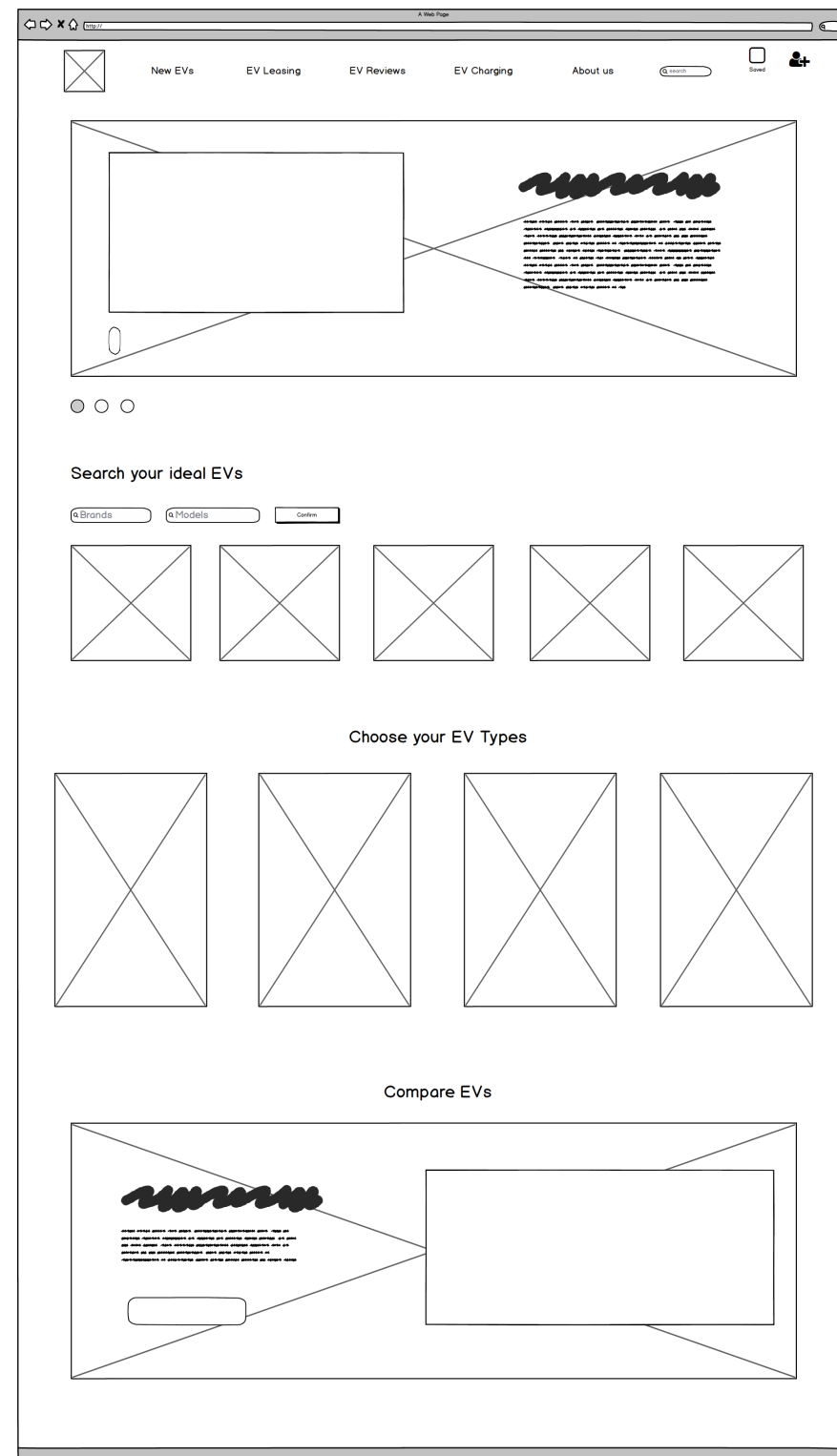
Figure 26. Home-Page wireframe
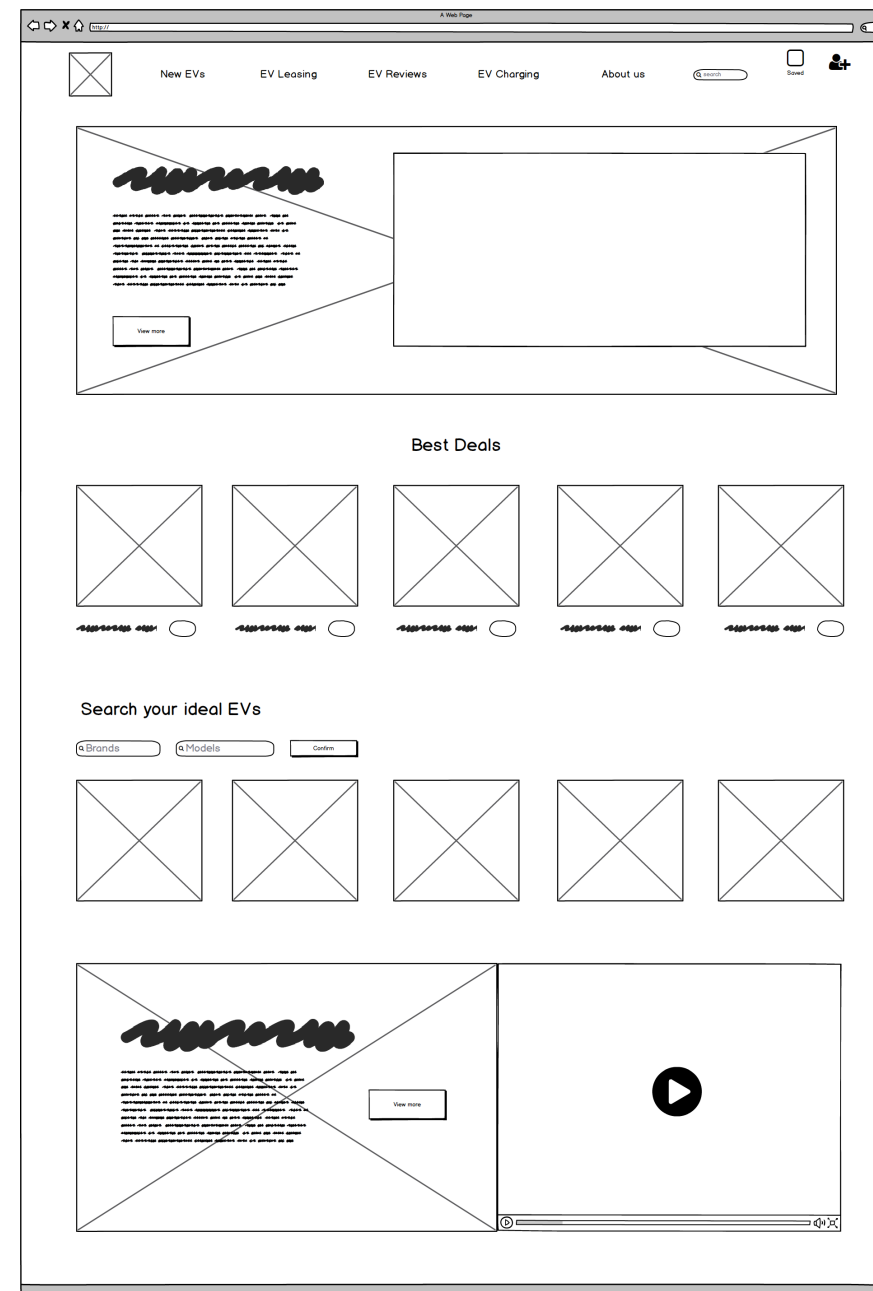
Figure 27. New EVs-Page wireframe
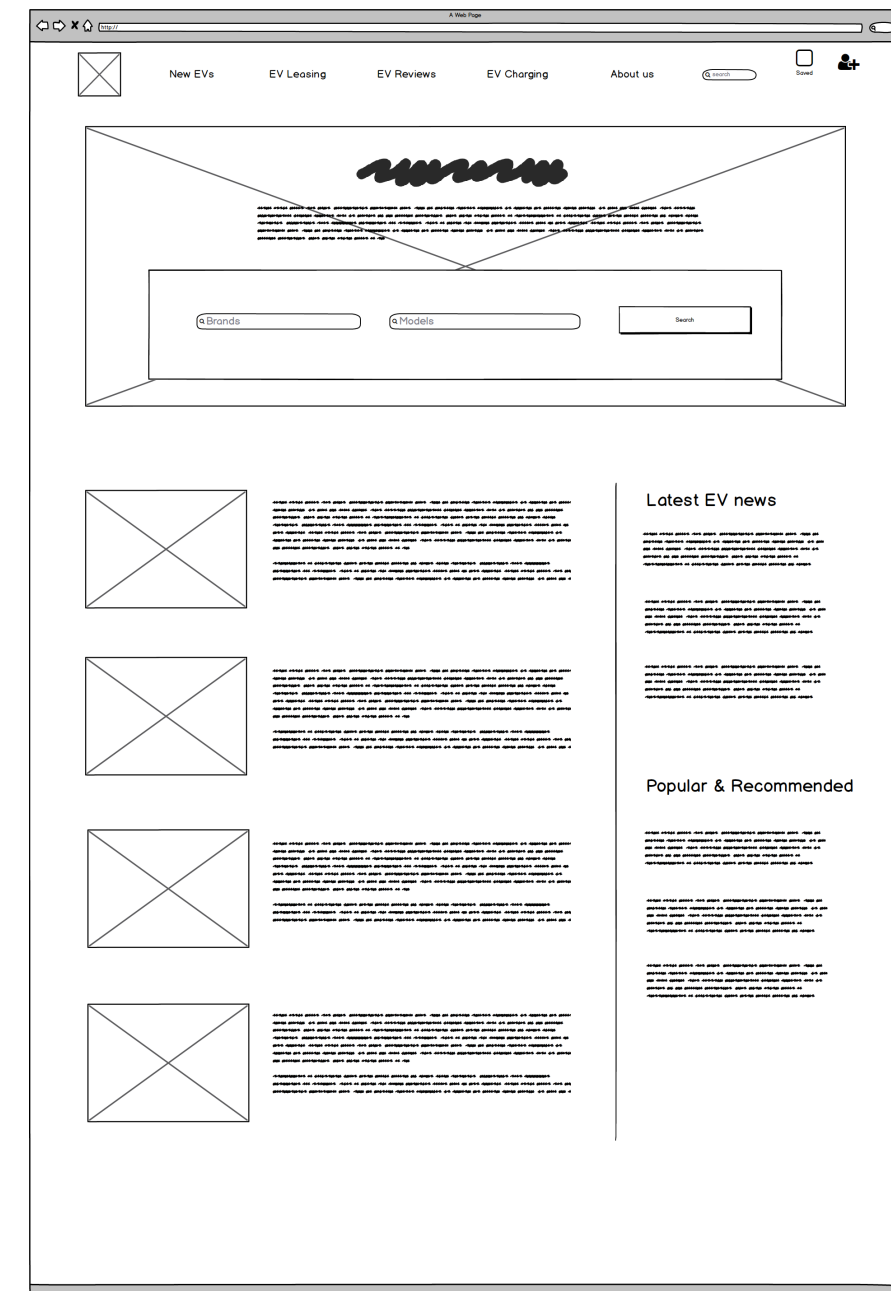
Figure 28. EV News-page wireframe

4.3 Mood Board
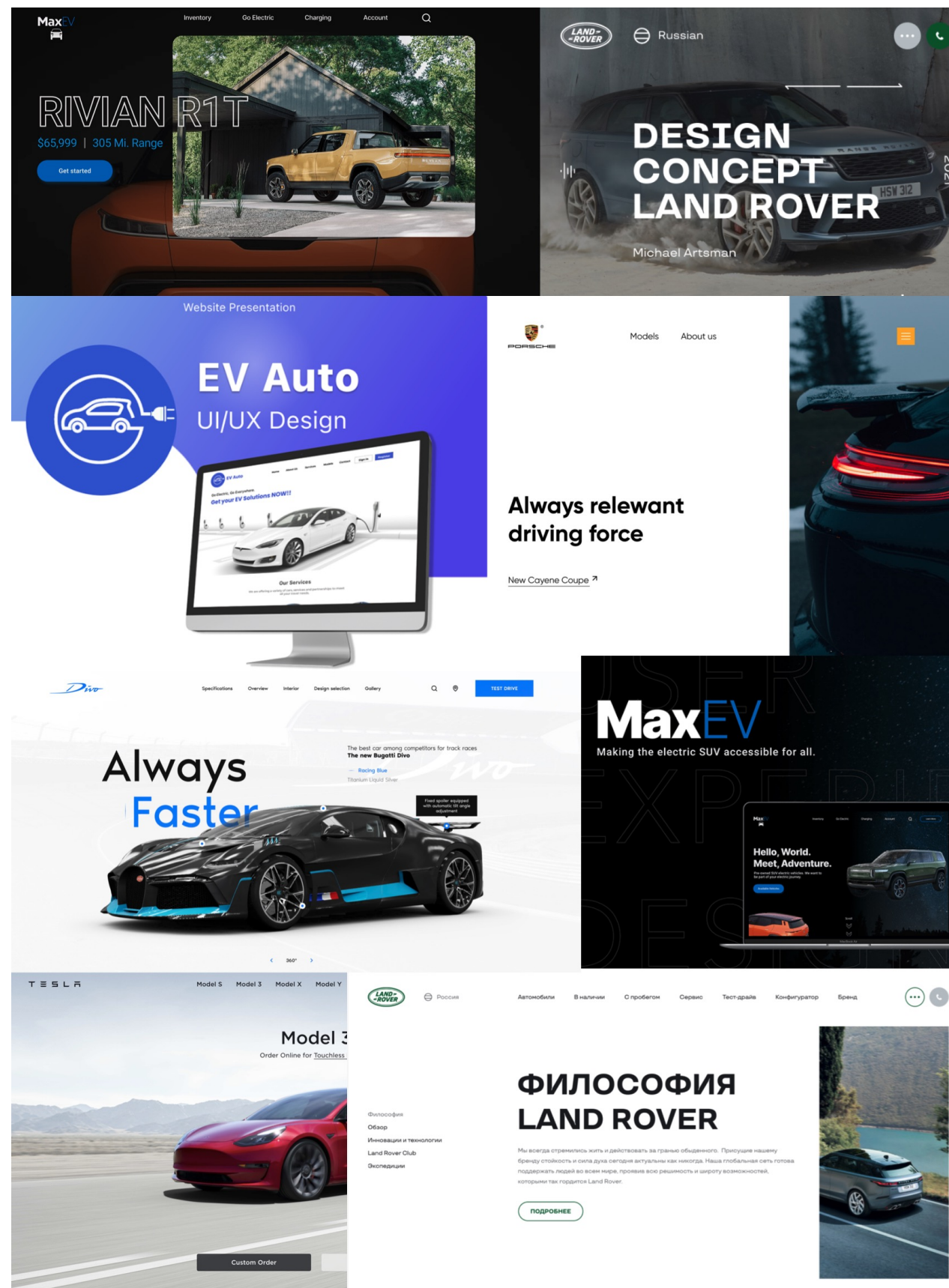
Figure 29. Mood Board

4.4 Style Guides

Typography

Character Styles

HEADLINE
Avenir / Medium / 95px

Title
Avenir / Black / 55px

Subtitle
Inter / Medium / 55px

Header
Avenir / Regular / 37px

Subheader
Inter / Regular / 25px

Navigation
Avenir / Roman / 20px

Heading 2
Avenir / Meiidum / 18px

BUTTON
Avenir / Book / 25px

Paragraph Styles

Larger Body
Avenir / Regular / 22px

"Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

Regual Body
Avenir / Book / 20px

"Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

Small Body
Inter / Regular / 18px

"Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

Color

Main Color
HEX #4B94BD

Secondary Color
HEX #464444

HEX #000000

HEX #FFFFFF

Text Color

HEX #000000   HEX #FFFFFF   HEX #2792BF   HEX #464444

Figure 30. Style Guide

4.5 Components Library

Icons

Features

Charging List
Select Line
Choose make
Select wheel
Select interiro
Select wheel

Mileage
Rating
Choose model

Filter
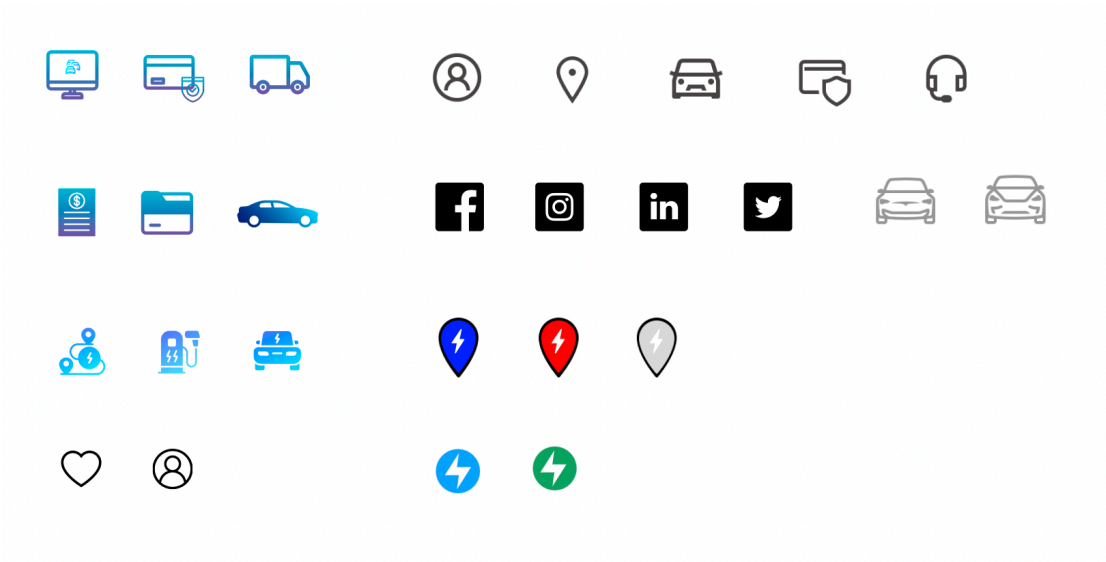
Buttons

Component 34/Search button
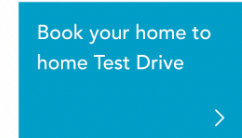
Search all 230 electric cars

Component 40

View more

Component 42

Continue to payment

Sign in button

Sign in

Component 41

BUY NOW

Component 43

Book your home to home Test Drive

Select make bu...

Select make

Price button

Min price

Select model

Select model

Max price

...

Add button

Add

Remove

Option Button

☐ Home charging station   £ 1,580

☑ Home charging station   £ 1,580
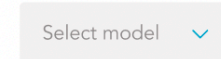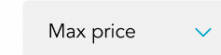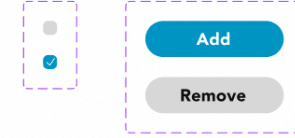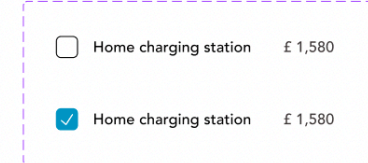
View Button

View all brands

Search bar button

Find brand

Interior Gallery 1
Interior Gallery 2
Gallery 1
Gallery 2
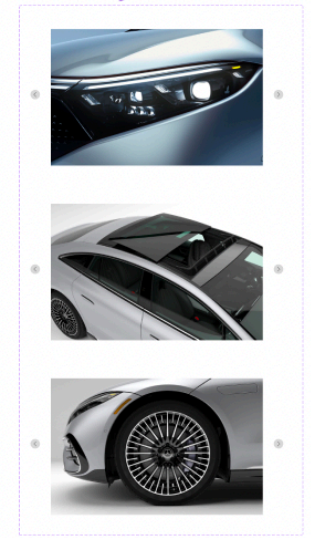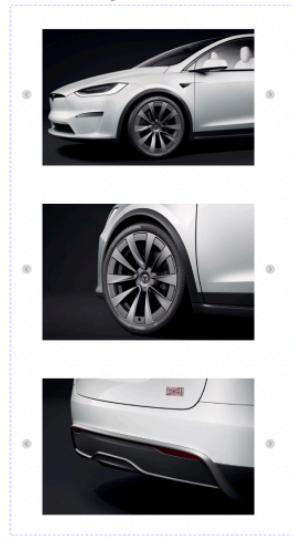
4.6 User Flow Map
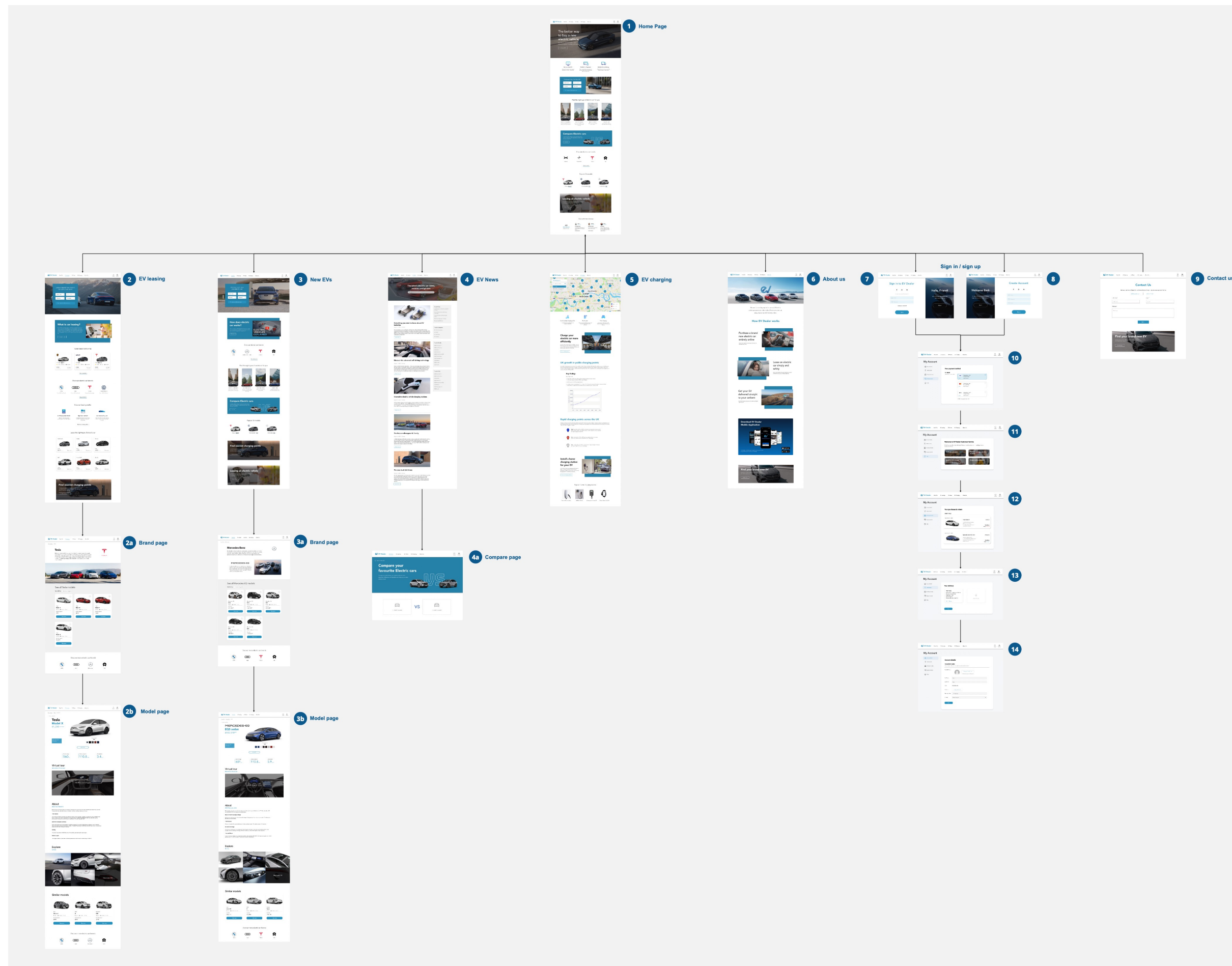
Figure 31. User flow

4.7 High-Fi Prototypes

The main deliverable in this project is the high-fidelity prototype created on **Figma platform**. It contains 150 static clickable mobile interfaces and supports the main website functions.

1. **Home page:** The first image shown below is the home page of the website. From the home page, users can access to various EV's information, including Popular EV brands, models, and recommend EV types.

2. **EV brands page:** Users from this page, can browser all available EV brands.

3. **Comparison page (3-7):** Comparison page was provided to assist users in comparing different EV models and understand the differences. Users can choose up to three models at the same time.
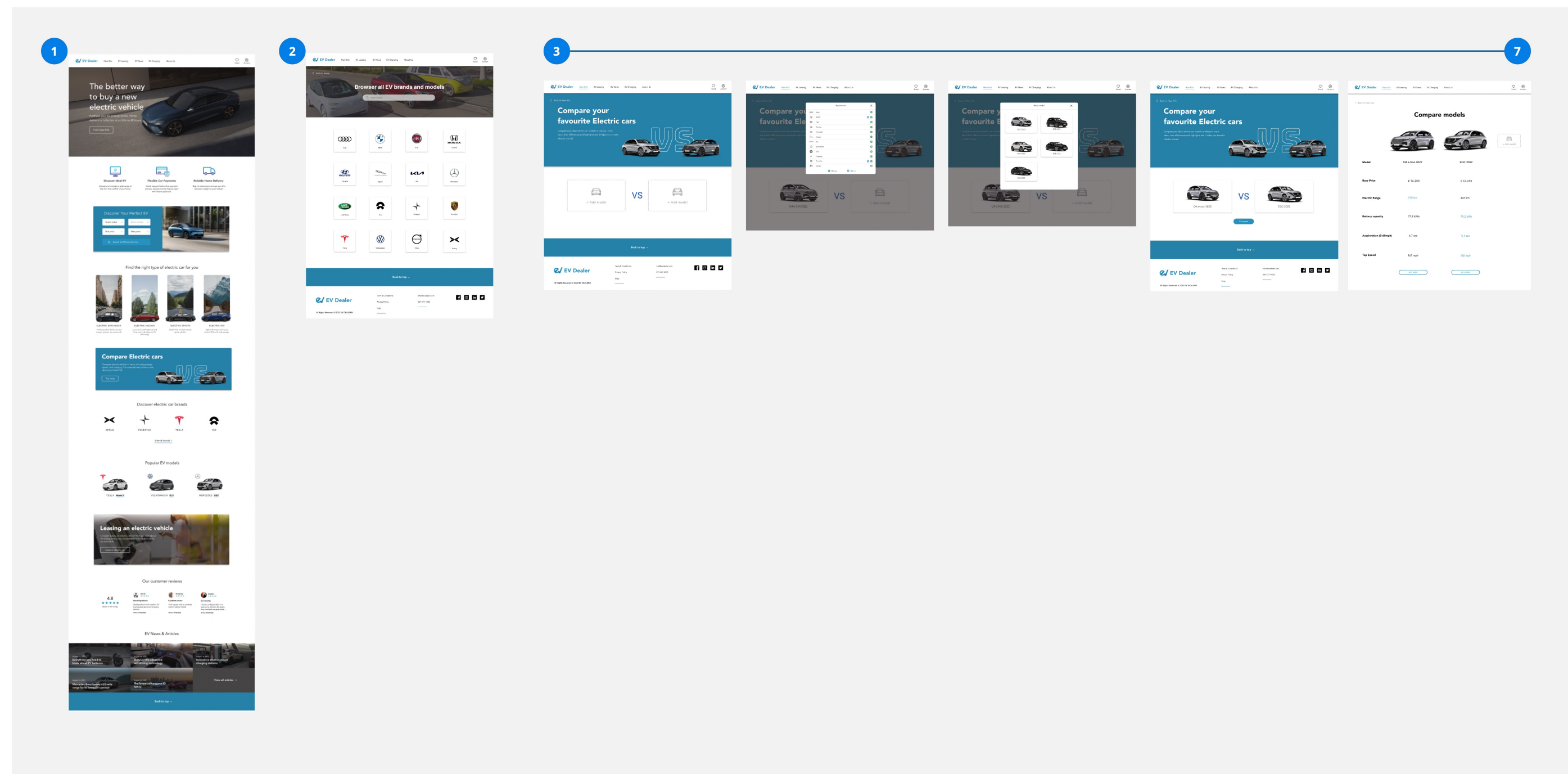
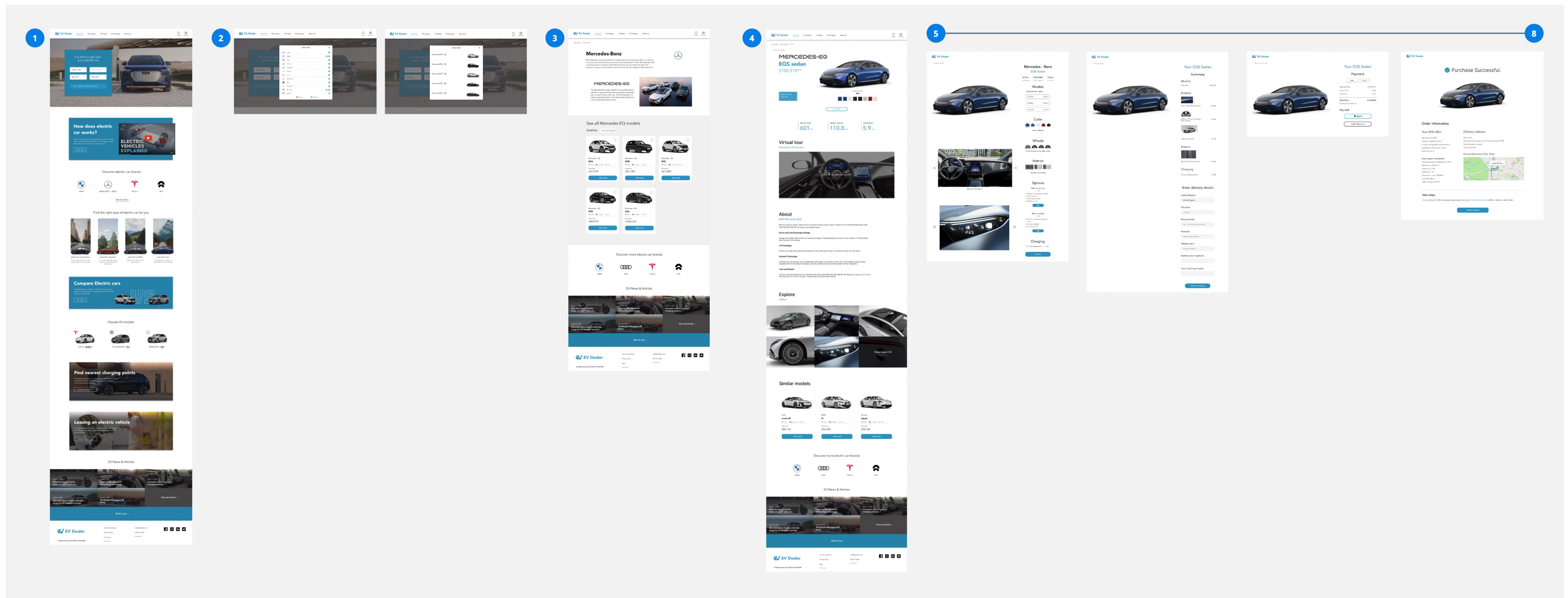*Figure 32. EV Dealer Website - Home page*

1. **New EVs page:** The New EVs is the primary page where users can access information about buying brand-new electric vehicles.

2. **Selection pages:** Users are able to select their interested EV brands and models.

3. **EV brand introduction page:** Brand's introduction, background, and all EV models will be demonstrated in this page.

4. **EV Model page:** Providing the most comprehensive information toward one specific model. Users from this page can view both the interior and exterior of the selected model. "About" and "Image gallery" were also provided to help users gain a deeper understanding of the vehicle. Users can book drive and make a purchase directly from this page.

5. **Model customization and payment process(5-8):** Easy and convenient purchase process. EV buyers can customize their model by selecting models, color, wheel, interior, and optional packages. Once customization was completed, they are required to provide both the account and bank details. A purchase confirmation page will be presented at the end to illustrate the overall details of the order.
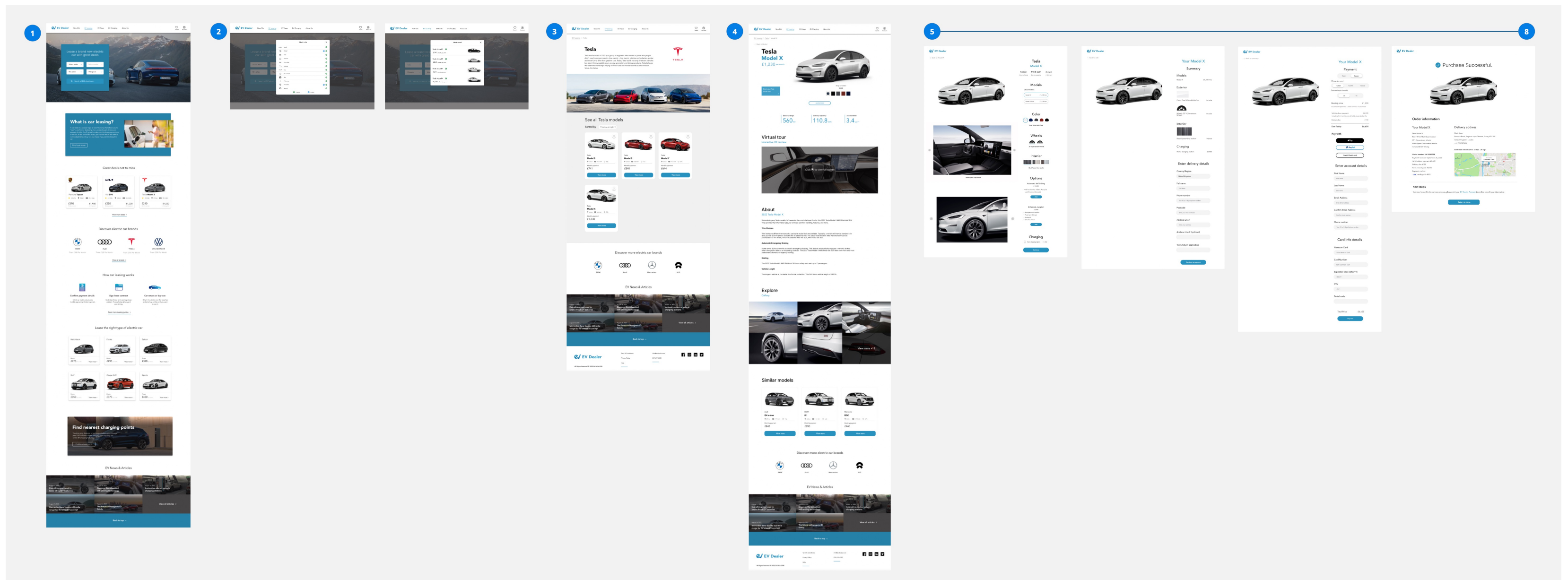

Figure 33. EV Dealer Website - New EVs page

1. **New EVs page:** The EV Leasing is the primary page where users can access information about leasing brand-new electric vehicles.

2. **Selection pages**

3. **EV brand introduction page:** Brand's introduction, background, and all leasing options will be demonstrated in this page.

4. **EV Model page**

5. **Model customization and payment process(5-8):** Easy and convenient leasing process. EV buyers can customize their model by selecting models, color, wheel, interior, and optional packages. Once customization was completed, they are able to modify their leasing option and pay their initial down payment. A purchase confirmation page will be presented at the end to illustrate the overall details of the order.

Figure 34. EV Dealer Website - EV Lesing

1. **EV News page:** Users from this web page can access to the latest EV news, reviews, and guides. Popular and recommended EV articles were provided to help consumers understand EV more easily and efficiently.

2. **EV charging page:** EV charging page was created to assist EV buyers in finding and booking near-by charging stations. Home charging station installation service was provided to help consumers to install their home charging in a more effective way.

3. **About us page:** Providing detailed information about how EV Dealer works and what customer services we are offering to the customers.

4. **EV Model page**

5. **Saved page:** Users are able to view all the saved models from this page.
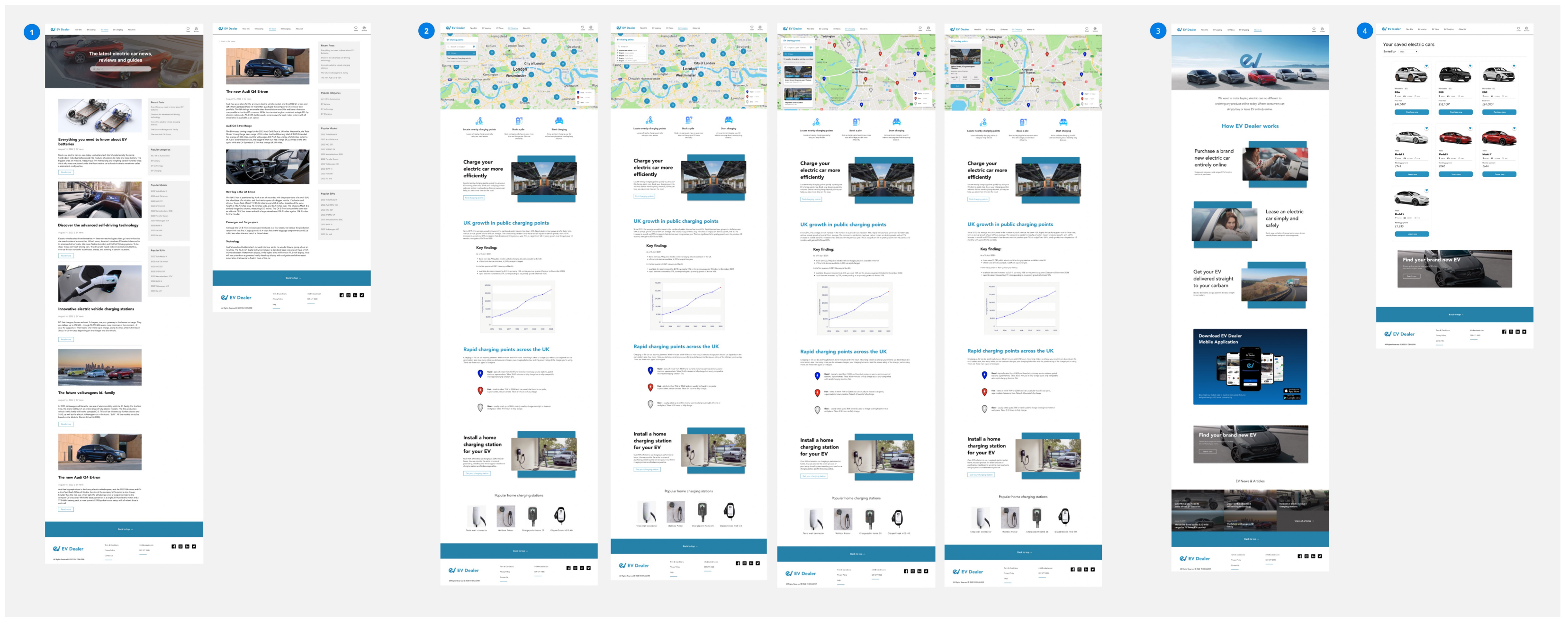
1. **Login/sign up page:** Users can choose to login or sign up their accounts.

2. **Account details page:** Users can modify their personal information directly on this page.

3. **Address book:** Modifying address details.

4. **Purchases & orders page:** Users are able to view their on-going and past orders. By clicking the view details button, users can more details about their orders.

5. **Help page:** Customer service page was provided to help consumers to solve different problems
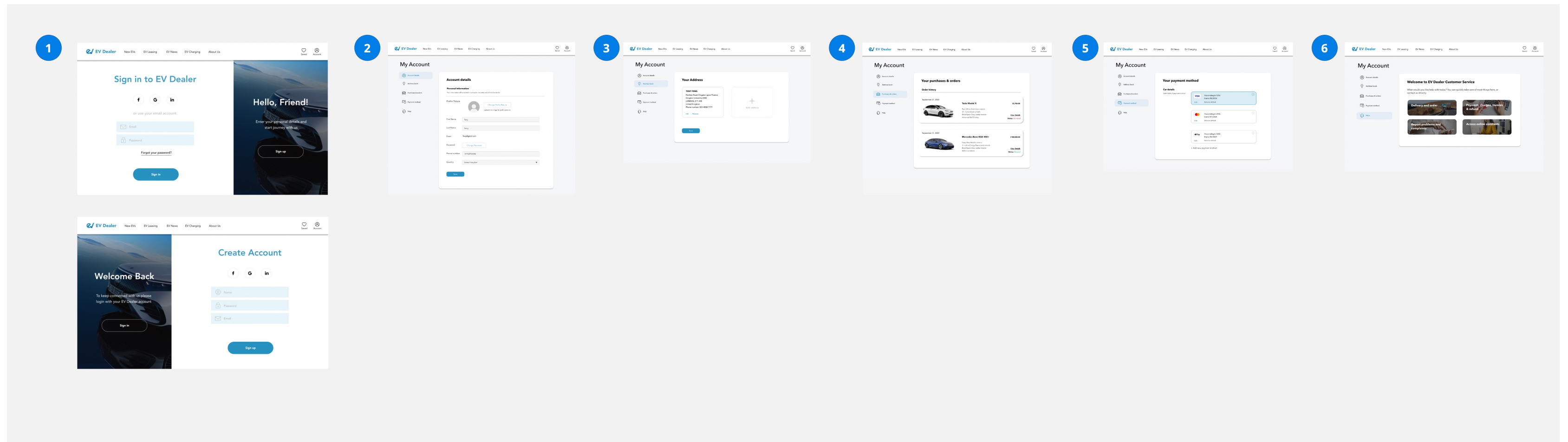
5. Test Phase

5.1 Usability Testing

"Usability testing is an essential method used to evaluate how easy a website is to use" (Emma, 2015). Usability testing was implemented in this project to evaluate the final deliverable - EV Dealer Website and identify usability problems through specific user interactions and testings.

1. The objectives of conducting usability testing:

- Enhance the user experience of the EV Dealer website.
- Discover and identify potential usability issues and interaction errors.
- Gain design recommendation and suggestion by analyzing users' feedback and performance data.

2. Participants:

According to Jakob Nielsen, he stated that "**testing with five participants is enough to get an ideal number of usability problems, and reliable feedback from a usability study**" (2012).

The usability test session included five participants, all of whom were recruited by online invitation and in-person conversation. All participants agreed to take part in an online usability testing session and were advised that their personal information would be kept confidential and not shared with anyone else.

Participant	Gender	Age	Occupation	Vehicle purchase experience	Owned a car
1	Male	23	Programmer	Yes	1
2	Female	23	Ux designer	Yes	1
3	Male	24	Accountant	Yes	0
4	Male	24	Data Analyst	Yes	1
5	Female	27	Product manager	Yes	1

Table 2 - Usability testing Participant's table

3. Tasks:

Participants were expected to perform 7 activities with distinct settings and instructions during the testing session. While using the prototypes, we urged participants to think aloud and offer regular feedback.

The following are the task instructions:

1. Access both the exterior and interior of the Mercedes EQS model.
2. Purchase a Mercedes-Benz EQS model
3. Compare two Electric SUV models
4. Lease a Tesla Model X model
5. Find a news that introduces the new Audi Q4 E-tron
6. Find an EV charging station near Kingston Upon Thames, London
7. Login your account to view the order status of your Mercedes EQS

4. Metrics:

There are three primary metrics that used to evaluate the usability:

- Effectiveness: task success rate – the completeness and correctness of performing a single task.
- Efficiency: measured by the number of mistakes, the number of assists, and the overall completion time.
- Satisfaction: the SUS questionnaire acceptance result.

5. Evaluation Results:

By analyzing the result of the usability testing session, 80% (4 out of 5) of the participants have completed all required tasks without causing major errors. However, 3 out of 5 of the participant were not able to complete the Task 3 (compare two Electric SUV models) independently, since they cannot directly find the compare feature in the New EVs page. Overall, all participants have obtained a great experience from using the EV Dealer Website. 80% of the participants mentioned that they would recommend the website to their friends and would definitely make a purchase from the website.

Task #	Task Success rate (%)	Number of assists	Number of errors	Assisted task completion rate(%)	Average completion time (mm:ss)
1	100	0	0	0	01:13
2	100	0	0	0	02:19
3	100	4	0	100	03:43
4	100	0	0	0	02:30
5	100	2	0	100	01:23
6	100	0	0	0	01:16
7	100	0	0	0	00:57

Table 3 - Usability testing task performance data

SUS:

The System Usability Scale (SUS) was applied to measure the usability of the website. The average SUS score of the usability test session is 88.5 (Grade A), which identifies as "Excellent" and "Acceptable" scores. The highest score is 95, and the lowest is 85.

User#	SUS Score
1	90
2	85
3	85
4	87.5
5	95
Mean	**88.5**
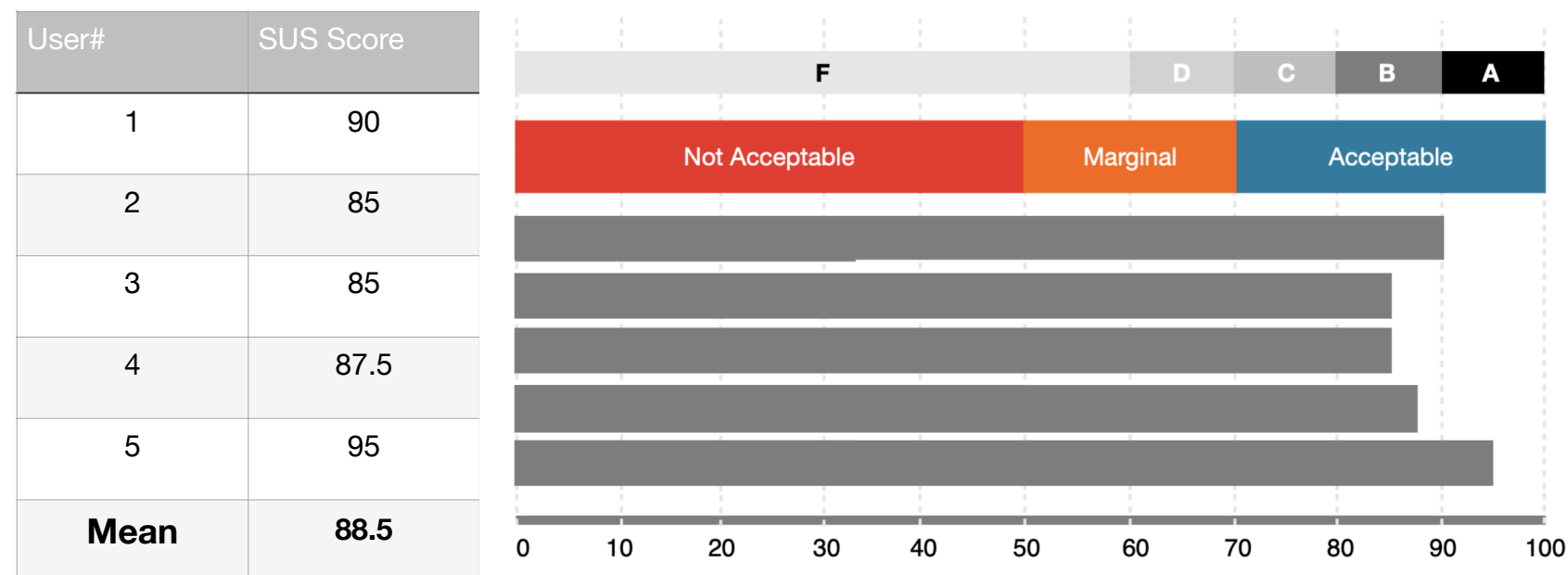
Table 4 - Usability testing SUS table

6. Usability issues:

Issue#	Participant's description of issue	Observation
1	"When I am comparing two models, I need to go back to the previous page to change the models I selected if I selected the wrong one."	Participant was not able to change the selected compare models directly.
2	"Comparison feature was hard to find for me."	Participant cannot find the comparison feature from the New EVs page.
3	"The process of reserving a charging station confuses me because I need to click the "Book" button twice. And I also have a hard time distinguishing when the booking time can be changed."	Participant hesitated to click the book button for charging station.
4	"Buy Now" button was not obvious to me.	The "Buy now" button was a bit hard to find.
5	"The 360 degree interior feature is hard to notice."	Participants did not notice the 360 degree feature.

Table 5 - Usability issues table

7. Redesign suggestions & recommendations:

| Issue#	Issue description	Redesign recommendations	Priority
1	Comparison feature was difficult to find.	Present comparison feature at a more conspicuous place.	High
2	The process booking a charging station was confused and unclear.	Simplify the process of booking a charging station.	High
3	"Buy now" button in the product page was not obvious.	Reorganize the content of the product page, in order to empathize the "Buy now" option.	High
4	Compared models cannot be modified.	Add feature to enable users can modify their selected models.	Medium

Table 6 - Redesign recommendations table

5.2 Prototype Iteration

Iteration 1: According to the result of the usability testing, 60% of the participants mentioned that "the comparison feature is hard to find." The comparison feature has now been added to the home page, where users can find it more easily.

Iteration 2: The model page is such important content that provides comprehensive information about the vehicle. During the usability testing session, one of the participants stated that the "BUY NOW" button on the model page was not obvious and not eye-catching. From the updated model page, the "BUY NOW" button was placed below the color selection, where it can grab the user's attention the first time.

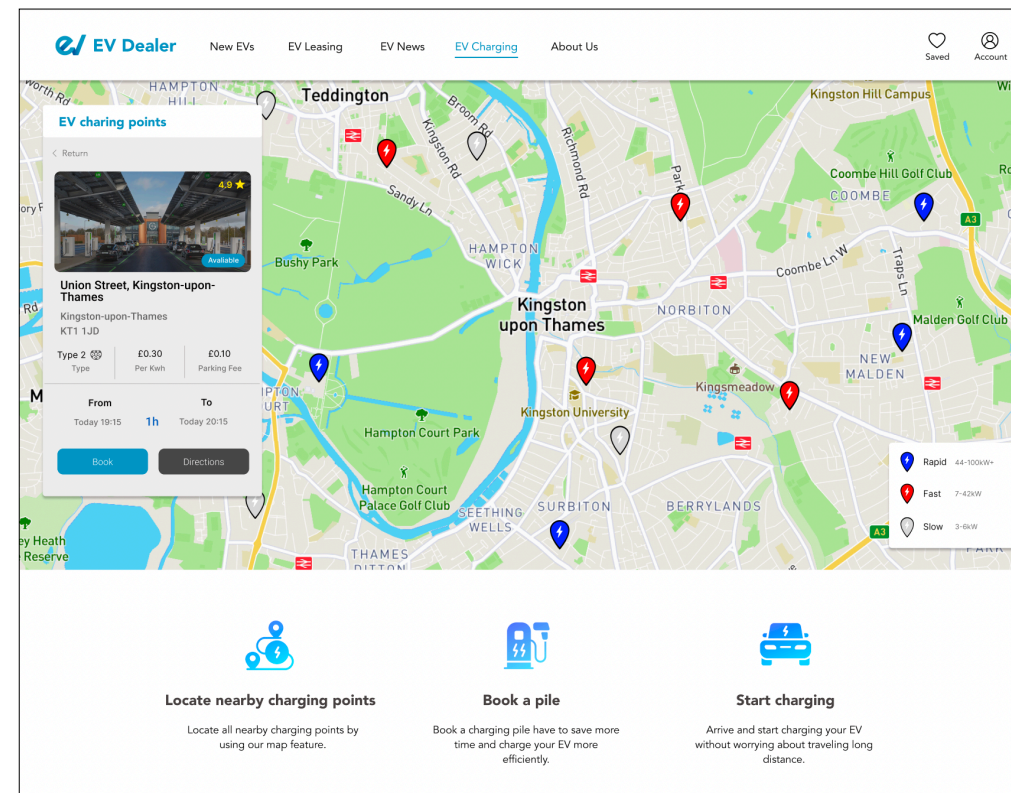**Updated Home page**
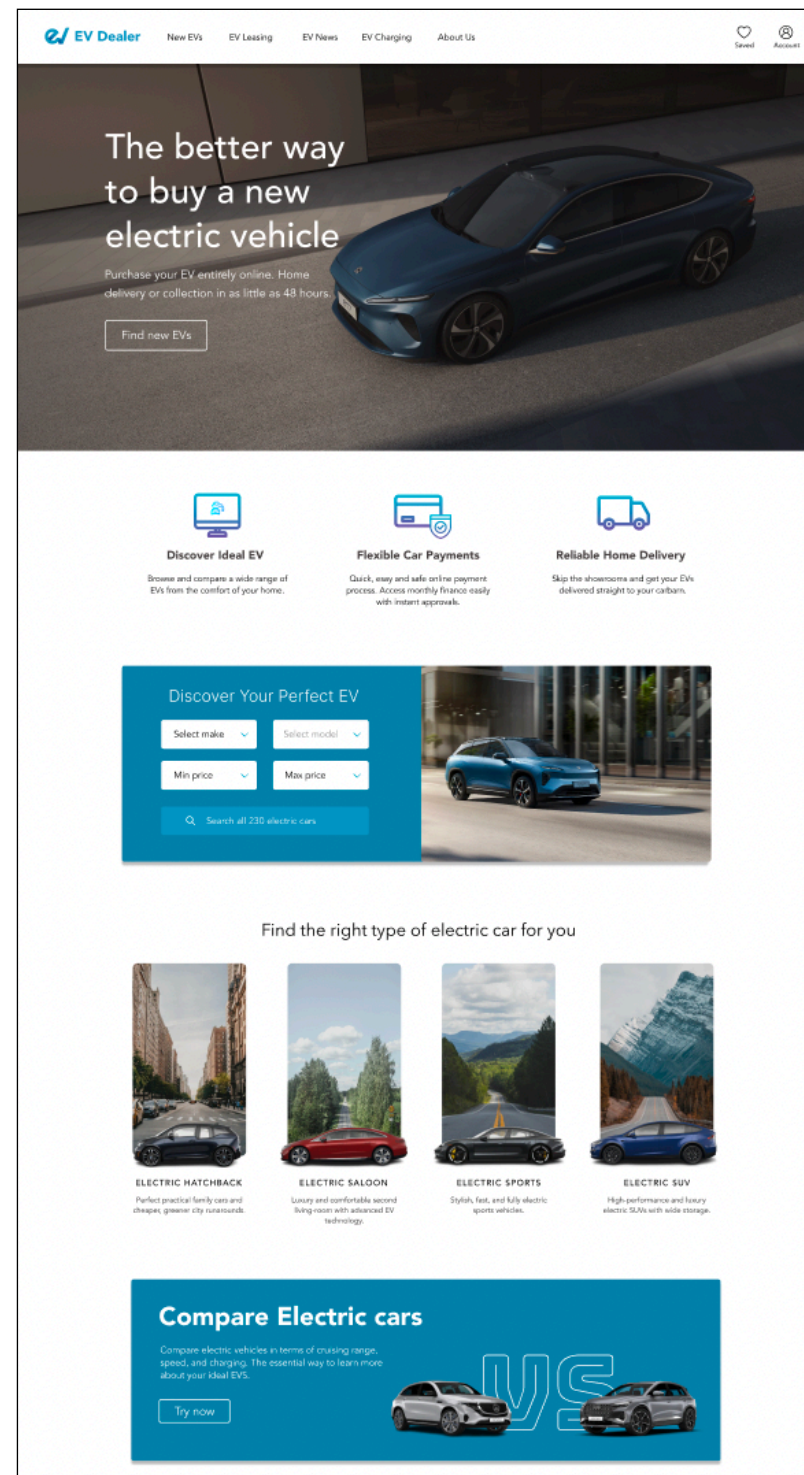
Previous EQS model page
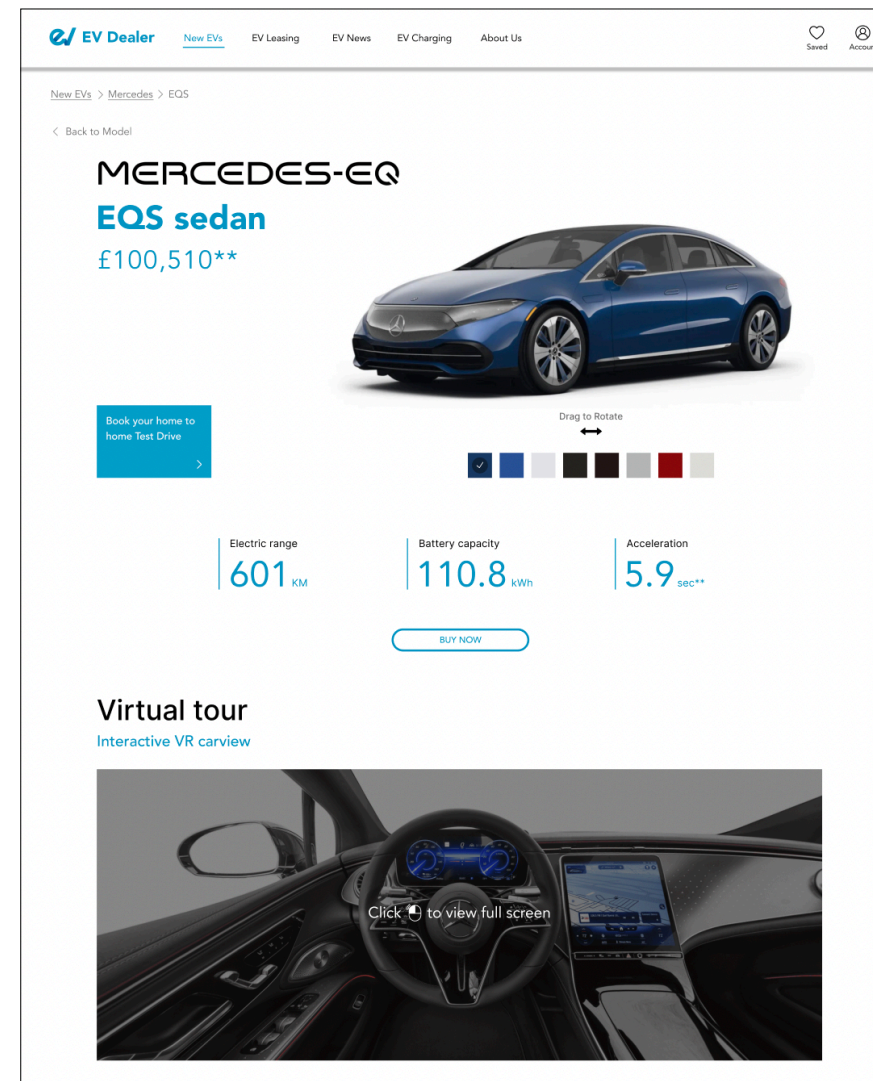
Updated EQS model page

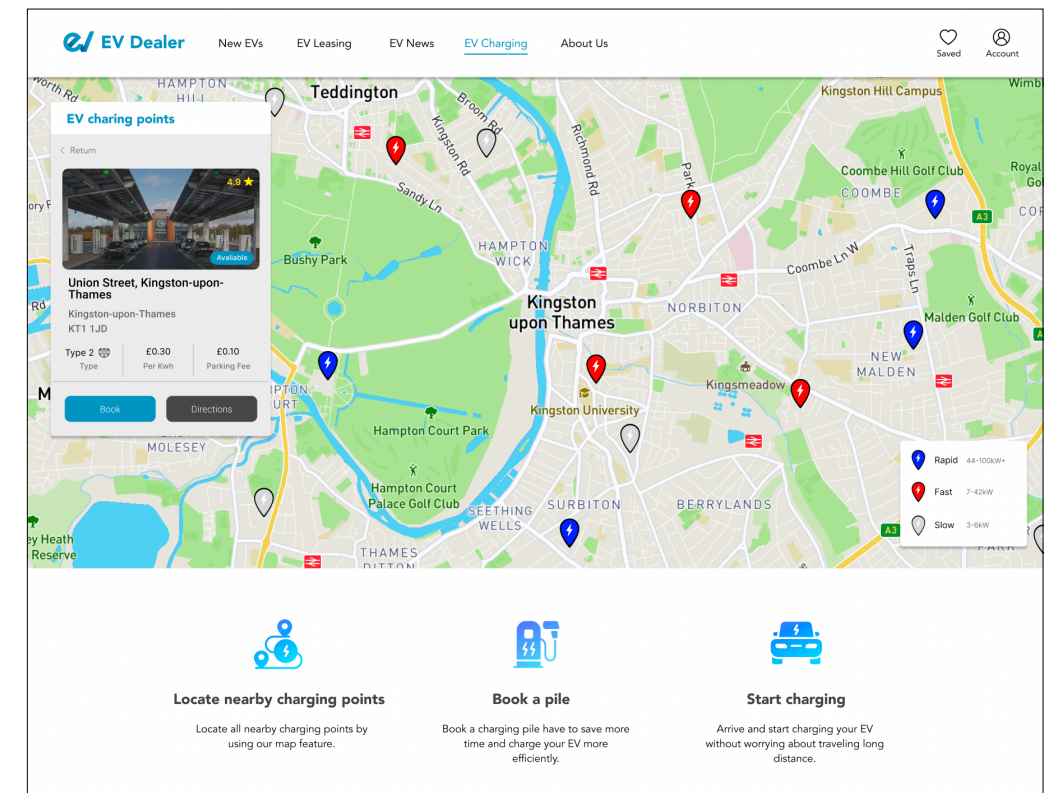**Previous EV charging page**

Updated EV charging page

Iteration 3: The time selection feature was removed from the EV charging points page since users may get confused when selecting the booking time on the first page. The time selection feature will be presented right after the users click the "Book" button.
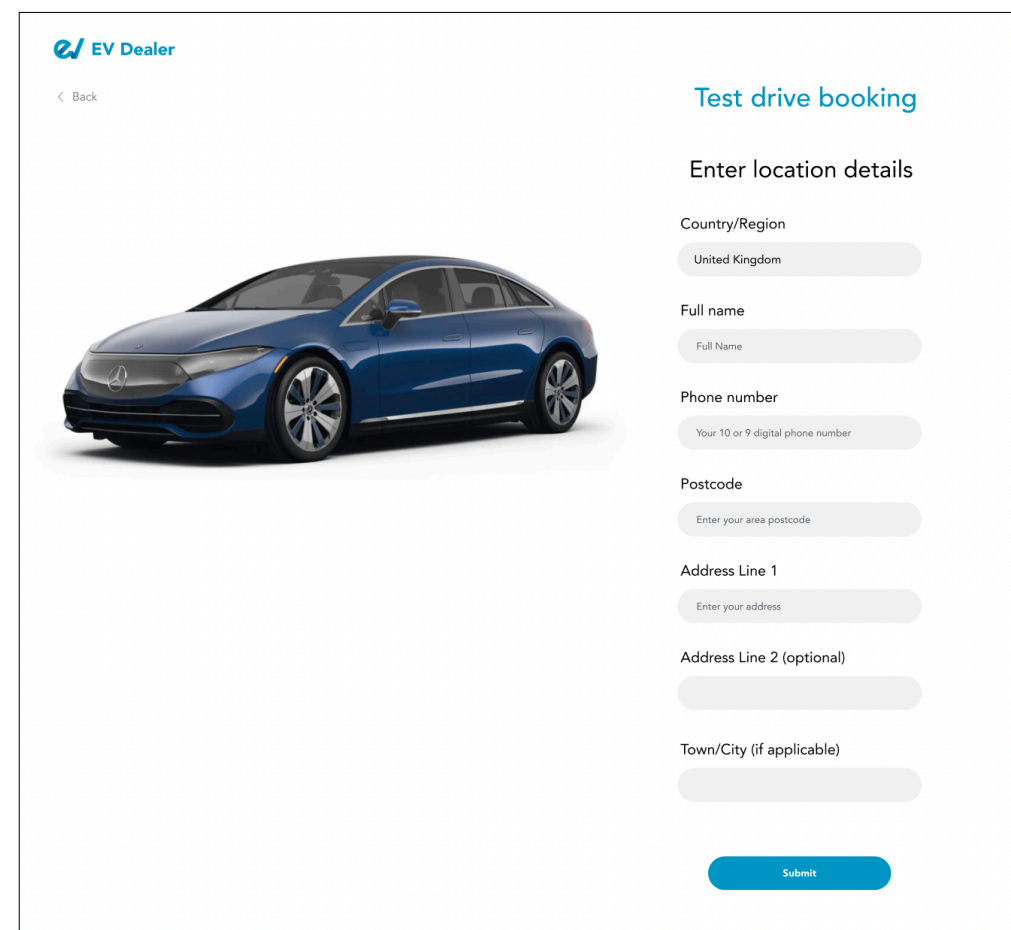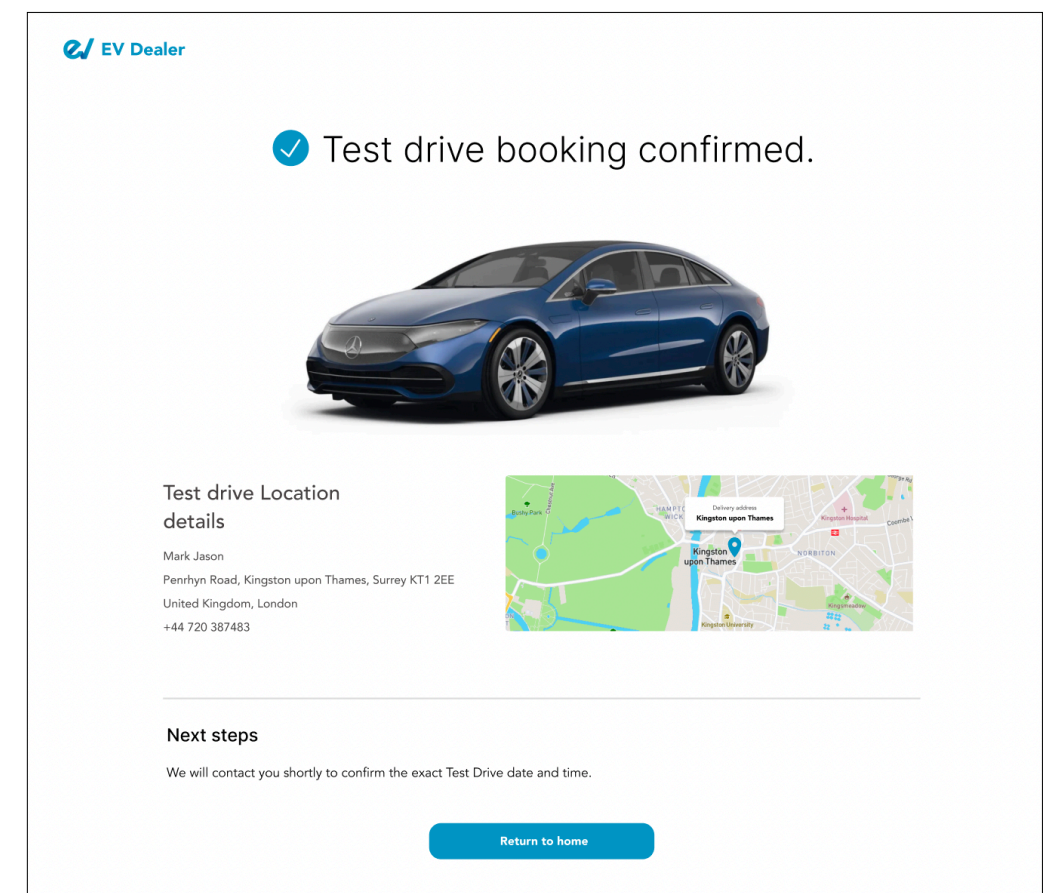
Test Drive page one

Test Drive page two

New pages: Two Test Drive booking pages were added to the final prototype in order to help users book their test drive more conveniently. The first test drive page requires users to provide their preferred test drive location. The second page is a booking confirmation page where users can view all the booking details.

Discussion

Strengths and Weaknesses

Strengths

The EV Dealer website was mainly created to facilitate users to purchase or lease electric vehicles entirely online without visiting any dealerships and offline showrooms.

The below are the strengths that have been highlighted for the website:

- The main strength of the EV Dealer website is the website only provides electric vehicle buying options. It is a "pure EV website" that only targets consumers who are interested in Electric vehicles and have high EV purchase intention.

- The EV Dealer website provides users with clear and useful navigation, which assists them in locating information more conveniently. Constant feedback was also provided when users were navigating between different inner pages and completing essential actions.

- The overall layout of the website is well-organized and concise. It makes users feel comfortable while they are browsing the web page.

- The website provides comprehensive features and functions to help consumers to purchase or lease EVs more conveniently and safely without contacting unknown dealerships.

- VR and 360 degree interior features were offered to help users to understand EV models in a more efficient way.

- EV charging services were provided to help users access EV facilities more conveniently. Users from the website can search and book nearby charging stations whenever they needed.

Weaknesses

Due to various limitations, there are a lot of features and ideations were not able to present and achieved in this project.

And there are weaknesses and limitations:

- The EV Dealer website was not able to provide all customer services, such as online EV renting, selling, and other financial-related options.

- The website does not offer after-sale services, which is very risky since the majority of today's electric vehicles are very expensive. Purchasing such an expensive vehicle entirely online needs strong and comprehensive after-sale service in order to ensure consumers' interests.

- The filter feature of the website was quite limited that users were only able to select specific makes and models.

Future work

For future work, conducting usability testing on a large sample of users would be the first essential step in order to identify potential usability issues and optimize them to provide a better user experience.

The following actions will be implemented in the later work:
- Optimizing current web features and interfaces.
- Provide EV renting and selling services.
- Offer reliable and useful after-sale customer services.
- Cooperate with professional web designers and programmers to publish the website online.

Finally, launch the official EV Dealer website to the public.

Design Rationale

Issue A: Limited online electric vehicle purchase opportunities

- Research: the majority of online vehicle selling platforms provides limited opportunities for consumers purchase electric vehicles.

- Solution: Provide more online EV purchase opportunities and enable customers to purchase or lease EVs entirely online.

- Provide features: EVs online purchase and leasing features. News EV and EV leasing pages.

- User experience: Users can easily purchase or lease electric vehicles online.

Issue B: Inadequate electric vehicle information and demonstrations

- Research: Many existing online vehicle selling platforms are primarily focusing on the sales of petrol cars. Also, due to the widespread of COVID-19, offline showrooms were temporarily closed.

- Solution: Provide comprehensive information about EV brands and models. Implement VR technology to allow users to experience an online vehicle showroom.

- Provide features: 360 Degree interior and Virtual tour features.

- User experience: Users can understand different EV brands and models via detailed descriptions and advanced VR functions.

Issue C: Complicated and insecure online payment process

- Research: The online payment process of most existing automotive websites is very complicated and not user-friendly.

- Solution: Provide easy and secure online payment process.

- User experience: Buying an EV online is as easy as buying a normal product from Amazon.

Issue D: Current offline test drive is not available

- Research: Many automotive companies are temporarily closing their Test Drive service due to social-distancing policy and major lockdowns.

- Solution: Provide door-to-door Test Drive service which customers can test drive their selected models from their home.

- Provide features: Online Test Drive booking feature.

- User experience: Users can book their test drive easily online.

Issue E: Lack of EV knowledge and awareness

- Solution: The EV News page were created to provide comprehensive and latest EV articles to help customers to learn more about a variety of EV information.

- Provide features: EV News page

- User experience: Users can browser different EV related articles.

Issue F: Difficult to access EV charging facilities

- Research: EV charging facilities is one of the most important factors that influences customer's EV purchase intention. Many customers are afraid of purchasing EVs because they did not where to charge their cars.

- Solution: EV charging page was created to help users search or book near-by charging points.

- Provide features: EV charging points booking and home charging station installation service.

Reference

Anon, Global EV sales for 2021. EV. Available at: https://www.ev-volumes.com/ [Accessed May 12, 2022].

Anon, What is design thinking? The Interaction Design Foundation. Available at: https://www.interaction-design.org/literature/topics/design-thinking?page=2 [Accessed May 12, 2022].

Chris Bibey·eCommerce·July 20, 2021·5 min read, 12 min read, 17 min read, 5 min read, and 10 min read. "Ecommerce Automotive Trends: Where Things Are Headed in 2021 and Beyond." The Ecomm Manager, July 20, 2021. https://theecommmanager.com/ecommerce-automotive-trends/.

"Customer Experience in a New Dimension: 3D Augmented Reality App Mercedes Car and Virtual Reality Goggles: Mercedes-Benz Is Accelerating Digitalisation in Sales." marsMediaSite. Accessed September 11, 2022. https://group-media.mercedes-benz.com/marsMediaSite/en/instance/ko/Customer-experience-in-a-new-dimension-3D-Augmented-Reality-App-Mercedes-cAR-and-Virtual-Reality-goggles-Mercedes-Benz-is-accelerating-digitalisation-in-Sales.xhtml?oid=40291230#prevId=40291586.

Energy, G.D. et al., 2020. Covid-19 outbreak to Impact Electric Vehicle production. Power Technology. Available at: https://www.power-technology.com/comment/covid-19-electric-vehicle-production/ [Accessed May 12, 2022].

"Global EV Sales for 2021." EV. Accessed September 11, 2022. https://www.ev-volumes.com/.

Hailes, Dara. "Transformation toward Ecommerce in Automotive Retailing." Cox Automotive Inc., December 1, 2021. https://www.coxautoinc.com/market-insights/transformation-toward-ecommerce-in-automotive-retailing/.

Hausman, Angela. "Automotive Ecommerce: The Current State and Trends for 2022." MKT Maven, December 1, 2021. https://www.hausmanmarketingletter.com/automotive-ecommerce-the-current-state-and-trends-for-2022/.

Liikennevirta Oy (Ltd.), 2022. The Global Electric Vehicle Market in 2022 – virta. Virta Global. Available at: https://www.virta.global/global-electric-vehicle-market [Accessed May 12, 2022].

Murallie, T., 2021. The Beginners' Guide to design thinking. Medium. Available at: https://bootcamp.uxdesign.cc/beginners-guide-to-design-thinking-afcf18dce039 [Accessed May 12, 2022].

Prabhu, Tanu N. "9 General Principles for Good Website Design!" Medium. UX Planet, January 13, 2020. https://uxplanet.org/9-general-principles-for-good-website-design-d9853548f454.

Revolutionparts. "6 Automotive Ecommerce Trends That We Can Expect in the Future." RevolutionParts, October 14, 2020. https://www.revolutionparts.com/blog/automotive-industry-trends/.

Sun, X. et al., 2022. Modeling potential impact of COVID-19 pandemic on Global Electric Vehicle Supply Chain. iScience, 25(3), p.103903.

Wen, W. et al., 2021. Impacts of covid-19 on the electric vehicle industry: Evidence from China. Renewable and Sustainable Energy Reviews, 144, p.111024.

Written by Jennifer Leigh Brown Columnist, Written by, Jennifer Leigh Brown, and Columnist. "Empathy Mapping: A Guide to Getting inside a User's Head: UX Booth." Empathy Mapping: A Guide to Getting Inside a User's Head | UX Booth. Accessed September 11, 2022. https://www.uxbooth.com/articles/empathy-mapping-a-guide-to-getting-inside-a-users-head/.

Appendices

Appendix A: Consent Form

Appendix B: Debrief Form

Appendix C: Participant information sheet

Appendix D: Participant screener

Appendix E: Survey report

Appendix F: User interview schedule

Appendix G: Observational study moderator script

Appendix H: Observational study task instruction sheet

Appendix I: Usability testing moderator script

Appendix J: Usability testing participant information sheet

Appendix K: Usability testing participant screener

Appendix L: Usability testing post-test questionnaire

Appendix M: Usability testing task instruction sheet

Appendix N: Usability testing observation sheet